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# RESEARCH MEMORANDUM

## THE HYDRODYNAMIC FORCE CHARACTERISTICS OF STREAMLINE BODIES OF REVOLUTION HAVING FINENESS RATIOS OF 6, 9, AND 12 WITH AND WITHOUT CHINE STRIPS

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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

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# THE HYDRODYNAMIC FORCE CHARACTERISTICS OF STREAMLINE BODIES OF REVOLUTION HAVING FINENESS RATIOS OF 6, 9, AND 12 WITH AND WITHOUT CHINE STRIPS

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## SUMMARY

Hydrodynamic force characteristics, as determined by general tank tests, are given for three streamline bodies of revolution equipped with chine strips and having fineness ratios of 6, 9, and 12, respectively. In addition, these force characteristics are given for the same bodies with the chine strips removed and, to a limited extent, for the same bodies with the tail cones removed.

Hydrodynamic resistance, pitching moment, wetted length, and height of the model above the water surface are tabulated for a range of trim, load, and speed. In order to facilitate analysis, the curves are plotted using hydrodynamic coefficients which generally group along single curves for all speed-load combinations.

## INTRODUCTION

The usefulness of hydro-skis as a means of obtaining high-speed, water-based airplanes with a minimum of compromise to their aerodynamic performance was presented in reference 1. In that investigation, the hydro-skis were incorporated in a streamline fuselage because such a fuselage offers aerodynamic and structural advantages. It was demonstrated in reference 2 that the hydrodynamic performance of this configuration was influenced to a large degree by the hydrodynamic characteristics of the fuselage. The hydrodynamic performance of this fuselage equipped with hydro-skis was greatly improved by the addition of narrow longitudinal strips on the lower rear portion of the fuselage. Other investigations (refs. 3 to 7) also indicate that simple modifications to streamline fuselages greatly improve their usefulness as fuselages of water-based airplanes. These investigations indicate that full-length, narrow strips located port and starboard of the lower profile line would be generally the most desirable configuration.

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The primary purpose of this paper is to provide general hydrodynamic force data on streamline bodies of revolution of fineness ratios 6, 9, and 12 with and without chine strips. Since the data obtained may prove useful in the design of hydrodynamic bodies other than fuselages for ski-equipped seaplanes, the scope of the investigation was extended to speeds beyond the current ski-emergence speeds of such aircraft. Tests were made on three models having the same nondimensional offsets and the same volume but differing in fineness ratio. Corresponding tests were also made on the models with the strips removed. In addition, limited tests were made on the models equipped with chine strips but with a small portion of the aft end removed to simulate a fuselage with jet exhaust. Values of resistance, trimming moment, wetted length, and height of the model above the water surface are presented for a wide range of trim, load, and speed.

## SYMBOLS

$C_{D_Q}$ drag coefficient based on volume of fuselage, $\dfrac{R}{\frac{1}{2}\rho Q^{2/3}V^2} = \dfrac{2C_{R_Q}}{\left(C_{V_Q}\right)^2}$

$C_{D_\Delta}$ drag coefficient based on load, $\dfrac{R}{\frac{1}{2}\rho\left(\Delta/w\right)^{2/3}V^2} = \dfrac{2C_{R_Q}}{\left(C_{\Delta_Q}\right)^{2/3}\left(C_{V_Q}\right)^2}$

$C_{L_Q}$ lift coefficient based on volume of fuselage, $\dfrac{\Delta}{\frac{1}{2}\rho Q^{2/3}V^2} = \dfrac{2C_{\Delta_Q}}{\left(C_{V_Q}\right)^2}$

$C_{M_Q}$ trimming-moment coefficient based on volume of fuselage, $\dfrac{M}{wQ^{4/3}}$

$C_{R_Q}$ resistance coefficient based on volume of fuselage $R/wQ = 0.0467R$

$C_{V_Q}$ speed coefficient based on volume of fuselage, $\dfrac{V}{\sqrt{gQ^{1/3}}} = 0.211V$

| | |
|---|---|
| $C_{V_\Delta}$ | speed coefficient based on load, $\dfrac{V}{\sqrt{g\left(\frac{\Delta}{w}\right)^{1/3}}} = \dfrac{C_{V_Q}}{\left(C_{\Delta_Q}\right)^{1/6}}$ |
| $C_{\Delta_Q}$ | load coefficient based on volume of fuselage, $\dfrac{\Delta}{wQ} = 0.0467\Delta$ |
| D | maximum diameter of fuselage, ft |
| g | acceleration of gravity, 32.15 ft/sec$^2$ |
| h | height of center-line midpoint (as located on model with tail cone) above free-water surface, ft |
| L | length of model, ft |
| $l$ | wetted length measured from aft end of the model to intersection of heavy-spray line with lower profile line, ft |
| M | trimming moment about center-line midpoint (as located on model with tail cone), lb-ft $\left(14.9\ C_{M_Q}\right)$ |
| n | fineness ratio of fuselage, L/D |
| Q | volume of basic models, 0.338 cu ft |
| R | resistance, lb |
| V | speed, ft/sec |
| w | density of water, 63.3 lb/cu ft |
| x | distance from center of pressure to aft end of fuselage, ft |
| $\Delta$ | load on water, lb |
| $\rho$ | mass density of water, 1.97 slugs/cu ft |
| $\tau$ | angle of trim of center line, deg |

## DESCRIPTION OF MODELS

The three models tested were streamline bodies of revolution of fineness ratios 6, 9, and 12. The nondimensional offsets presented in table I were identical for all models and are the same as those for the family of fuselages tested in reference 8. For all three models, the centroid of the volume was 0.46L from the nose, the volume Q was 0.338 cubic foot. For the offsets in table I the ratio of the volume of a model to the volume of the cylinder formed by its length and maximum diameter is 0.591 regardless of size or fineness ratio.

Pertinent dimensions and characteristics of the models are compared in figure 1. Narrow, full-length chine strips were located 45° from the lower profile line. In order to simulate a fuselage with jet exhaust, the aft ends were made removable aft of the station where the cross-sectional area of the fuselages were 0.073 square foot. The volume of these removable cones was 0.001, 0.002, and 0.003 cubic foot for fineness ratios 6, 9, and 12, respectively. Transverse lines, 1 inch apart, were painted on the underside of each model for measuring wetted length (fig. 2).

## APPARATUS AND PROCEDURE

Tests were conducted with the small model towing gear of Langley tank no. 2 (fig. 3). A V-shaped wind screen, 3 feet wide with an included angle of 90° and extending to within less than an inch from the water surface, was placed directly in front of the model. High-speed runs made with the models just above the water surface showed that the screen reduced aerodynamic forces to a negligible value.

The models with chine strips were tested at fixed trims of 0°, 4°, 8°, 12°, 16°, and 20° at constant speeds and loads. The load-speed range for these tests is shown in figure 4. Tests were also made on the models with the chine strips removed but were restricted to low speeds because of excessive forces and spray. Additional tests were made on the models with chine strips but with the tail cones removed. These tests were limited to a trim of 8° and load coefficients of 0.2 and 0.4.

Measurements were made of resistance, trimming moment, wetted length, and height of the center-line midpoint above the free-water surface. Resistance was measured by a strain-gage dynamometer, which indicated the horizontal force on the towing staff. Trimming moment was measured by a strain-gage dynamometer, which indicated the moment about the midpoint of the center line of the model. In the case of the model with the tail cone removed, the center-line midpoint was the same distance from the nose as that for the model of the same fineness ratio with the tail cone attached. Center of pressure, as calculated from the measured forces and moments, is the point where the resultant of the hydrodynamic forces intersected the center line.

Wetted length was determined from underwater photographs, as illustrated in figure 2. It was measured along the center line from the aft end of the model to the station at which the heavy-spray line intersected the lower profile line.

The measurements are believed to be accurate within the following limits:

| | |
|---|---|
| Load, lb . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.1 |
| Resistance, lb . . . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.1 |
| Trimming moment, lb-ft . . . . . . . . . . . . . . . . . . . . . . . | ±0.3 |
| Wetted length, ft . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.02 |
| Height, ft . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.01 |
| Trim, deg . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.1 |
| Speed, fps . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | ±0.2 |

## RESULTS AND DISCUSSION

The data for the models of fineness ratios 6, 9, and 12, with chine strips, are given in tables II, III, and IV and are plotted in figures 5 and 6, 7 and 8, and 9 and 10, respectively. Spray photographs are shown in figure 11. The data for the models of fineness ratios 6, 9, and 12, without chine strips, are given in tables V, VI, and VII, and are plotted in figures 12, 13, and 14, respectively. Spray photographs are shown in figure 15. The data for the models of fineness ratios 6, 9, and 12, with chine strips, but with the tail cones removed, are given in tables VIII, IX, and X, and are plotted in figures 16, 17, and 18. Spray photographs are shown in figure 19.

### Method of Data Presentation

The data in each table are presented in three groups. In the first four columns, the data are presented as hydrodynamic Froude scale coefficients. These coefficients are similar to conventional hydrodynamic Froude coefficients, except that the cube root of the total volume $Q^{1/3}$ is used as the characteristic linear dimension, rather than the beam. Since the volume is constant in this case, the use of $Q^{1/3}$ provides a direct comparison of the three fineness-ratio hulls.

In the next five columns the data are presented as hydrodynamic coefficients which, under low-speed displacement conditions, generally group along a single curve for all the speed-load combinations investigated. These coefficients and ratios are based on the cube root of the displaced volume $(\Delta/w)^{1/3}$ as the characteristic linear dimension because, under displacement conditions, buoyancy forces predominate.

In the last five columns the data are presented as hydrodynamic coefficients which, under high-speed planing conditions, generally group along a single curve for all the speed-load combinations investigated. These coefficients also are based on the characteristic linear dimension $Q^{1/3}$ and are analogous to fundamental aerodynamic coefficients because, under planing conditions, dynamic forces predominate. The lengths, $x$, $l$, and $h$, are expressed as ratios of overall length $L$ to facilitate comparisons. The value of $L$ for the models without tail cones is, of course, less than the value of $L$ for the corresponding models with tail cones.

These "collapsing" coefficients, which are generally independent of speed and load, were obtained by the methods of references 9, 10, and 11.

In order to facilitate analysis, the collapsing coefficients were used exclusively in plotting the data. The displacement coefficients were plotted against the Froude speed coefficient $C_{V_\Delta}$ and the planing coefficients against the dynamic lift coefficient $C_{L_Q}$. At a given trim, the planing range for each load tested was assumed to extend up to $C_{L_Q}$ (or down to a speed) beyond which the $C_{D_Q}$ data began to deviate from the single curve. At all lower speeds, displacement conditions should be applied. Since there is no well-defined boundary between displacement and planing, the ranges of $C_{V_\Delta}$ and $C_{L_Q}$ are overlapped, particularly for the lower values of $C_{\Delta_Q}$ and $\tau$.

## General Characteristics

At very low trims the streamline bodies with chine strips had an increasing tendency to suck under the water surface with increase in $C_{V_\Delta}$. However, this tendency decreased with increase in fineness ratio or trim. At 0° trim (figs. 5(a), 7(a), and 9(a)) the models for all three fineness ratios sucked under and no data were obtained for planing conditions. At 4° trim the fineness-ratio-6 model (fig. 5(b)) sucked under but only for a short range of $C_{V_\Delta}$.

Under displacement conditions (figs. 5, 7, and 9), the drag coefficients $C_{D_\Delta}$, for a given trim and fineness ratio, generally grouped along a single curve for all loads with a small and fairly uniform scatter. Center-of-pressure ratio $\frac{x}{(\Delta/w)^{1/3}}$ and wetted-length ratio $\frac{l}{(\Delta/w)^{1/3}}$ also grouped along a single curve for the heavier loads, with very little scatter, but, with decrease in trim or fineness ratio, individual curves were required for an increasing number of the lighter loads. The height ratios $\frac{h}{(\Delta/w)^{1/3}}$ did not collapse at all.

With increase in speed coefficient $C_{V_\Delta}$, the drag coefficient $C_{D_\Delta}$ increased rapidly to a peak value at $C_{V_\Delta} \approx 1.2$. In a more conventional plot of the Froude scale coefficients, $C_{R_Q}$ against $C_{V_Q}$, the resistance corresponding to the peak at $C_{V_\Delta}$ of about 1.2 would appear only as a slight protuberance on the upward slope of the curve. On the other hand, the resistance peak normally obtained in such a conventional plot appears on the plots of $C_{D_\Delta}$ against $C_{V_\Delta}$ only as a slight proturberance on the downward slope of that curve approximately at values of $C_{V_\Delta}$ where planing forces become predominant.

Under planing conditions (figs. 6, 8, and 10), the drag coefficients $C_{D_Q}$, as well as the ratios for center of pressure $x/L$, wetted length $l/L$, and height $h/L$, for a given trim and fineness ratio, all grouped along single curves for all loads.

The simultaneous side and bottom photographs of the models with chine strips (fig. 11) show that the spray became heavier with increase in speed until planing began; after which the amount of spray decreased.

## Effect of Trim

The effect of trim on the hydrodynamic characteristics of the models with chine strips is shown in figures 20, 21, and 22 for fineness ratios 6, 9, and 12, respectively. Data for resistance, center of pressure, ratio of center of pressure to wetted length, wetted length, and height of the center-line midpoint are plotted against $C_{V_\Delta}$ and $C_{L_Q}$ for constant trims in parts (a), (b), (c), (d), and (e), respectively, of these figures. For trims at which more than one curve had to be drawn in figures 5 to 10, the curve for $C_{\Delta_Q} = 0.3$ was used in figures 20, 21, or 22 as being representative.

Resistance.- For a given speed coefficient $C_{V_\Delta}$, the drag coefficient $C_{D_\Delta}$ generally increased with trim $\tau$ up to values of $C_{V_\Delta}$ varying from about 3.5 for fineness ratio 6 to about 4.0 for fineness ratio 12. The plots of the drag coefficient $C_{D_Q}$ against the lift coefficient $C_{L_Q}$ are approximately parallel curves for all trims. For a given $C_{L_Q}$, $C_{D_Q}$ generally decreased with increase in trim up to a best trim (trim for minimum resistance). For fineness ratio 6, best trim appeared to be just above 20°. For fineness ratio 9, best trim was between 16° and 20°; and for fineness ratio 12, between 12° and 16°.

Center of pressure.- For a given $C_{V_\Delta}$, the curves of the center-of-pressure ratio $\frac{x}{(\Delta/w)^{1/3}}$ show a slight rearward movement of the center of pressure with increase in trim. For a given $C_{L_Q}$, the curves of the center-of-pressure ratio $x/L$ show that the center of pressure moved rearward rapidly with increase in trim. At low values of $C_{L_Q}$ the variation in center of pressure with trim became considerable and at small trims, the center of pressure on the lower fineness-ratio models was calculated to be forward of the wetted portion of the model (figs. 20(c), 21(c), and 22(c)). Such calculated values indicate that negative pressures were acting near the rear portion of the wetted area.

Wetted length.- For a given $C_{V_\Delta}$, the wetted-length ratio $\frac{l}{(\Delta/w)^{1/3}}$ decreased with increase in trim. For a given $C_{L_Q}$, the wetted-length ratio $l/L$ also decreased with increase in trim. At the low trims, $l/L$ still had a substantial value as $C_{L_Q}$ approached zero.

Height.- For a given $C_{V_\Delta}$, the height ratio $\frac{h}{(\Delta/w)^{1/3}}$ increased with trim. For a given $C_{L_Q}$, the height ratio $h/L$ also increased with trim. The curve for fineness ratio 6 at 4° trim shows how the model sucked under at a $C_{V_\Delta}$ of about 4.5, while at higher trims the model rose with increase in $C_{V_\Delta}$. The curve for fineness ratio 9 at 4° trim shows a tendency to suck down at a $C_{V_\Delta}$ of about 6.5.

Spray.- The side photographs of the fineness-ratio-9 model in figure 23 show that an increase in trim resulted in considerable reduction in spray. This effect increased with decrease in fineness ratio.

## Effect of Fineness Ratio

The effect of fineness ratio on the hydrodynamic characteristics of the streamline bodies with chine strips is shown in figure 24 for best trim and in figure 25 for the condition where the hydrodynamic trimming moment M about the midpoint of the center line was zero. For each of these conditions, separate comparisons are made in the displacement speed range and in the planing speed range. The curves of best trim in figure 24 indicate the trims at which approximately minimum resistance was obtained within the scope of the investigation.

Displacement speed range.- At best trim (fig. 24(a)) for a given speed coefficient $C_{V_\Delta}$, an increase in fineness ratio decreased the trim $\tau$, decreased the drag coefficient $C_{D_\Delta}$, moved the center of pressure forward (the center-of-pressure ratio $\frac{x}{(\Delta/w)^{1/3}}$ increased), increased the wetted-length ratio $\frac{l}{(\Delta/w)^{1/3}}$, and decreased the height ratio $\frac{h}{(\Delta/w)^{1/3}}$. Similar effects were obtained at zero trimming moment (fig. 25(a)).

Planing speed range.- At best trim (fig. 24(b)), for a given lift coefficient $C_{L_Q}$, an increase in fineness ratio decreased the trim $\tau$; had little effect on the drag coefficient $C_{D_Q}$, the center-of-pressure ratio $x/L$, or the wetted-length ratio $l/L$; but decreased the ratio of the height of the center-line midpoint to the overall length $h/L$. Similar effects were obtained at zero trimming moment (fig. 25(b)).

Reference lines of constant $\Delta/R$ were superimposed on the $C_{D_Q}$ curves in figures 24(b) and 25(b). For all three fineness ratios, $\Delta/R$ was approximately 3.5 at high values of $C_{L_Q}$ for both the best trim and the zero-trimming-moment conditions. However, with decrease in $C_{L_Q}$, $\Delta/R$ increased to approximately 5.0 at best trim but decreased to approximately 2.0 for zero trimming moment.

Spray.- The side photographs in figure 26 show that at a trim of 8°, an increase in fineness ratio from 6 to 9 resulted in an appreciable reduction in spray. The reduction in spray was less marked with further increase in fineness ratio from 9 to 12. The effects of fineness ratio on the spray characteristics were similar at other trims but decreased somewhat with increase in trim.

## Effect of Chine Strips

The effect of the chine strips on the hydrodynamic characteristics of the models is shown in figures 12, 13, and 14 for fineness ratios 6, 9, and 12, respectively. Faired curves through the data for the models without chine strips are shown as solid lines, together with corresponding curves for the models with chine strips, shown as dashed lines. Because the data for the models without strips were obtained only for low speeds, plots are given for displacement conditions only.

At 0° trim, the hydrodynamic characteristics of all three fineness-ratio models were just as poor with strips as without strips. At trims of 4° and higher, the chine strips still had practically no effect up to moderate speeds corresponding to a $C_{V_\Delta}$ of about 2.7. However, there was a slight tendency for the strips to take effect at lower values of $C_{V_\Delta}$ with increase in trim or fineness ratio. With further increase in $C_{V_\Delta}$, the hydrodynamic characteristics of the models without chine strips deteriorated rapidly. The rapid increase in draft, coupled with the movement forward of the center of pressure of the models without chine strips, indicates the development of increasingly powerful suction forces. Thus, the chine strips effectively improved the hydrodynamic characteristics of the streamline bodies except at very low speeds.

The simultaneous side and bottom photographs in figure 15 show that without chine strips, the spray characteristics of the streamline bodies deteriorated rapidly with increase in speed and also, to a lesser degree, with decrease in fineness ratio.

## Effect of Removing Tail Cones

The effect of removing the tail cones from the bodies with chine strips is shown in figures 16, 17, and 18 for fineness ratios 6, 9, and 12, respectively. Faired curves through the data for the models without tail cones are plotted as solid lines, together with corresponding curves for the models with tail cones, shown as dashed lines. The curves for the models without tail cones are practically the same as those for the models with tail cones; some of them being identical.

The simultaneous side and bottom photographs in figure 19 show that the spray characteristics of the models with the tail cones removed are approximately the same as those of the models with tail cones (fig. 11).

## CONCLUSIONS

The data obtained in this investigation of the hydrodynamic forces and moments acting on a family of streamline bodies of three fineness ratios with chine strips indicate the following:

1. Under displacement conditions, for a given speed coefficient $C_{V_\Delta}$, the drag coefficient $C_{D_\Delta}$ increased with trim.

2. Under planing conditions, for a given lift coefficient $C_{L_Q}$, the drag coefficient $C_{D_Q}$ decreased with increase in trim up to a best trim (trim for minimum resistance).

3. Best trim, as well as trim for zero trimming moment about center-line midpoint ($M = 0$), decreased with increase in fineness ratio from 6 to 12.

4. At best trim, or for zero trimming moment about the center-line midpoint, an increase in fineness ratio from 6 to 12 resulted in a decrease in the drag coefficient $C_{D_\Delta}$ under displacement conditions but had little effect on the drag coefficient $C_{D_Q}$ under planing conditions.

5. With decrease in lift coefficient $C_{L_Q}$, the load-resistance ratio increased from about 3.5 to about 5.0 at best trim and decreased from about 3.5 to about 2.0 at trim for zero trimming moment about the center-line midpoint.

6. An increase in fineness ratio resulted in an appreciable reduction in spray.

7. The chine strips effectively improved the hydrodynamic characteristics of the streamline bodies except at very low speeds.

8. Removal of the tail cones had a negligible effect on the hydrodynamic characteristics of the streamline bodies.

Langley Aeronautical Laboratory,
National Advisory Committee for Aeronautics,
Langley Field, Va., October 29, 1954.

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TABLE I.- NONDIMENSIONAL OFFSETS

| d/L (a) | 2y/D (b) |
|---|---|
| 0 | 0 |
| .010 | .213 |
| .021 | .289 |
| .042 | .402 |
| .062 | .483 |
| .083 | .552 |
| .125 | .663 |
| .167 | .746 |
| .208 | .813 |
| .250 | .865 |
| .333 | .943 |
| .417 | .985 |
| .500 | 1.000 |
| .583 | .970 |
| .667 | .884 |
| .750 | .734 |
| .833 | .514 |
| .875 | .393 |
| .917 | .266 |
| .958 | .135 |
| .979 | .068 |
| 1.000 | 0 |

[a]Ratio of distance from nose to total length of model.

[b]Ratio of diameter to maximum diameter of model.

TABLE II

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.432 | 0.084 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .081 |
| 0 | 1.06 | .002 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0036 | ----- | .514 | .081 |
| 0 | 1.48 | .005 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0046 | ----- | ----- | .080 |
| 0 | 2.11 | .011 | .010 | ---- | ----- | ---- | ---- | ---- | 0 | .0049 | ----- | ----- | .072 |
| 0 | 2.53 | .019 | .025 | ---- | ----- | ---- | ---- | ---- | 0 | .0059 | ----- | .755 | .069 |
| 0 | 3.17 | .028 | .048 | ---- | ----- | ---- | ---- | ---- | 0 | .0056 | ----- | .842 | .067 |
| 0 | 3.59 | .160 | .194 | ---- | ----- | ---- | ---- | ---- | 0 | .0249 | ----- | ----- | .030 |
| .10 | 0 | 0 | .003 | 0 | ----- | 4.64 | 6.88 | 0.45 | ------ | ------ | 0.506 | .749 | .049 |
| .10 | .63 | .002 | .012 | .93 | 0.046 | 4.82 | ---- | .43 | .4988 | .0100 | .526 | ----- | .047 |
| .10 | 1.06 | .009 | .048 | 1.55 | .075 | 5.62 | 7.73 | .40 | .1797 | .0162 | .613 | .842 | .044 |
| .10 | 1.48 | .016 | .060 | 2.17 | .068 | 5.87 | ---- | .43 | .0917 | .0147 | .640 | ----- | .047 |
| .10 | 2.11 | .032 | .075 | 3.10 | .067 | 6.18 | 8.68 | .40 | .0449 | .0144 | .674 | .946 | .044 |
| .10 | 2.53 | .053 | .099 | 3.72 | .076 | 6.71 | ---- | .33 | .0312 | .0165 | .731 | ----- | .036 |
| .10 | 3.17 | .122 | .149 | 4.65 | .113 | 7.79 | 9.19 | .18 | .0200 | .0244 | .849 | 1.000 | .020 |
| .10 | 3.59 | .263 | .229 | 5.26 | .190 | 9.55 | ---- | 0 | .0155 | .0409 | 1.041 | ----- | 0 |
| .20 | 0 | 0 | .025 | 0 | ----- | 3.85 | 6.26 | .25 | ------ | ------ | .529 | .859 | .035 |
| .20 | .63 | .004 | .030 | .83 | .058 | 3.91 | ---- | .24 | .9975 | .0200 | .536 | ----- | .033 |
| .20 | 1.06 | .018 | .096 | 1.38 | .094 | 4.44 | 7.30 | .20 | .3594 | .0323 | .610 | 1.000 | .027 |
| .20 | 1.48 | .031 | .123 | 1.93 | .083 | 4.69 | ---- | .20 | .1833 | .0284 | .644 | ----- | .028 |
| .20 | 2.11 | .048 | .124 | 2.76 | .063 | 4.69 | 7.30 | .20 | .0899 | .0216 | .644 | 1.000 | .028 |
| .20 | 2.53 | .079 | .129 | 3.31 | .072 | 4.74 | ---- | .16 | .0624 | .0246 | .650 | ----- | .022 |
| .20 | 3.17 | .219 | .194 | 4.14 | .128 | 5.30 | 7.30 | -.18 | .0399 | .0437 | .728 | 1.000 | -.025 |
| .30 | 0 | 0 | .040 | 0 | ----- | 3.37 | 6.34 | .14 | ------ | ------ | .529 | .996 | .022 |
| .30 | .63 | .004 | .043 | .77 | .045 | 3.39 | ---- | .11 | 1.4963 | .0200 | .532 | ----- | .017 |
| .30 | 1.06 | .026 | .123 | 1.29 | .104 | 3.79 | 6.38 | .06 | .5391 | .0467 | .596 | 1.000 | .010 |
| .30 | 1.48 | .039 | .161 | 1.80 | .080 | 3.99 | ---- | .06 | .2750 | .0357 | .627 | ----- | .010 |
| .30 | 2.11 | .063 | .146 | 2.58 | .063 | 3.90 | 6.38 | .06 | .1348 | .0283 | .613 | 1.000 | .010 |
| .30 | 2.53 | .118 | .134 | 3.09 | .082 | 3.84 | ---- | .02 | .0936 | .0368 | .603 | ----- | .003 |
| .30 | 3.17 | .242 | .095 | 3.87 | .108 | 3.65 | 6.38 | -.16 | .0599 | .0483 | .573 | 1.000 | -.025 |
| .40 | 0 | 0 | .055 | 0 | ----- | 3.08 | 5.79 | .07 | ------ | ------ | .532 | 1.000 | .012 |
| .40 | .63 | .006 | .055 | .74 | .055 | 3.08 | ---- | .04 | 1.9950 | .0299 | .532 | ----- | .007 |
| .40 | 1.06 | .036 | .143 | 1.23 | .119 | 3.37 | 5.79 | -.01 | .7188 | .0647 | .583 | 1.000 | -.001 |
| .40 | 1.48 | .056 | .190 | 1.72 | .094 | 3.53 | ---- | -.01 | .3666 | .0513 | .610 | ----- | -.001 |
| .40 | 2.11 | .089 | .152 | 2.46 | .074 | 3.41 | 5.79 | -.01 | .1797 | .0400 | .590 | 1.000 | -.002 |
| .40 | 2.53 | .129 | .109 | 2.96 | .074 | 3.26 | ---- | -.06 | .1248 | .0402 | .563 | ----- | -.011 |
| .50 | 0 | 0 | .069 | 0 | ----- | 2.86 | 5.38 | 0 | ------ | ------ | .532 | 1.000 | 0 |
| .50 | .63 | .007 | .056 | .71 | .056 | 2.82 | ---- | -.03 | 2.4938 | .0349 | .526 | ----- | -.006 |
| .50 | 1.06 | .048 | .155 | 1.18 | .136 | 3.08 | 5.38 | -.09 | .8985 | .0863 | .573 | 1.000 | -.017 |
| .50 | 1.48 | .074 | .194 | 1.66 | .108 | 3.17 | ---- | -.09 | .4583 | .0678 | .590 | ----- | -.017 |
| .50 | 2.11 | .099 | .125 | 2.37 | .070 | 2.99 | 5.38 | -.10 | .2246 | .0445 | .556 | 1.000 | -.019 |
| .50 | 2.53 | .162 | .085 | 2.84 | .081 | 2.89 | ---- | -.18 | .1560 | .0505 | .539 | ----- | -.034 |
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.309 | 0.087 |
| 0 | .63 | .001 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0.0050 | ----- | ----- | .088 |
| 0 | 1.06 | .002 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0036 | ----- | .472 | .085 |
| 0 | 1.48 | .004 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0037 | ----- | ----- | .082 |
| 0 | 2.11 | .011 | .013 | ---- | ----- | ---- | ---- | ---- | 0 | .0049 | 4.711 | .657 | .078 |
| 0 | 2.53 | .014 | .031 | ---- | ----- | ---- | ---- | ---- | 0 | .0044 | 7.879 | ----- | .071 |
| 0 | 3.17 | .023 | .052 | ---- | ----- | ---- | ---- | ---- | 0 | .0046 | 8.131 | .693 | .070 |
| 0 | 3.59 | .029 | .067 | ---- | ----- | ---- | ---- | ---- | 0 | .0045 | 8.159 | ----- | .071 |
| 0 | 4.22 | .040 | .095 | ---- | ----- | ---- | ---- | ---- | 0 | .0045 | 8.610 | .696 | .071 |
| 0 | 4.64 | .048 | .109 | ---- | ----- | ---- | ---- | ---- | 0 | .0045 | 8.081 | ----- | .073 |
| 0 | 5.28 | .061 | .144 | ---- | ----- | ---- | ---- | ---- | 0 | .0044 | 8.452 | .685 | .071 |

TABLE II.- Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Continued | | | | | | | | | | | | | |
| 0 | 6.33 | 0.082 | 0.212 | ---- | ----- | ----- | ---- | ---- | 0 | 0.0041 | 9.227 | 0.671 | 0.071 |
| 0 | 7.39 | .103 | .279 | ---- | ----- | ----- | ---- | ---- | 0 | .0038 | 9.625 | .671 | .070 |
| 0 | 8.44 | .142 | .344 | ---- | ----- | ----- | ---- | ---- | 0 | .0040 | 8.691 | .671 | .071 |
| 0 | 9.50 | .151 | .434 | ---- | ----- | ----- | ---- | ---- | 0 | .0040 | 8.617 | .668 | .070 |
| 0 | 10.55 | .226 | .524 | ---- | ----- | ----- | ---- | ---- | 0 | .0041 | 8.364 | .673 | .071 |
| 0 | 11.61 | .264 | .610 | ---- | ----- | ----- | ---- | ---- | 0 | .0039 | 8.321 | .665 | .072 |
| 0 | 12.66 | .317 | .734 | ---- | ----- | ----- | ---- | ---- | 0 | .0040 | 8.341 | .657 | .073 |
| 0 | 13.72 | .376 | .848 | ---- | ----- | ----- | ---- | ---- | 0 | .0040 | 8.139 | .668 | .073 |
| 0 | 14.77 | .431 | .982 | ---- | ----- | ----- | ---- | ---- | 0 | .0040 | 8.226 | .651 | .073 |
| .10 | 0 | 0 | -.024 | 0 | ----- | 4.05 | 7.44 | 0.45 | ------ | ------ | .441 | .811 | .049 |
| .10 | .63 | .002 | -.019 | .93 | 0.046 | 4.17 | ---- | .46 | .4988 | .0200 | .455 | ----- | .050 |
| .10 | 1.06 | .009 | .011 | 1.55 | .075 | 4.62 | 7.65 | .48 | .1797 | .0162 | .526 | .833 | .052 |
| .10 | 1.48 | .014 | .021 | 2.17 | .059 | 5.01 | ---- | .45 | .0917 | .0128 | .546 | ----- | .049 |
| .10 | 2.11 | .027 | .055 | 3.10 | .056 | 5.72 | 5.72 | .42 | .0449 | .0121 | .623 | .839 | .046 |
| .10 | 2.53 | .041 | .113 | 3.72 | .059 | 6.95 | ---- | .35 | .0312 | .0128 | .758 | ----- | .038 |
| .10 | 3.17 | .053 | .151 | 4.65 | .049 | 8.34 | 7.75 | .36 | .0200 | .0106 | .910 | .845 | .039 |
| .10 | 3.59 | .054 | .190 | 5.26 | .039 | 8.50 | ---- | .43 | .0155 | .0084 | .927 | ----- | .047 |
| .10 | 4.22 | .061 | .206 | 6.19 | .032 | 8.87 | 7.16 | .47 | .0112 | .0069 | .967 | .780 | .051 |
| .10 | 4.64 | .066 | .214 | 6.81 | .028 | 8.99 | ---- | .49 | .0093 | .0061 | .981 | ----- | .054 |
| .10 | 5.28 | .079 | .235 | 7.74 | .026 | 9.36 | 6.83 | .53 | .0072 | .0057 | 1.021 | .744 | .058 |
| .10 | 6.33 | .101 | .297 | 9.29 | .023 | 10.54 | 6.62 | .56 | .0050 | .0050 | 1.149 | .721 | .061 |
| .10 | 7.39 | .127 | .324 | 10.84 | .022 | 11.00 | 6.46 | .56 | .0037 | .0047 | 1.200 | .704 | .061 |
| .10 | 8.44 | .162 | .423 | 12.39 | .021 | 12.84 | 6.39 | .58 | .0028 | .0045 | 1.399 | .696 | .063 |
| .10 | 9.50 | .195 | .504 | 13.94 | .020 | 14.09 | 6.36 | .57 | .0022 | .0043 | 1.536 | .693 | .062 |
| .10 | 10.55 | .238 | .590 | 15.49 | .020 | 15.58 | 6.31 | .58 | .0018 | .0043 | 1.698 | .687 | .063 |
| .10 | 11.61 | .278 | .682 | 17.04 | .019 | 16.96 | 6.29 | .58 | .0015 | .0041 | 1.850 | .685 | .063 |
| .10 | 12.66 | .336 | .806 | 18.59 | .019 | 18.66 | 6.29 | .59 | .0013 | .0042 | 2.035 | .685 | .065 |
| .10 | 13.72 | .390 | .935 | 20.13 | .019 | 20.36 | 6.29 | .59 | .0011 | .0041 | 2.221 | .685 | .065 |
| .10 | 14.77 | .445 | 1.065 | 21.68 | .019 | 21.97 | 6.10 | .61 | .0009 | .0041 | 2.393 | .665 | .066 |
| .20 | 0 | 0 | -.045 | 0 | ----- | 3.24 | 6.44 | .25 | ------ | ------ | .445 | .884 | .035 |
| .20 | .63 | .002 | -.035 | .83 | .029 | 3.34 | ---- | .23 | .9975 | .0100 | .458 | ----- | .032 |
| .20 | 1.06 | .015 | .024 | 1.38 | .079 | 3.83 | 6.62 | .21 | .3594 | .0270 | .526 | .909 | .029 |
| .20 | 1.48 | .026 | .049 | 1.93 | .070 | 4.05 | ---- | .21 | .1833 | .0238 | .556 | ----- | .029 |
| .20 | 2.11 | .041 | .080 | 2.76 | .054 | 4.32 | 6.59 | .20 | .0898 | .0184 | .593 | .904 | .028 |
| .20 | 2.53 | .060 | .115 | 3.31 | .055 | 4.62 | ---- | .17 | .0624 | .0187 | .634 | ----- | .023 |
| .20 | 3.17 | .120 | .229 | 4.14 | .070 | 5.52 | 6.89 | .10 | .0399 | .0240 | .758 | .946 | .014 |
| .20 | 3.59 | .187 | .379 | 4.69 | .085 | 6.68 | ---- | -.01 | .0311 | .0291 | .917 | ----- | -.001 |
| .20 | 4.22 | ----- | ----- | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .20 | 4.64 | .108 | .395 | 6.07 | .029 | 6.90 | ---- | .27 | .0186 | .0100 | .947 | ----- | .037 |
| .20 | 5.28 | .110 | .383 | 6.90 | .023 | 6.80 | 5.84 | .32 | .0144 | .0079 | .933 | .802 | .045 |
| .20 | 6.33 | .129 | .434 | 8.28 | .019 | 7.19 | 5.54 | .38 | .0100 | .0061 | .987 | .760 | .052 |
| .20 | 7.39 | .152 | .474 | 9.65 | .016 | 7.49 | 5.40 | .40 | .0073 | .0056 | 1.028 | .741 | .055 |
| .20 | 8.44 | .186 | .535 | 11.04 | .015 | 7.96 | 5.23 | .42 | .0056 | .0052 | 1.092 | .718 | .057 |
| .20 | 9.50 | .218 | .610 | 12.42 | .014 | 8.50 | 5.22 | .43 | .0044 | .0048 | 1.166 | .716 | .059 |
| .20 | 10.55 | .254 | .661 | 13.80 | .013 | 8.87 | 5.07 | .45 | .0036 | .0046 | 1.217 | .696 | .062 |
| .20 | 11.61 | .295 | .765 | 15.18 | .013 | 9.60 | 5.05 | .45 | .0030 | .0044 | 1.318 | .693 | .062 |
| .20 | 12.66 | .353 | .894 | 16.56 | .013 | 10.48 | 4.99 | .46 | .0025 | .0044 | 1.439 | .685 | .063 |
| .20 | 13.72 | .405 | .998 | 17.94 | .013 | 11.13 | 4.99 | .46 | .0021 | .0043 | 1.527 | .685 | .063 |
| .30 | 0 | 0 | -.055 | 0 | ----- | 2.90 | 5.90 | .14 | ------ | ------ | .455 | .926 | .022 |
| .30 | .63 | .004 | -.039 | .77 | .045 | 2.98 | ---- | .11 | 1.4963 | .0200 | .468 | ----- | .017 |
| .30 | 1.06 | .024 | .043 | 1.29 | .096 | 3.39 | 6.21 | .08 | .5391 | .0431 | .532 | .960 | .013 |
| .30 | 1.48 | .033 | .074 | 1.80 | .067 | 3.54 | ---- | .10 | .2750 | .0302 | .556 | ----- | .016 |
| .30 | 2.11 | .056 | .103 | 2.58 | .056 | 3.69 | 6.04 | .10 | .1348 | .0252 | .580 | .948 | .016 |
| .30 | 2.53 | .079 | .123 | 3.09 | .055 | 3.78 | ---- | .07 | .0936 | .0246 | .593 | ----- | .012 |
| .30 | 3.17 | .141 | .240 | 3.87 | .063 | 4.34 | 6.22 | .01 | .0599 | .0282 | .681 | .977 | .002 |
| .30 | 3.59 | .233 | .402 | 4.38 | .081 | 5.09 | ---- | -.16 | .0466 | .0362 | .799 | ----- | -.025 |
| .30 | 4.22 | ----- | ----- | ----- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .30 | 4.64 | ----- | ----- | ----- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |

[redacted]

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{F_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.30 | 5.28 | 0.162 | 0.598 | 6.45 | 0.026 | 6.05 | 5.52 | 0.18 | 0.0215 | 0.0116 | 0.950 | 0.867 | 0.029 |
| .30 | 6.33 | .161 | .568 | 7.74 | .018 | 5.92 | 5.11 | .29 | .0150 | .0080 | .930 | .802 | .046 |
| .30 | 7.39 | .182 | .608 | 9.02 | .015 | 6.09 | 4.98 | .32 | .0110 | .0067 | .957 | .783 | .050 |
| .30 | 8.44 | .206 | .657 | 10.31 | .013 | 6.31 | 4.80 | .35 | .0084 | .0058 | .991 | .755 | .054 |
| .30 | 9.50 | .244 | .724 | 11.60 | .012 | 6.61 | 4.64 | .35 | .0067 | .0054 | 1.038 | .730 | .056 |
| .30 | 10.55 | .277 | .785 | 12.89 | .011 | 6.86 | 4.57 | .37 | .0054 | .0050 | 1.078 | .718 | .058 |
| .30 | 11.61 | .310 | .848 | 14.18 | .010 | 7.12 | 4.47 | .38 | .0044 | .0046 | 1.119 | .702 | .060 |
| .40 | 0 | 0 | -.054 | 0 | ----- | 2.71 | 5.56 | .06 | ------ | ------ | .468 | .963 | .010 |
| .40 | .63 | .005 | -.034 | .74 | .046 | 2.77 | ---- | .03 | 1.9950 | .0249 | .479 | ----- | .005 |
| .40 | 1.06 | .031 | .066 | 1.23 | .103 | 3.10 | 5.74 | 0 | .7188 | .0557 | .536 | .993 | 0 |
| .40 | 1.48 | .047 | .099 | 1.72 | .079 | 3.22 | ---- | .02 | .3666 | .0431 | .556 | ----- | .004 |
| .40 | 2.11 | .071 | .133 | 2.46 | .059 | 3.33 | 5.68 | .02 | .1797 | .0319 | .576 | .982 | .003 |
| .40 | 2.53 | .096 | .147 | 2.96 | .055 | 3.37 | ---- | -.01 | .1248 | .0299 | .583 | ----- | -.002 |
| .40 | 3.17 | .190 | .275 | 3.70 | .070 | 3.78 | 5.79 | -.09 | .0799 | .0379 | .654 | 1.000 | -.016 |
| .40 | 3.59 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .40 | 4.22 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .40 | 4.64 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .40 | 5.28 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | ----- | ----- |
| .40 | 6.33 | .197 | .264 | 7.39 | .018 | 5.40 | 4.92 | .20 | .0200 | .0098 | .933 | .850 | .035 |
| .40 | 7.39 | .209 | .764 | 8.62 | .014 | 5.40 | 4.61 | .27 | .0147 | .0077 | .933 | .797 | .046 |
| .40 | 8.44 | .231 | .785 | 9.85 | .012 | 5.46 | 4.46 | .30 | .0112 | .0065 | .944 | .772 | .052 |
| .50 | 0 | 0 | -.042 | 0 | ----- | 2.57 | 5.27 | -.01 | ------ | ------ | .479 | .982 | -.002 |
| .50 | .63 | .005 | -.019 | .71 | .040 | 2.63 | ---- | -.03 | 2.4938 | .0249 | .489 | ----- | -.006 |
| .50 | 1.06 | .045 | .084 | 1.18 | .128 | 2.89 | 5.38 | -.06 | .8985 | .0809 | .539 | 1.000 | -.012 |
| .50 | 1.48 | .059 | .115 | 1.66 | .086 | 2.97 | ---- | -.04 | .4583 | .0541 | .553 | ----- | -.007 |
| .50 | 2.11 | .089 | .146 | 2.37 | .063 | 3.04 | 5.38 | -.05 | .2246 | .0400 | .566 | 1.000 | -.009 |
| .50 | 2.53 | .122 | .161 | 2.84 | .060 | 3.08 | ---- | -.08 | .1560 | .0381 | .573 | ----- | -.015 |
| .50 | 3.17 | .192 | .293 | 3.55 | .061 | 3.40 | 5.38 | -.19 | .0999 | .0383 | .634 | 1.000 | -.036 |
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.345 | 0.095 |
| 0 | .63 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .093 |
| 0 | 1.06 | .002 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | .500 | .486 | .094 |
| 0 | 1.48 | .004 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0037 | .500 | ----- | .092 |
| 0 | 2.11 | .009 | .005 | ----- | ----- | ---- | ---- | ---- | 0 | .0040 | 1.407 | .519 | .089 |
| 0 | 2.53 | .012 | .015 | ----- | ----- | ---- | ---- | ---- | 0 | .0037 | 2.714 | ----- | .084 |
| 0 | 3.17 | .019 | .031 | ----- | ----- | ---- | ---- | ---- | 0 | .0038 | 3.327 | .530 | .084 |
| 0 | 3.59 | .026 | .040 | ----- | ----- | ---- | ---- | ---- | 0 | .0040 | 3.125 | ----- | .084 |
| 0 | 4.22 | .036 | .055 | ----- | ----- | ---- | ---- | ---- | 0 | .0040 | 3.104 | .533 | .084 |
| 0 | 4.64 | .042 | .065 | ----- | ----- | ---- | ---- | ---- | 0 | .0039 | 3.131 | ----- | .084 |
| 0 | 5.28 | .052 | .080 | ----- | ----- | ---- | ---- | ---- | 0 | .0037 | 3.118 | .536 | .084 |
| 0 | 6.33 | .072 | .125 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | 3.455 | .522 | .085 |
| 0 | 7.39 | .095 | .169 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 3.522 | .528 | .085 |
| 0 | 8.44 | .121 | .203 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.347 | .533 | .085 |
| 0 | 9.50 | .155 | .275 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.508 | .528 | .085 |
| 0 | 10.55 | .193 | .324 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 3.347 | .553 | .085 |
| 0 | 11.61 | .231 | .402 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.448 | .525 | .087 |
| 0 | 12.66 | .275 | .469 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.394 | .528 | .085 |
| 0 | 13.72 | .322 | .544 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.367 | .547 | .085 |
| 0 | 14.77 | .374 | .610 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 3.266 | .519 | .085 |
| 0 | 15.83 | .439 | .679 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 3.121 | .516 | .085 |
| 0 | 16.88 | .493 | .796 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 3.242 | .519 | .085 |

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Continued | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.066 | 0 | ----- | 3.09 | 6.31 | 0.51 | ------ | ------ | 0.337 | 0.687 | 0.056 |
| .10 | .63 | .002 | -.060 | .93 | 0.046 | 3.28 | ---- | .49 | 0.4988 | 0.0100 | .357 | ----- | .054 |
| .10 | 1.06 | .009 | -.032 | 1.55 | .075 | 3.89 | 6.44 | .49 | .1797 | .0162 | .425 | .702 | .054 |
| .10 | 1.48 | .016 | -.019 | 2.17 | .068 | 4.17 | ---- | .51 | .0917 | .0147 | .455 | ----- | .055 |
| .10 | 2.11 | .026 | .031 | 3.10 | .054 | 5.22 | 6.03 | .51 | .0449 | .0117 | .570 | .657 | .056 |
| .10 | 2.53 | .032 | .062 | 3.72 | .046 | 5.84 | ---- | .51 | .0312 | .0100 | .637 | ----- | .056 |
| .10 | 3.17 | .039 | .080 | 4.65 | .036 | 6.24 | 6.05 | .53 | .0200 | .0078 | .681 | .660 | .058 |
| .10 | 3.59 | .046 | .085 | 5.26 | .033 | 6.30 | ---- | .57 | .0155 | .0072 | .687 | ----- | .062 |
| .10 | 4.22 | .054 | .096 | 6.19 | .028 | 6.52 | 5.64 | .61 | .0112 | .0061 | .711 | .614 | .066 |
| .10 | 4.64 | .061 | .103 | 6.81 | .026 | 6.64 | ---- | .63 | .0093 | .0057 | .725 | ----- | .069 |
| .10 | 5.28 | .071 | .115 | 7.74 | .024 | 6.83 | 5.38 | .64 | .0072 | .0051 | .744 | .587 | .070 |
| .10 | 6.33 | .092 | .156 | 9.29 | .021 | 7.57 | 5.15 | .67 | .0050 | .0046 | .826 | .561 | .073 |
| .10 | 7.39 | .114 | .184 | 10.84 | .019 | 8.00 | 5.12 | .70 | .0037 | .0042 | .873 | .558 | .076 |
| .10 | 8.44 | .142 | .224 | 12.39 | .019 | 8.65 | 5.12 | .70 | .0028 | .0040 | .944 | .558 | .076 |
| .10 | 9.50 | .156 | .289 | 13.94 | .017 | 9.70 | 5.07 | .70 | .0022 | .0037 | 1.058 | .553 | .076 |
| .10 | 10.55 | .209 | .335 | 15.49 | .018 | 10.20 | 5.07 | .71 | .0018 | .0036 | 1.112 | .553 | .077 |
| .10 | 11.61 | .244 | .415 | 17.04 | .017 | 11.31 | 4.92 | .71 | .0015 | .0036 | 1.233 | .536 | .077 |
| .10 | 12.66 | .291 | .475 | 18.59 | .017 | 11.86 | 4.82 | .71 | .0013 | .0036 | 1.294 | .525 | .077 |
| .10 | 13.72 | .338 | .555 | 20.13 | .017 | 12.73 | 5.02 | .71 | .0011 | .0036 | 1.388 | .547 | .077 |
| .10 | 14.77 | .392 | .610 | 21.68 | .017 | 13.07 | 4.89 | .71 | .0009 | .0035 | 1.426 | .533 | .077 |
| .10 | 15.83 | .458 | .687 | 23.23 | .017 | 13.69 | 4.82 | .71 | .0008 | .0037 | 1.492 | .525 | .077 |
| .20 | 0 | 0 | -.110 | 0 | ----- | 2.67 | 5.66 | .28 | ------ | ------ | .367 | .777 | .038 |
| .20 | .63 | .003 | -.094 | .83 | .044 | 2.83 | ---- | .24 | .9975 | .0150 | .388 | ----- | .033 |
| .20 | 1.06 | .019 | -.044 | 1.38 | .100 | 3.26 | 5.87 | .24 | .3594 | .0341 | .448 | .805 | .033 |
| .20 | 1.48 | .025 | -.025 | 1.93 | .067 | 3.41 | ---- | .26 | .1833 | .0229 | .468 | ----- | .036 |
| .20 | 2.11 | .042 | .040 | 2.76 | .055 | 3.98 | 5.83 | .23 | .0858 | .0189 | .546 | .800 | .032 |
| .20 | 2.53 | .062 | .129 | 3.31 | .056 | 4.69 | ---- | .20 | .0624 | .0193 | .644 | ----- | .028 |
| .20 | 3.17 | .072 | .202 | 4.14 | .042 | 5.30 | 5.83 | .26 | .0399 | .0144 | .727 | .800 | .035 |
| .20 | 3.59 | .075 | .194 | 4.69 | .034 | 5.23 | ---- | .34 | .0311 | .0117 | .718 | ----- | .046 |
| .20 | 4.22 | .080 | .194 | 5.52 | .026 | 5.23 | 4.97 | .39 | .0225 | .0090 | .718 | .682 | .053 |
| .20 | 4.64 | .086 | .184 | 6.07 | .023 | 5.13 | ---- | .42 | .0186 | .0080 | .704 | ----- | .058 |
| .20 | 5.28 | .094 | .184 | 6.90 | .020 | 5.13 | 4.54 | .46 | .0144 | .0068 | .704 | .623 | .063 |
| .20 | 6.33 | .114 | .203 | 8.28 | .017 | 5.25 | ---- | .50 | .0100 | .0057 | .721 | ----- | .069 |
| .20 | 7.39 | .134 | .235 | 9.66 | .014 | 5.48 | 4.40 | .52 | .0073 | .0049 | .752 | .603 | .072 |
| .20 | 8.44 | .162 | .250 | 11.04 | .013 | 5.65 | 4.23 | .54 | .0056 | .0045 | .775 | .581 | .074 |
| .20 | 9.50 | .187 | .324 | 12.42 | .012 | 6.11 | 4.19 | .54 | .0044 | .0041 | .839 | .575 | .074 |
| .20 | 10.55 | .228 | .363 | 13.80 | .012 | 6.33 | 4.13 | .54 | .0036 | .0041 | .869 | .567 | .074 |
| .20 | 11.61 | .268 | .433 | 15.18 | .012 | 6.78 | 4.09 | .55 | .0030 | .0040 | .930 | .561 | .076 |
| .20 | 12.66 | .307 | .494 | 16.56 | .011 | 7.15 | 4.05 | .55 | .0025 | .0038 | .981 | .556 | .076 |
| .20 | 13.72 | .355 | .551 | 17.94 | .011 | 7.44 | 3.93 | .56 | .0021 | .0038 | 1.021 | .539 | .077 |
| .30 | 0 | 0 | -.134 | 0 | ----- | 2.51 | 5.29 | .14 | ------ | ------ | .394 | .831 | .023 |
| .30 | .63 | .005 | -.108 | .77 | .056 | 2.59 | ---- | .11 | 1.4963 | .0249 | .414 | ----- | .017 |
| .30 | 1.06 | .028 | -.044 | 1.29 | .112 | 2.96 | 5.52 | .11 | .5391 | .0503 | .465 | .867 | .017 |
| .30 | 1.48 | .036 | -.015 | 1.80 | .074 | 3.11 | ---- | .14 | .2750 | .0330 | .489 | ----- | .023 |
| .30 | 2.11 | .056 | .050 | 2.58 | .056 | 3.41 | 5.45 | .13 | .1348 | .0252 | .536 | .856 | .020 |
| .30 | 2.53 | .088 | .169 | 3.09 | .061 | 3.99 | ---- | .08 | .0336 | .0275 | .627 | ----- | .013 |
| .30 | 3.17 | .123 | .249 | 3.87 | .055 | 4.35 | 5.45 | .10 | .0599 | .0246 | .684 | .856 | .016 |
| .30 | 3.59 | .116 | .354 | 4.38 | .040 | 4.87 | ---- | .17 | .0466 | .0180 | .765 | ----- | .027 |
| .30 | 4.22 | .115 | .333 | 5.16 | .029 | 4.72 | 4.73 | .28 | .0337 | .0129 | .741 | .744 | .044 |
| .30 | 4.64 | .116 | .303 | 5.67 | .024 | 4.62 | ---- | .31 | .0278 | .0108 | .725 | ----- | .048 |
| .30 | 5.28 | .122 | .283 | 6.45 | .020 | 4.53 | 4.29 | .36 | .0216 | .0088 | .711 | .673 | .057 |
| .30 | 6.33 | .140 | .289 | 7.74 | .016 | 4.54 | 4.00 | .42 | .0150 | .0070 | .714 | .629 | .066 |
| .30 | 7.39 | .160 | .295 | 9.02 | .013 | 4.54 | 3.88 | .45 | .0110 | .0059 | .714 | .609 | .071 |
| .30 | 8.44 | .184 | .315 | 10.31 | .012 | 4.63 | 3.70 | .46 | .0084 | .0052 | .728 | .581 | .072 |
| .30 | 9.50 | .208 | .363 | 11.60 | .010 | 4.85 | 3.61 | .47 | .0067 | .0046 | .762 | .567 | .074 |
| .30 | 10.55 | .245 | .394 | 12.89 | .010 | 4.95 | 3.57 | .48 | .0054 | .0044 | .778 | .561 | .075 |
| .30 | 11.61 | .284 | .454 | 14.18 | .009 | 5.23 | 3.57 | .49 | .0044 | .0042 | .822 | .561 | .077 |

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.40 | 0 | 0 | -0.141 | 0 | ----- | 2.40 | 5.11 | 0.05 | ------ | ------ | 0.415 | 0.884 | 0.009 |
| .40 | .63 | .006 | -.110 | .74 | 0.055 | 2.51 | ---- | .04 | 1.9950 | 0.0299 | .435 | ----- | .008 |
| .40 | 1.06 | .038 | -.032 | 1.23 | .126 | 2.77 | 5.31 | .04 | .7188 | .0683 | .479 | .918 | .007 |
| .40 | 1.48 | .048 | -.019 | 1.72 | .081 | 2.83 | ---- | .05 | .3666 | .0440 | .489 | ----- | .009 |
| .40 | 2.11 | .071 | .070 | 2.46 | .059 | 3.12 | 5.21 | .04 | .1797 | .0319 | .539 | .901 | .008 |
| .40 | 2.53 | .102 | .194 | 2.96 | .059 | 3.53 | ---- | -.01 | .1248 | .0318 | .610 | ----- | -.002 |
| .40 | 3.17 | .167 | .465 | 3.70 | .061 | 4.38 | 5.37 | -.04 | .0799 | .0333 | .758 | .929 | -.007 |
| .40 | 3.59 | .181 | .533 | 4.19 | .052 | 4.60 | ---- | .04 | .0622 | .0281 | .795 | ----- | .006 |
| .40 | 4.22 | .159 | .500 | 4.93 | .033 | 4.50 | 4.74 | .33 | .0449 | .0179 | .778 | .819 | .057 |
| .40 | 4.64 | .153 | .461 | 5.42 | .026 | 4.38 | ---- | .23 | .0371 | .0142 | .758 | ----- | .040 |
| .40 | 5.28 | .154 | .409 | 6.16 | .020 | 4.21 | 4.15 | .29 | .0288 | .0111 | .728 | .718 | .050 |
| .40 | 6.33 | .167 | .394 | 7.39 | .015 | 4.17 | 3.86 | .35 | .0200 | .0083 | .721 | .668 | .061 |
| .40 | 7.39 | .183 | .375 | 8.62 | .012 | 4.09 | 3.65 | .39 | .0147 | .0067 | .708 | .631 | .068 |
| .40 | 8.44 | .207 | .375 | 9.85 | .011 | 4.07 | 3.52 | .41 | .0112 | .0058 | .704 | .609 | .071 |
| .50 | 0 | 0 | .127 | 0 | ----- | 2.35 | 4.93 | -.03 | ------ | ------ | .438 | .918 | -.005 |
| .50 | .63 | .007 | -.086 | .71 | .055 | 2.46 | ---- | -.05 | 2.4938 | .0349 | .458 | ----- | -.010 |
| .50 | 1.06 | .049 | -.013 | 1.18 | .140 | 2.64 | 5.12 | -.05 | .8985 | .0881 | .492 | .954 | -.010 |
| .50 | 1.48 | .063 | .011 | 1.66 | .092 | 2.72 | ---- | -.02 | .4583 | .0577 | .506 | ----- | -.004 |
| .50 | 2.11 | .088 | .090 | 2.37 | .063 | 2.99 | 5.08 | -.04 | .2246 | .0395 | .539 | .946 | -.008 |
| .50 | 2.53 | .125 | .224 | 2.84 | .062 | 3.22 | ---- | -.09 | .1560 | .0390 | .600 | ----- | -.018 |
| .50 | 3.17 | .209 | .504 | 3.55 | .066 | 3.89 | 5.26 | -.15 | .0999 | .0417 | .725 | .979 | -.029 |
| .50 | 3.59 | .291 | .703 | 4.03 | .072 | 4.34 | ---- | -.18 | .0777 | .0452 | .809 | ----- | -.034 |
| .50 | 4.22 | .216 | .703 | 4.74 | .039 | 4.36 | 4.73 | .05 | .0562 | .0243 | .812 | .881 | .009 |
| $\tau = 12^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.393 | .116 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .109 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | 0.500 | .356 | .109 |
| 0 | 1.48 | .003 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0027 | .500 | ----- | .109 |
| 0 | 2.11 | .006 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0027 | .500 | .373 | .106 |
| 0 | 2.53 | .007 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | .500 | ----- | .104 |
| 0 | 3.17 | .012 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0024 | .500 | .393 | .102 |
| 0 | 3.59 | .016 | .003 | ---- | ----- | ---- | ---- | ---- | 0 | .0025 | .737 | ----- | .102 |
| 0 | 4.22 | .021 | .007 | ---- | ----- | ---- | ---- | ---- | 0 | .0024 | .855 | .399 | .102 |
| 0 | 4.64 | .022 | .007 | ---- | ----- | ---- | ---- | ---- | 0 | .0020 | .842 | ----- | .106 |
| 0 | 5.28 | .029 | .010 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | .889 | .401 | .105 |
| 0 | 6.33 | .045 | .020 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | 1.010 | .404 | .105 |
| 0 | 7.39 | .006 | .027 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | 1.030 | .396 | .105 |
| 0 | 8.44 | .076 | .034 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.010 | .407 | .105 |
| 0 | 9.50 | .093 | .046 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.057 | .407 | .105 |
| 0 | 10.55 | .115 | .055 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.044 | .407 | .105 |
| 0 | 11.61 | .141 | .066 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.030 | .399 | .105 |
| 0 | 12.66 | .169 | .099 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.165 | .381 | .105 |
| 0 | 13.72 | .201 | .089 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.003 | .404 | .105 |
| 0 | 14.77 | .235 | .114 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | 1.050 | .384 | .104 |
| 0 | 15.83 | .270 | .124 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | 1.024 | .384 | .104 |
| 0 | 16.88 | .301 | .194 | ---- | ----- | ---- | ---- | ---- | 0 | .0021 | 1.236 | .404 | .104 |
| .10 | 0 | 0 | -.080 | 0 | ----- | 2.81 | 5.51 | 0.62 | ------ | ------ | .307 | .601 | .067 |
| .10 | .63 | .003 | -.075 | .93 | 0.070 | 2.94 | ---- | .59 | .4988 | .0150 | .320 | ----- | .065 |
| .10 | 1.06 | .010 | -.055 | 1.55 | .084 | 3.40 | 5.59 | .61 | .1797 | .0180 | .371 | .609 | .066 |
| .10 | 1.48 | .018 | -.039 | 2.17 | .077 | 3.74 | ---- | .62 | .0197 | .0165 | .408 | ----- | .067 |
| .10 | 2.11 | .026 | 0 | 3.10 | .054 | 4.57 | 5.46 | .62 | .0449 | .0117 | .500 | .595 | .067 |
| .10 | 2.53 | .030 | .004 | 3.72 | .044 | 4.67 | ---- | .64 | .0312 | .0094 | .509 | ----- | .070 |
| .10 | 3.17 | .036 | .011 | 4.65 | .033 | 4.82 | 4.95 | .69 | .0200 | .0072 | .526 | .539 | .076 |
| .10 | 3.59 | .041 | .011 | 5.26 | .030 | 4.79 | ---- | .76 | .0155 | .0064 | .522 | ----- | .083 |
| .10 | 4.22 | .047 | .011 | 6.19 | .025 | 4.79 | 4.56 | .79 | .0112 | .0053 | .522 | .497 | .086 |
| .10 | 4.64 | .049 | .004 | 6.81 | .021 | 4.67 | ---- | .82 | .0093 | .0045 | .509 | ----- | .089 |

[redacted]

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{(\Delta/w)^{1/3}}$ | $\frac{l}{(\Delta/w)^{1/3}}$ | $\frac{h}{(\Delta/w)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^\circ$ - Continued | | | | | | | | | | | | | |
| 0.10 | 5.28 | 0.056 | 0.007 | 7.74 | 0.019 | 4.70 | 4.33 | 0.84 | 0.0072 | 0.0040 | 0.512 | 0.472 | 0.092 |
| .10 | 6.33 | .069 | .012 | 9.29 | .016 | 4.82 | 4.09 | .86 | .0050 | .0034 | .526 | .446 | .094 |
| .10 | 7.39 | .086 | .016 | 10.84 | .015 | 4.88 | 3.97 | .86 | .0037 | .0032 | .532 | .432 | .094 |
| .10 | 8.44 | .102 | .032 | 12.39 | .013 | 5.16 | 3.97 | .88 | .0028 | .0029 | .563 | .432 | .096 |
| .10 | 9.50 | .121 | .035 | 13.94 | .013 | 5.19 | 3.97 | .90 | .0022 | .0027 | .566 | .432 | .098 |
| .10 | 10.55 | .142 | .046 | 15.49 | .012 | 5.35 | 3.27 | .90 | .0018 | .0026 | .583 | .356 | .098 |
| .10 | 11.61 | .169 | .055 | 17.04 | .012 | 5.47 | 3.89 | .90 | .0015 | .0025 | .596 | .424 | .098 |
| .10 | 12.66 | .195 | .085 | 18.59 | .011 | 5.87 | 3.63 | .90 | .0013 | .0024 | .640 | .396 | .098 |
| .10 | 13.72 | .228 | .085 | 20.13 | .011 | 5.87 | 3.76 | .90 | .0011 | .0024 | .640 | .410 | .098 |
| .10 | 14.77 | .263 | .099 | 21.68 | .011 | 6.02 | 3.68 | .90 | .0009 | .0024 | .657 | .401 | .098 |
| .10 | 15.83 | .294 | .104 | 23.23 | .011 | 6.02 | 3.71 | .90 | .0008 | .0023 | .657 | .404 | .098 |
| .20 | 0 | 0 | -.135 | 0 | ----- | 2.46 | 5.03 | .31 | ------ | ------ | .337 | .690 | .043 |
| .20 | .63 | .005 | -.120 | .83 | .073 | 2.58 | ---- | .27 | .9975 | .0249 | .354 | ----- | .037 |
| .20 | 1.06 | .021 | -.084 | 1.38 | .110 | 2.92 | 5.19 | .28 | .3594 | .0377 | .401 | .713 | .039 |
| .20 | 1.48 | .027 | -.065 | 1.93 | .072 | 3.07 | ---- | .31 | .1833 | .0247 | .421 | ----- | .043 |
| .20 | 2.11 | .049 | .030 | 2.76 | .064 | 3.88 | 5.17 | .28 | .0898 | .0220 | .532 | .710 | .038 |
| .20 | 2.53 | .056 | .065 | 3.31 | .051 | 4.17 | ---- | .32 | .0624 | .0175 | .573 | ----- | .044 |
| .20 | 3.17 | .063 | .069 | 4.14 | .037 | 4.20 | 4.60 | .41 | .0399 | .0126 | .576 | .631 | .056 |
| .20 | 3.59 | .069 | .062 | 4.69 | .031 | 4.15 | ---- | .46 | .0311 | .0107 | .570 | ----- | .063 |
| .20 | 4.22 | .073 | .050 | 5.52 | .024 | 4.03 | 4.13 | .51 | .0225 | .0082 | .553 | .567 | .070 |
| .20 | 4.64 | .078 | .035 | 6.07 | .021 | 3.91 | ---- | .57 | .0186 | .0072 | .536 | ----- | .078 |
| .20 | 5.28 | .083 | .025 | 6.90 | .018 | 3.83 | 3.76 | .60 | .0144 | .0060 | .526 | .516 | .082 |
| .20 | 6.33 | .096 | .022 | 8.28 | .014 | 3.80 | 3.56 | .62 | .0100 | .0048 | .522 | .488 | .085 |
| .20 | 7.39 | .112 | .020 | 9.66 | .012 | 3.78 | 3.37 | .64 | .0073 | .0041 | .519 | .463 | .088 |
| .20 | 8.44 | .130 | .025 | 11.04 | .011 | 3.83 | 3.23 | .65 | .0056 | .0037 | .526 | .443 | .089 |
| .20 | 9.50 | .148 | .035 | 12.42 | .010 | 3.91 | 3.25 | .66 | .0044 | .0033 | .536 | .446 | .091 |
| .20 | 10.55 | .169 | .036 | 13.80 | .009 | 3.91 | 3.21 | .67 | .0035 | .0030 | .536 | .441 | .092 |
| .20 | 11.61 | .194 | .045 | 15.18 | .008 | 3.96 | 3.05 | .68 | .0030 | .0029 | .543 | .418 | .094 |
| .20 | 12.66 | .223 | .072 | 16.56 | .008 | 4.15 | 3.07 | .68 | .0025 | .0028 | .570 | .421 | .094 |
| .20 | 13.72 | .259 | .066 | 17.94 | .008 | 4.10 | 3.17 | .68 | .0021 | .0028 | .563 | .435 | .094 |
| .30 | 0 | 0 | -.168 | 0 | ----- | 2.32 | 4.82 | .17 | ------ | ------ | .364 | .758 | .027 |
| .30 | .63 | .006 | -.145 | .77 | .067 | 2.44 | ---- | .14 | 1.4963 | .0299 | .384 | ----- | .022 |
| .30 | 1.06 | .032 | -.101 | 1.29 | .128 | 2.68 | 4.97 | .16 | .5391 | .0575 | .421 | .780 | .025 |
| .30 | 1.48 | .040 | -.075 | 1.80 | .082 | 2.81 | ---- | .18 | .2750 | .0367 | .441 | ----- | .028 |
| .30 | 2.11 | .067 | .045 | 2.58 | .067 | 3.39 | 5.00 | .13 | .1348 | .0301 | .532 | .786 | .021 |
| .30 | 2.53 | .085 | .139 | 3.09 | .059 | 3.84 | ---- | .15 | .0936 | .0265 | .603 | ----- | .024 |
| .30 | 3.17 | .099 | .174 | 3.87 | .044 | 4.01 | 4.54 | .26 | .0599 | .0198 | .630 | .713 | .042 |
| .30 | 3.59 | .101 | .154 | 4.38 | .035 | 3.90 | ---- | .34 | .0466 | .0157 | .613 | ----- | .054 |
| .30 | 4.22 | .105 | .119 | 5.16 | .026 | 3.73 | 3.89 | .41 | .0337 | .0118 | .586 | .612 | .064 |
| .30 | 4.64 | .108 | .092 | 5.67 | .022 | 3.60 | 3.54 | .45 | .0278 | .0100 | .566 | .556 | .071 |
| .30 | 5.28 | .114 | .069 | 6.45 | .018 | 3.49 | 3.27 | .50 | .0216 | .0082 | .549 | .514 | .078 |
| .30 | 6.33 | .125 | .049 | 7.74 | .014 | 3.41 | 3.12 | .53 | .0150 | .0062 | .536 | .491 | .083 |
| .30 | 7.39 | .140 | .040 | 9.02 | .011 | 3.37 | 3.02 | .56 | .0110 | .0051 | .529 | .474 | .088 |
| .30 | 8.44 | .159 | .035 | 10.31 | .010 | 3.32 | 2.97 | .57 | .0084 | .0045 | .522 | .466 | .090 |
| .30 | 9.50 | .176 | .035 | 11.60 | .009 | 3.32 | 2.91 | .57 | .0067 | .0039 | .522 | .457 | .090 |
| .30 | 10.55 | .197 | .036 | 12.89 | .008 | 3.32 | 2.80 | .60 | .0054 | .0035 | .522 | .441 | .095 |
| .30 | 11.61 | .222 | .040 | 14.18 | .007 | 3.35 | ---- | .60 | .0045 | .0033 | .526 | ----- | .095 |
| .40 | 0 | 0 | -.180 | 0 | ----- | 2.26 | 4.69 | .05 | ------ | ------ | .391 | .811 | .009 |
| .40 | .63 | .008 | -.149 | .74 | .073 | 2.36 | ---- | .04 | 1.9950 | .0399 | .408 | ----- | .006 |
| .40 | 1.06 | .046 | -.089 | 1.23 | .152 | 2.57 | 4.82 | .04 | .7188 | .0827 | .445 | .833 | .007 |
| .40 | 1.46 | .054 | -.067 | 1.72 | .091 | 2.65 | ---- | .08 | .3666 | .0495 | .458 | ----- | .013 |
| .40 | 2.11 | .083 | .068 | 2.46 | .069 | 3.12 | 4.85 | .02 | .1797 | .0373 | .539 | .839 | .004 |
| .40 | 2.53 | .120 | .224 | 2.96 | .069 | 3.63 | ---- | .02 | .1248 | .0374 | .627 | ----- | .003 |
| .40 | 3.17 | .136 | .300 | 3.70 | .050 | 3.86 | 4.52 | .12 | .0799 | .0272 | .667 | .783 | .021 |

[redacted]

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^{\circ}$ - Concluded | | | | | | | | | | | | | |
| 0.40 | 3.59 | 0.141 | 0.277 | 4.19 | 0.040 | 3.78 | ---- | 0.21 | 0.0622 | 0.0219 | 0.654 | ----- | 0.036 |
| .40 | 4.22 | .140 | .224 | 4.93 | .029 | 3.60 | 3.79 | .30 | .0449 | .0157 | .623 | 0.657 | .053 |
| .40 | 4.64 | .142 | .174 | 5.42 | .024 | 3.45 | ---- | .36 | .0371 | .0132 | .596 | ----- | .063 |
| .40 | 5.28 | .146 | .135 | 6.16 | .019 | 3.31 | 3.40 | .40 | .0288 | .0105 | .573 | .589 | .070 |
| .40 | 6.33 | .155 | .089 | 7.39 | .014 | 3.17 | 3.10 | .46 | .0200 | .0077 | .549 | .536 | .079 |
| .40 | 7.39 | .169 | .060 | 8.62 | .011 | 3.08 | 2.95 | .48 | .0147 | .0062 | .532 | .511 | .084 |
| .40 | 8.44 | .183 | .055 | 9.85 | .009 | 3.06 | 2.84 | .51 | .0112 | .0051 | .529 | .491 | .088 |
| .50 | 0 | 0 | -.169 | 0 | ----- | 2.24 | 4.62 | -.04 | ------ | ------ | .417 | .861 | -.007 |
| .50 | .63 | .010 | -.134 | .71 | .079 | 2.34 | ---- | -.06 | 2.4938 | .0499 | .435 | ----- | -.012 |
| .50 | 1.06 | .059 | -.087 | 1.18 | .168 | 2.46 | 4.73 | -.05 | .8985 | .1060 | .458 | .881 | -.009 |
| .50 | 1.48 | .067 | -.047 | 1.66 | .097 | 2.55 | ---- | .01 | .4583 | .0614 | .475 | ----- | .003 |
| .50 | 2.11 | .103 | .095 | 2.37 | .073 | 2.92 | 4.76 | -.05 | .2246 | .0463 | .543 | .887 | -.009 |
| .50 | 2.53 | .148 | .322 | 2.84 | .073 | 3.46 | ---- | -.10 | .1560 | .0462 | .644 | ----- | -.019 |
| .50 | 3.17 | .179 | .441 | 3.55 | .057 | 3.73 | 4.53 | -.01 | .0999 | .0357 | .694 | .844 | -.001 |
| .50 | 3.59 | .179 | .427 | 4.03 | .044 | 3.71 | ---- | .09 | .0777 | .0278 | .691 | ----- | .017 |
| .50 | 4.22 | .179 | .354 | 4.74 | .032 | 3.53 | 3.83 | .20 | .0562 | .0201 | .657 | .713 | .038 |
| $\tau = 16^{\circ}$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.289 | 0.139 |
| 0 | .63 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .139 |
| 0 | 1.06 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .216 | .141 |
| 0 | 1.48 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .145 |
| 0 | 2.11 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .101 | .146 |
| 0 | 4.64 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .150 |
| 0 | 11.61 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .151 |
| .10 | 0 | 0 | -.094 | 0 | ----- | 2.47 | 4.82 | 0.72 | ------ | ------ | 0.270 | .525 | .078 |
| .10 | .63 | .006 | -.089 | .93 | 0.139 | 2.60 | ---- | .68 | 0.4988 | 0.0299 | .283 | ----- | .074 |
| .10 | 1.06 | .013 | -.079 | 1.55 | .109 | 2.87 | 4.92 | .72 | .1797 | .0234 | .313 | .536 | .078 |
| .10 | 1.48 | .020 | -.060 | 2.17 | .065 | 3.31 | ---- | .73 | .0917 | .0183 | .361 | ----- | .080 |
| .10 | 2.11 | .026 | -.046 | 3.10 | .054 | 3.62 | 4.51 | .81 | .0449 | .0117 | .394 | .491 | .088 |
| .10 | 2.53 | .028 | -.049 | 3.72 | .040 | 3.55 | ---- | .85 | .0312 | .0087 | .388 | ----- | .092 |
| .10 | 3.17 | .029 | -.058 | 4.65 | .027 | 3.37 | 3.86 | .94 | .0200 | .0058 | .367 | .421 | .102 |
| .10 | 3.59 | .028 | -.069 | 5.26 | .020 | 3.15 | ---- | .98 | .0155 | .0044 | .344 | ----- | .107 |
| .10 | 4.22 | .029 | -.079 | 6.19 | .015 | 2.94 | 3.35 | 1.04 | .0112 | .0033 | .320 | .365 | .114 |
| .10 | 4.64 | .031 | -.085 | 6.81 | .013 | 2.81 | ---- | 1.07 | .0093 | .0029 | .307 | ----- | .116 |
| .10 | 5.28 | .031 | -.094 | 7.74 | .010 | 2.63 | 3.04 | 1.08 | .0072 | .0022 | .286 | .331 | .118 |
| .10 | 6.33 | .029 | -.115 | 9.29 | .006 | 2.19 | 2.63 | 1.11 | .0050 | .0014 | .239 | .286 | .121 |
| .10 | 7.39 | .031 | -.143 | 10.84 | .005 | 1.61 | 2.50 | 1.13 | .0037 | .0011 | .175 | .272 | .123 |
| .10 | 8.44 | .031 | -.159 | 12.39 | .004 | 1.30 | 2.40 | 1.15 | .0028 | .0009 | .142 | .261 | .125 |
| .10 | 9.50 | .033 | -.180 | 13.94 | .003 | .87 | 2.24 | 1.16 | .0022 | .0007 | .094 | .244 | .127 |
| .10 | 10.55 | .033 | -.165 | 15.49 | .003 | 1.21 | 2.14 | 1.17 | .0018 | .0006 | .131 | .233 | .128 |
| .10 | 11.61 | .032 | -.194 | 17.04 | .002 | .59 | 1.80 | 1.19 | .0015 | .0005 | .064 | .196 | .129 |
| .10 | 12.66 | .031 | -.201 | 18.59 | .002 | .43 | 1.73 | 1.19 | .0013 | .0004 | .047 | .188 | .129 |
| .10 | 13.72 | .032 | -.209 | 20.13 | .001 | .28 | 1.47 | 1.20 | .0011 | .0003 | .030 | .160 | .130 |
| .10 | 14.77 | .031 | -.230 | 21.68 | .001 | -.15 | .31 | 1.20 | .0009 | .0003 | -.170 | .034 | .130 |
| .10 | 15.83 | .031 | -.209 | 23.23 | .001 | .28 | 1.13 | 1.19 | .0008 | .0002 | .030 | .123 | .129 |
| .20 | 0 | 0 | -.155 | 0 | ----- | 2.26 | 4.50 | .37 | ------ | ------ | .310 | .617 | .051 |
| .20 | .63 | .006 | -.147 | .83 | .087 | 2.33 | ---- | .34 | .9975 | .0299 | .320 | ----- | .046 |
| .20 | 1.06 | .026 | -.127 | 1.38 | .137 | 2.52 | 4.68 | .38 | .3594 | .0467 | .347 | .643 | .052 |
| .20 | 1.48 | .037 | -.087 | 1.93 | .099 | 2.90 | ---- | .38 | .1833 | .0339 | .398 | ----- | .052 |
| .20 | 2.11 | .054 | -.032 | 2.76 | .071 | 3.37 | 4.46 | .41 | .0898 | .0243 | .462 | .612 | .056 |
| .20 | 2.53 | .057 | -.030 | 3.31 | .052 | 3.39 | ---- | .50 | .0624 | .0178 | .465 | ----- | .069 |
| .20 | 3.17 | .060 | -.049 | 4.14 | .035 | 3.24 | 3.68 | .61 | .0399 | .0120 | .445 | .505 | .083 |
| .20 | 3.59 | .060 | -.067 | 4.69 | .027 | 3.10 | ---- | .66 | .0311 | .0093 | .425 | ----- | .090 |
| .20 | 4.22 | .059 | -.090 | 5.52 | .019 | 2.90 | 3.19 | .72 | .0225 | .0066 | .398 | .438 | .099 |

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 16^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 4.64 | 0.059 | -0.105 | 6.07 | 0.016 | 2.78 | ---- | 0.76 | 0.0186 | 0.0055 | 0.381 | ----- | 0.105 |
| .20 | 5.28 | .059 | -.130 | 6.90 | .012 | 2.58 | 2.80 | .78 | .0144 | .0042 | .354 | 0.384 | .107 |
| .20 | 6.33 | .059 | -.161 | 8.29 | .008 | 2.31 | 2.60 | .82 | .0100 | .0029 | .317 | .356 | .113 |
| .20 | 7.39 | .061 | -.200 | 9.66 | .006 | 1.99 | 2.45 | .83 | .0073 | .0022 | .273 | .337 | .114 |
| .20 | 8.44 | .060 | -.230 | 11.04 | .005 | 1.74 | 2.25 | .87 | .0056 | .0017 | .239 | .309 | .119 |
| .20 | 9.50 | .062 | -.260 | 12.42 | .004 | 1.50 | 2.13 | .88 | .0044 | .0014 | .206 | .292 | .120 |
| .20 | 10.55 | .066 | -.270 | 13.80 | .004 | 1.42 | 2.15 | .88 | .0036 | .0012 | .195 | .295 | .120 |
| .20 | 11.61 | .071 | -.308 | 15.18 | .003 | 1.13 | 1.98 | .89 | .0030 | .0011 | .155 | .272 | .123 |
| .20 | 12.66 | .073 | -.337 | 16.56 | .003 | .91 | 1.74 | .90 | .0025 | .0009 | .125 | .238 | .124 |
| .20 | 13.72 | .073 | -.351 | 17.94 | .002 | .81 | 1.78 | .90 | .0021 | .0008 | .111 | .244 | .124 |
| .30 | 0 | 0 | -.190 | 0 | ----- | 2.19 | 4.39 | .19 | ------ | ------ | .344 | .690 | .029 |
| .30 | .63 | .010 | -.174 | .77 | .111 | 2.27 | ---- | .17 | 1.4963 | .0499 | .357 | ----- | .027 |
| .30 | 1.06 | .042 | -.151 | 1.29 | .168 | 2.43 | 4.50 | .20 | .5391 | .0755 | .381 | .707 | .031 |
| .30 | 1.48 | .054 | -.101 | 1.80 | .110 | 2.68 | ---- | .21 | .2750 | .0495 | .421 | ----- | .033 |
| .30 | 2.11 | .089 | 0 | 2.58 | .089 | 3.18 | 4.41 | .23 | .1348 | .0400 | .500 | .593 | .036 |
| .30 | 2.53 | .095 | .015 | 3.09 | .066 | 3.24 | ---- | .25 | .0936 | .0296 | .509 | ----- | .039 |
| .30 | 3.17 | .098 | 0 | 3.87 | .041 | 3.18 | 3.70 | .44 | .0599 | .0196 | .499 | .581 | .069 |
| .30 | 3.59 | .096 | -.030 | 4.38 | .033 | 3.02 | ---- | .51 | .0466 | .0149 | .475 | ----- | .080 |
| .30 | 4.22 | .094 | -.069 | 5.16 | .024 | 2.85 | 3.12 | .58 | .0337 | .0106 | .448 | .491 | .090 |
| .30 | 4.64 | .092 | -.100 | 5.67 | .019 | 2.71 | ---- | .61 | .0278 | .0085 | .425 | ----- | .096 |
| .30 | 5.28 | .089 | -.132 | 6.45 | .014 | 2.55 | 2.79 | .65 | .0216 | .0064 | .401 | .438 | .103 |
| .30 | 6.33 | .085 | -.190 | 7.74 | .010 | 2.27 | 2.50 | .69 | .0150 | .0044 | .357 | .393 | .108 |
| .30 | 7.39 | .090 | -.230 | 9.02 | .007 | 2.08 | 2.34 | .72 | .0110 | .0033 | .327 | .368 | .113 |
| .30 | 8.44 | .092 | -.255 | 10.31 | .006 | 1.95 | 2.16 | .74 | .0084 | .0026 | .307 | .340 | .117 |
| .30 | 9.50 | .093 | -.310 | 11.60 | .005 | 1.69 | 2.02 | .75 | .0067 | .0021 | .266 | .317 | .119 |
| .30 | 10.55 | .095 | -.330 | 12.89 | .004 | 1.61 | 2.04 | .76 | .0054 | .0017 | .253 | .320 | .120 |
| .30 | 11.61 | .100 | -.377 | 14.18 | .003 | 1.39 | 1.91 | .77 | .0044 | .0015 | .219 | .300 | .121 |
| .40 | 0 | 0 | -.204 | 0 | ----- | 2.16 | 4.33 | .05 | ------ | ------ | .374 | .749 | .008 |
| .40 | .63 | .012 | -.188 | .74 | .110 | 2.22 | ---- | .02 | 1.9950 | .0599 | .384 | ----- | .003 |
| .40 | 1.06 | .057 | -.167 | 1.23 | .189 | 2.32 | 4.41 | .05 | .7188 | .1024 | .401 | .763 | .008 |
| .40 | 1.48 | .071 | -.096 | 1.72 | .120 | 2.55 | ---- | .06 | .3566 | .0651 | .441 | ----- | .011 |
| .40 | 2.11 | .120 | .043 | 2.46 | .099 | 3.02 | 4.35 | .06 | .1797 | .0539 | .522 | .752 | .011 |
| .40 | 2.53 | .134 | .089 | 2.96 | .077 | 3.17 | ---- | .14 | .1243 | .0418 | .549 | ----- | .024 |
| .40 | 3.17 | .139 | .070 | 3.70 | .051 | 3.12 | 3.75 | .28 | .0799 | .0278 | .539 | .648 | .048 |
| .40 | 3.59 | .137 | .025 | 4.19 | .039 | 2.96 | ---- | .36 | .0622 | .0213 | .512 | ----- | .062 |
| .40 | 4.22 | .132 | -.029 | 4.93 | .027 | 2.79 | 3.13 | .44 | .0449 | .0148 | .482 | .542 | .077 |
| .40 | 4.64 | .132 | -.069 | 5.42 | .023 | 2.67 | ---- | .50 | .0371 | .0123 | .462 | ----- | .086 |
| .40 | 5.28 | .128 | -.120 | 6.16 | .017 | 2.49 | 2.71 | .54 | .0288 | .0092 | .431 | .469 | .093 |
| .40 | 6.33 | .121 | -.193 | 7.39 | .011 | 2.26 | 2.43 | .59 | .0200 | .0060 | .391 | .421 | .102 |
| .40 | 7.39 | .121 | -.250 | 8.62 | .008 | 2.06 | 2.26 | .61 | .0147 | .0041 | .357 | .390 | .106 |
| .40 | 8.44 | .121 | -.281 | 9.85 | .006 | 1.97 | 2.16 | .64 | .0112 | .0034 | .340 | .373 | .110 |
| .50 | 0 | 0 | -.205 | 0 | ----- | 2.14 | 4.29 | -.05 | ------ | ------ | .398 | .800 | -.010 |
| .50 | .63 | .015 | -.179 | .71 | .119 | 2.21 | ---- | -.08 | 2.4938 | .0748 | .411 | ----- | -.016 |
| .50 | 1.06 | .073 | -.155 | 1.18 | .208 | 2.28 | 4.40 | -.05 | .8965 | .1312 | .425 | .819 | -.009 |
| .50 | 1.48 | .085 | -.084 | 1.66 | .124 | 2.46 | ---- | -.02 | .4583 | .0779 | .458 | ----- | -.004 |
| .50 | 2.11 | .149 | .070 | 2.37 | .106 | 2.84 | 4.34 | -.04 | .2246 | .0669 | .529 | .808 | -.008 |
| .50 | 2.53 | .167 | .163 | 2.84 | .083 | 3.08 | ---- | .02 | .1560 | .0521 | .573 | ----- | .004 |
| .50 | 3.17 | .179 | .170 | 3.55 | .057 | 3.08 | 3.69 | .19 | .0999 | .0357 | .573 | .687 | .035 |
| .50 | 3.59 | .176 | .104 | 4.03 | .043 | 2.93 | ---- | .27 | .0777 | .0274 | .546 | ----- | .051 |
| .50 | 4.22 | .173 | .025 | 4.74 | .031 | 2.73 | 3.09 | .37 | .0562 | .0194 | .509 | .575 | .069 |

TABLE II - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 20^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.233 | 0.172 |
| 0 | .63 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .176 |
| 0 | 1.06 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .123 | .178 |
| 0 | 1.48 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .185 |
| 0 | 2.11 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .084 | .188 |
| 0 | 2.53 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .188 |
| 0 | 3.17 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .188 |
| 0 | 3.59 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .323 |
| 0 | 4.22 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .188 |
| 0 | 4.64 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .188 |
| 0 | 5.28 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .188 |
| 0 | 6.33 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .188 |
| 0 | 12.66 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .188 |
| .10 | 0 | 0 | -.095 | 0 | ----- | 2.38 | 4.45 | 0.85 | ------ | ------ | 0.259 | .485 | .092 |
| .10 | .63 | .008 | -.090 | .93 | 0.185 | 2.53 | ---- | .80 | 0.4988 | 0.0399 | .279 | ----- | .087 |
| .10 | 1.06 | .016 | -.086 | 1.55 | .134 | 2.72 | 4.48 | .87 | .1797 | .0288 | .297 | .488 | .095 |
| .10 | 1.48 | .025 | -.069 | 2.17 | .106 | 3.12 | ---- | .90 | .0917 | .0229 | .340 | ----- | .098 |
| .10 | 2.11 | .027 | -.069 | 3.10 | .056 | 3.12 | 3.79 | 1.04 | .0449 | .0121 | .340 | .413 | .114 |
| .10 | 2.53 | .024 | -.080 | 3.72 | .035 | 2.87 | ---- | 1.13 | .0312 | .0075 | .313 | ----- | .123 |
| .10 | 3.17 | .024 | -.101 | 4.65 | .022 | 2.44 | 2.96 | 1.21 | .0200 | .0048 | .266 | .323 | .132 |
| .10 | 3.59 | .023 | -.110 | 5.26 | .017 | 2.26 | ---- | 1.26 | .0155 | .0036 | .246 | ----- | .138 |
| .10 | 4.22 | .021 | -.125 | 6.19 | .011 | 1.92 | 2.29 | 1.33 | .0112 | .0024 | .209 | .250 | .145 |
| .10 | 4.64 | .019 | -.139 | 6.81 | .008 | 1.58 | ---- | 1.36 | .0093 | .0018 | .172 | ----- | .148 |
| .10 | 5.28 | .018 | -.151 | 7.74 | .006 | 1.33 | 1.80 | 1.39 | .0072 | .0013 | .145 | .196 | .152 |
| .10 | 6.33 | .016 | -.170 | 9.29 | .004 | .90 | 1.39 | 1.42 | .0050 | .0008 | .098 | .152 | .155 |
| .10 | 7.39 | .016 | -.180 | 10.84 | .003 | .68 | 1.11 | 1.46 | .0037 | .0006 | .074 | .121 | .159 |
| .10 | 8.44 | .016 | -.190 | 12.39 | .002 | .46 | .85 | 1.46 | .0028 | .0004 | .051 | .093 | .159 |
| .10 | 9.50 | .016 | -.194 | 13.94 | .002 | .37 | .88 | 1.48 | .0022 | .0004 | .040 | .096 | .161 |
| .10 | 10.55 | .018 | -.210 | 15.49 | .001 | .06 | .75 | 1.49 | .0018 | .0003 | .007 | .081 | .162 |
| .10 | 11.61 | .018 | -.204 | 17.04 | .001 | .19 | .62 | 1.49 | .0015 | .0003 | .020 | .067 | .162 |
| .10 | 12.66 | .018 | -.214 | 18.59 | .001 | -.06 | .67 | 1.50 | .0013 | .0002 | -.007 | .073 | .163 |
| .10 | 13.72 | .018 | -.209 | 20.13 | .001 | .06 | .18 | 1.50 | .0011 | .0002 | .007 | .020 | .163 |
| .10 | 14.77 | .018 | -.225 | 21.68 | .001 | -.28 | .44 | 1.50 | .0009 | .0002 | -.030 | .048 | .163 |
| .10 | 15.83 | .019 | ----- | 23.23 | .001 | ---- | .31 | 1.50 | .0008 | .0002 | ----- | .034 | .163 |
| .20 | 0 | 0 | -.165 | 0 | ----- | 2.11 | 4.17 | .43 | ------ | ------ | .290 | .572 | .060 |
| .20 | .63 | .012 | -.153 | .83 | .175 | 2.26 | ---- | .42 | .9975 | .0599 | .310 | ----- | .057 |
| .20 | 1.06 | .034 | -.141 | 1.38 | .179 | 2.43 | 4.27 | .47 | .3594 | .0611 | .334 | .587 | .064 |
| .20 | 1.48 | .052 | -.102 | 1.93 | .139 | 2.78 | ---- | .49 | .1833 | .0477 | .381 | ----- | .067 |
| .20 | 2.11 | .059 | -.080 | 2.76 | .077 | 2.97 | 3.80 | .61 | .0898 | .0265 | .407 | .522 | .084 |
| .20 | 2.53 | .060 | -.094 | 3.31 | .055 | 2.87 | ---- | .70 | .0624 | .0187 | .394 | ----- | .096 |
| .20 | 3.17 | .056 | -.130 | 4.14 | .033 | 2.55 | 3.01 | .81 | .0399 | .0112 | .350 | .413 | .112 |
| .20 | 3.59 | .053 | -.159 | 4.69 | .024 | 2.31 | ---- | .89 | .0311 | .0082 | .317 | ----- | .122 |
| .20 | 4.22 | .047 | -.194 | 5.52 | .015 | 2.01 | 2.45 | .95 | .0225 | .0053 | .276 | .337 | .130 |
| .20 | 4.64 | .046 | -.214 | 6.07 | .013 | 1.84 | ---- | .98 | .0186 | .0043 | .253 | ----- | .135 |
| .20 | 5.28 | .043 | -.241 | 6.90 | .009 | 1.60 | 2.05 | 1.01 | .0144 | .0031 | .219 | .281 | .139 |
| .20 | 6.33 | .036 | -.276 | 8.28 | .005 | 1.28 | 1.64 | 1.05 | .0100 | .0018 | .175 | .225 | .145 |
| .20 | 7.39 | .033 | -.307 | 9.66 | .004 | 1.01 | 1.44 | 1.08 | .0073 | .0012 | .138 | .197 | .149 |
| .20 | 8.44 | .035 | -.320 | 11.04 | .003 | .88 | 1.15 | 1.10 | .0056 | .0010 | .121 | .157 | .152 |
| .20 | 9.50 | .034 | -.352 | 12.42 | .002 | .61 | 1.11 | 1.14 | .0044 | .0008 | .084 | .153 | .156 |
| .20 | 10.55 | .035 | -.350 | 13.80 | .002 | .63 | 1.06 | 1.14 | .0036 | .0006 | .087 | .146 | .156 |
| .20 | 11.61 | .034 | -.381 | 15.18 | .001 | .37 | .75 | 1.15 | .0030 | .0005 | .051 | .103 | .157 |
| .20 | 12.66 | .033 | -.391 | 16.56 | .001 | .27 | .65 | 1.15 | .0025 | .0004 | .037 | .089 | .157 |
| .20 | 13.72 | .033 | -.401 | 17.94 | .001 | .20 | .70 | 1.15 | .0021 | .0004 | .027 | .096 | .157 |

TABLE II - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 20^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.30 | 0 | 0 | -0.200 | 0 | ----- | 2.10 | 4.11 | 0.21 | ------ | ------ | 0.330 | 0.645 | 0.033 |
| .30 | .63 | .016 | -.185 | .77 | 0.178 | 2.21 | ---- | .20 | 1.4963 | 0.0798 | .347 | ----- | .032 |
| .30 | 1.06 | .052 | -.175 | 1.29 | .208 | 2.30 | 4.20 | .25 | .5391 | .0934 | .361 | .660 | .039 |
| .30 | 1.46 | .072 | -.111 | 1.80 | .147 | 2.64 | ---- | .25 | .2750 | .0660 | .415 | ----- | .039 |
| .30 | 2.11 | .098 | -.060 | 2.58 | .098 | 2.90 | 3.82 | .36 | .1348 | .0440 | .455 | .601 | .057 |
| .30 | 2.53 | .096 | -.069 | 3.09 | .067 | 2.85 | ---- | .46 | .0936 | .0299 | .448 | ----- | .073 |
| .30 | 3.17 | .092 | -.126 | 3.87 | .041 | 2.57 | 3.04 | .61 | .0599 | .0184 | .404 | .477 | .096 |
| .30 | 3.59 | .088 | -.169 | 4.38 | .031 | 2.36 | ---- | .69 | .0466 | .0137 | .371 | ----- | .108 |
| .30 | 4.22 | .080 | -.216 | 5.16 | .020 | 2.13 | 2.48 | .76 | .0337 | .0090 | .334 | .390 | .119 |
| .30 | 4.64 | .079 | -.255 | 5.67 | .016 | 1.95 | ---- | .79 | .0278 | .0073 | .307 | ----- | .124 |
| .30 | 5.28 | .072 | -.294 | 6.45 | .012 | 1.74 | 2.13 | .82 | .0216 | .0052 | .273 | .334 | .130 |
| .30 | 6.33 | .062 | -.355 | 7.74 | .007 | 1.41 | 1.82 | .88 | .0150 | .0031 | .222 | .286 | .138 |
| .30 | 7.39 | .057 | -.401 | 9.02 | .005 | 1.18 | 1.61 | .91 | .0110 | .0021 | .185 | .253 | .142 |
| .30 | 8.44 | .052 | -.421 | 10.31 | .003 | 1.08 | 1.38 | .93 | .0084 | .0015 | .169 | .216 | .146 |
| .30 | 9.50 | .052 | -.472 | 11.60 | .003 | .81 | 1.16 | .95 | .0067 | .0012 | .128 | .182 | .149 |
| .30 | 10.55 | .054 | -.493 | 12.89 | .002 | .71 | 1.12 | .96 | .0054 | .0010 | .111 | .177 | .151 |
| .30 | 11.61 | .052 | -.524 | 14.18 | .002 | .56 | .95 | .97 | .0044 | .0008 | .088 | .149 | .152 |
| .40 | 0 | 0 | -.216 | 0 | ----- | 2.11 | 4.09 | .05 | ------ | ------ | .364 | .707 | .009 |
| .40 | .63 | .018 | -.200 | .74 | .165 | 2.18 | ---- | .04 | 1.9950 | .0898 | .377 | ----- | .006 |
| .40 | 1.06 | .072 | -.186 | 1.23 | .238 | 2.26 | 4.17 | .08 | .7188 | .1294 | .391 | .721 | .014 |
| .40 | 1.48 | .090 | -.111 | 1.72 | .152 | 2.52 | ---- | .09 | .3666 | .0825 | .435 | ----- | .016 |
| .40 | 2.11 | .139 | -.030 | 2.46 | .115 | 2.79 | 3.91 | .17 | .1797 | .0624 | .482 | .676 | .030 |
| .40 | 2.53 | .143 | -.019 | 2.96 | .082 | 2.83 | ---- | .27 | .1248 | .0446 | .489 | ----- | .047 |
| .40 | 3.17 | .141 | -.086 | 3.70 | .052 | 2.61 | 3.00 | .44 | .0799 | .0282 | .452 | .519 | .077 |
| .40 | 3.59 | .132 | -.149 | 4.19 | .038 | 2.40 | ---- | .53 | .0622 | .0205 | .415 | ----- | .092 |
| .40 | 4.22 | .120 | -.221 | 4.93 | .025 | 2.16 | 2.53 | .61 | .0449 | .0135 | .374 | .438 | .106 |
| .40 | 4.64 | .113 | -.267 | 5.42 | .019 | 2.01 | ---- | .65 | .0371 | .0105 | .347 | ----- | .112 |
| .40 | 5.28 | .106 | -.328 | 6.16 | .014 | 1.79 | 2.17 | .70 | .0288 | .0076 | .310 | .376 | .120 |
| .40 | 6.33 | .093 | -.407 | 7.39 | .008 | 1.52 | 1.88 | .74 | .0200 | .0046 | .263 | .326 | .129 |
| .40 | 7.39 | .085 | -.471 | 8.62 | .006 | 1.31 | 1.74 | .78 | .0147 | .0031 | .226 | .300 | .135 |
| .40 | 8.44 | .078 | -.508 | 9.85 | .004 | 1.17 | 1.49 | .81 | .0112 | .0022 | .202 | .258 | .140 |
| .50 | 0 | 0 | -.210 | 0 | ----- | 2.12 | 4.08 | -.07 | ------ | ------ | .394 | .760 | -.014 |
| .50 | .63 | .024 | -.190 | .71 | .190 | 2.17 | ---- | -.08 | 2.4938 | .1197 | .404 | ----- | -.015 |
| .50 | 1.06 | .089 | -.185 | 1.18 | .254 | 2.21 | 4.14 | -.03 | .8985 | .1599 | .411 | .772 | -.005 |
| .50 | 1.45 | .105 | -.101 | 1.66 | .153 | 2.43 | ---- | -.03 | .4583 | .0962 | .452 | ----- | -.005 |
| .50 | 2.11 | .180 | .010 | 2.37 | .128 | 2.70 | 3.92 | .05 | .2246 | .0809 | .502 | .730 | .009 |
| .50 | 2.53 | .188 | .036 | 2.84 | .093 | 2.77 | ---- | .15 | .1560 | .0586 | .516 | ----- | .029 |
| .50 | 3.17 | .186 | -.036 | 3.55 | .059 | 2.59 | 3.13 | .33 | .0999 | .0371 | .482 | .584 | .061 |
| .50 | 3.59 | .177 | -.101 | 4.03 | .044 | 2.44 | ---- | .42 | .0777 | .0275 | .455 | ----- | .078 |
| .50 | 4.22 | .162 | -.204 | 4.74 | .029 | 2.19 | 2.56 | .52 | .0562 | .0182 | .408 | .477 | .097 |

TABLE III

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{B_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ----- | ---- | ------ | ------ | ----- | 0.487 | 0.056 |
| 0 | .63 | .001 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | 0.0050 | ----- | ----- | .058 |
| 0 | 1.06 | .002 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0036 | ----- | .786 | .058 |
| 0 | 1.48 | .004 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0037 | ----- | ----- | .056 |
| 0 | 2.11 | .010 | .011 | ---- | ----- | ----- | ----- | ---- | 0 | .0045 | ----- | .816 | .054 |
| 0 | 2.53 | .018 | .015 | ---- | ----- | ----- | ----- | ---- | 0 | .0056 | ----- | ----- | .052 |
| 0 | 3.17 | .031 | .035 | ---- | ----- | ----- | ----- | ---- | 0 | .0062 | ----- | .865 | .048 |
| 0 | 3.59 | .036 | .040 | ---- | ----- | ----- | ----- | ---- | 0 | .0056 | ----- | ----- | .050 |
| 0 | 4.22 | .048 | .067 | ---- | ----- | ----- | ----- | ---- | 0 | .0054 | ----- | .861 | .048 |
| 0 | 4.64 | .056 | .074 | ---- | ----- | ----- | ----- | ---- | 0 | .0052 | ----- | ----- | .051 |
| 0 | 5.23 | .071 | .100 | ---- | ----- | ----- | ----- | ---- | 0 | .0051 | ----- | .861 | .048 |
| 0 | 6.33 | .096 | .163 | ---- | ----- | ----- | ----- | ---- | 0 | .0048 | ----- | .857 | .048 |
| 0 | 7.39 | .125 | .222 | ---- | ----- | ----- | ----- | ---- | 0 | .0046 | ----- | .865 | .048 |
| 0 | 8.44 | .165 | .283 | ---- | ----- | ----- | ----- | ---- | 0 | .0046 | ----- | .854 | .048 |
| 0 | 9.50 | .212 | .384 | ---- | ----- | ----- | ----- | ---- | 0 | .0047 | ----- | .867 | .046 |
| .10 | 0 | 0 | .030 | 0 | ----- | 6.68 | 9.02 | 0.40 | ------ | ------ | 0.554 | .748 | .033 |
| .10 | .63 | .002 | .035 | .93 | 0.046 | 6.77 | ----- | .38 | .4988 | .0100 | .562 | ----- | .031 |
| .10 | 1.06 | .007 | .067 | 1.55 | .057 | 7.47 | 11.49 | .37 | .1797 | .0124 | .620 | .953 | .031 |
| .10 | 1.48 | .013 | .081 | 2.17 | .056 | 7.79 | ----- | .36 | .0917 | .0119 | .646 | ----- | .030 |
| .10 | 2.11 | .025 | .099 | 3.10 | .051 | 8.16 | 11.35 | .37 | .0449 | .0112 | .677 | .942 | .031 |
| .10 | 2.53 | .036 | .109 | 3.72 | .051 | 8.38 | ----- | .33 | .0312 | .0112 | .695 | ----- | .028 |
| .10 | 3.17 | .071 | .145 | 4.65 | .065 | 9.14 | 11.56 | .28 | .0200 | .0142 | .759 | .959 | .023 |
| .10 | 3.59 | .109 | .163 | 5.26 | .079 | 9.55 | ----- | .26 | .0155 | .0169 | .792 | ----- | .021 |
| .10 | 4.22 | .246 | .204 | 6.19 | .130 | 10.39 | 12.69 | .16 | .0112 | .0276 | .862 | 1.053 | .014 |
| .20 | 0 | 0 | .060 | 0 | ----- | 5.30 | 8.04 | .23 | ------ | ------ | .554 | .840 | .024 |
| .20 | .63 | .002 | .066 | .83 | .029 | 5.35 | ----- | .21 | .9975 | .0100 | .559 | ----- | .022 |
| .20 | 1.06 | .010 | .116 | 1.38 | .053 | 5.79 | 9.57 | .18 | .3594 | .0180 | .605 | 1.000 | .019 |
| .20 | 1.48 | .021 | .156 | 1.93 | .056 | 6.10 | ----- | .18 | .1833 | .0192 | .638 | ----- | .019 |
| .20 | 2.11 | .038 | .190 | 2.76 | .050 | 6.40 | 9.57 | .18 | .0898 | .0171 | .669 | 1.000 | .019 |
| .20 | 2.53 | .055 | .185 | 3.31 | .050 | 6.35 | ----- | .17 | .0624 | .0172 | .664 | ----- | .018 |
| .20 | 3.17 | .112 | .189 | 4.14 | .064 | 6.40 | 9.57 | .14 | .0399 | .0224 | .669 | 1.000 | .015 |
| .20 | 3.59 | .183 | .184 | 4.69 | .082 | 6.35 | ----- | .09 | .0311 | .0284 | .664 | ----- | .009 |
| .30 | 0 | 0 | .085 | 0 | ----- | 4.66 | 7.62 | .12 | ------ | ------ | .557 | .912 | .014 |
| .30 | .63 | .004 | .090 | .77 | .045 | 4.63 | ----- | .10 | 1.4963 | .0200 | .554 | ----- | .013 |
| .30 | 1.06 | .016 | .154 | 1.29 | .065 | 5.08 | 8.36 | .08 | .5391 | .0288 | .608 | 1.000 | .009 |
| .30 | 1.48 | .029 | .201 | 1.80 | .060 | 5.18 | ----- | .07 | .2750 | .0266 | .620 | ----- | .008 |
| .30 | 2.11 | .056 | .244 | 2.58 | .056 | 5.40 | 8.36 | .07 | .1348 | .0252 | .646 | 1.000 | .008 |
| .30 | 2.53 | .089 | .228 | 3.09 | .062 | 5.32 | ----- | .06 | .0936 | .0278 | .636 | ----- | .007 |
| .30 | 3.17 | .169 | .200 | 3.87 | .076 | 5.17 | 8.36 | .01 | .0599 | .0337 | .618 | 1.000 | .002 |
| .40 | 0 | 0 | .107 | 0 | ----- | 4.17 | 7.25 | .05 | ------ | ------ | .549 | .955 | .007 |
| .40 | .63 | .005 | .103 | .74 | .046 | 4.15 | ----- | .04 | 1.9950 | .0249 | .546 | ----- | .005 |
| .40 | 1.06 | .020 | .174 | 1.25 | .066 | 4.38 | 7.59 | .01 | .7188 | .0359 | .577 | 1.000 | .002 |
| .40 | 1.48 | .029 | .214 | 1.72 | .050 | 4.52 | ----- | -.004 | .3666 | .0266 | .595 | ----- | -.001 |
| .40 | 2.11 | .073 | .264 | 2.46 | .061 | 4.69 | 7.59 | -.01 | .1797 | .0328 | .618 | 1.000 | -.002 |
| .40 | 2.53 | .108 | .230 | 2.96 | .063 | 4.58 | ----- | -.03 | .1248 | .0337 | .603 | ----- | -.004 |
| .40 | 3.17 | .181 | .180 | 3.70 | .066 | 4.40 | 7.59 | -.09 | .0799 | .0361 | .579 | 1.000 | -.011 |
| .50 | 0 | 0 | .126 | 0 | ----- | 3.85 | 7.05 | 0 | ------ | ------ | .546 | 1.000 | 0 |
| .50 | .63 | .005 | .113 | .71 | .040 | 3.81 | ----- | -.01 | 2.4938 | .0249 | .541 | ----- | -.002 |
| .50 | 1.06 | .024 | .190 | 1.18 | .068 | 4.00 | 7.05 | -.05 | .8985 | .0431 | .567 | 1.000 | -.008 |
| .50 | 1.48 | .047 | .248 | 1.66 | .068 | 4.16 | ----- | -.06 | .4583 | .0431 | .590 | ----- | -.009 |
| .50 | 2.11 | .084 | .257 | 2.37 | .060 | 4.17 | 7.05 | -.08 | .2246 | .0377 | .592 | 1.000 | -.011 |
| .50 | 2.53 | .118 | .205 | 2.84 | .059 | 4.05 | ----- | -.10 | .1560 | .0368 | .574 | ----- | -.014 |
| .50 | 3.17 | .219 | .134 | 3.55 | .070 | 3.87 | 7.05 | -.19 | .0999 | .0437 | .549 | 1.000 | -.027 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.412 | 0.060 |
| 0 | .63 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0.0050 | 0.500 | ----- | .065 |
| 0 | 1.06 | .002 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | .500 | .568 | .065 |
| 0 | 1.48 | .002 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0018 | .500 | ----- | .064 |
| 0 | 2.11 | .008 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | 2.636 | .579 | .063 |
| 0 | 2.53 | .014 | .012 | ----- | ----- | ---- | ---- | ---- | 0 | .0044 | 2.697 | ----- | .062 |
| 0 | 3.17 | .019 | .026 | ----- | ----- | ---- | ---- | ---- | 0 | .0038 | 3.949 | .597 | .061 |
| 0 | 3.59 | .026 | .036 | ----- | ----- | ---- | ---- | ---- | 0 | .0040 | 4.077 | ----- | .060 |
| 0 | 4.22 | .033 | .055 | ----- | ----- | ---- | ---- | ---- | 0 | .0037 | 4.790 | .611 | .060 |
| 0 | 4.64 | .041 | .080 | ----- | ----- | ---- | ---- | ---- | 0 | .0038 | 5.543 | ----- | .059 |
| 0 | 5.28 | .053 | .092 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 4.979 | .630 | .060 |
| 0 | 6.33 | .073 | .149 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | 5.795 | .617 | .059 |
| 0 | 7.39 | .096 | .186 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 5.466 | .611 | .060 |
| 0 | 8.44 | .120 | .244 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 5.743 | .611 | .059 |
| 0 | 9.50 | .150 | .283 | ----- | ----- | ---- | ---- | ---- | 0 | .0033 | 5.364 | .611 | .060 |
| 0 | 10.55 | .193 | .335 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 4.982 | .600 | .061 |
| 0 | 11.61 | .230 | .409 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 5.079 | .600 | .060 |
| 0 | 12.66 | .280 | .480 | ----- | ----- | ---- | ---- | ---- | 0 | .0035 | 4.923 | .609 | .061 |
| 0 | 13.72 | .320 | .533 | ----- | ----- | ---- | ---- | ---- | 0 | .0034 | 4.792 | .590 | .060 |
| 0 | 14.77 | .369 | .630 | ----- | ----- | ---- | ---- | ---- | 0 | .0340 | 4.897 | .600 | .060 |
| 0 | 15.83 | .418 | .682 | ----- | ----- | ---- | ---- | ---- | 0 | .0330 | 4.702 | .583 | .060 |
| 0 | 15.88 | .470 | .785 | ----- | ----- | ---- | ---- | ---- | 0 | .0330 | 4.805 | ----- | .060 |
| .10 | 0 | 0 | -.054 | 0 | ----- | 4.85 | 9.30 | 0.40 | ------ | ------ | .403 | .771 | .033 |
| .10 | .63 | .002 | -.052 | .93 | 0.046 | 4.91 | ---- | .38 | .4968 | .0100 | .408 | ----- | .031 |
| .10 | 1.06 | .007 | -.014 | 1.55 | .058 | 5.71 | 9.43 | .36 | .1797 | .0126 | .474 | .782 | .030 |
| .10 | 1.48 | .012 | 0 | 2.17 | .051 | 6.03 | ---- | .36 | .0917 | .0110 | .500 | ----- | .030 |
| .10 | 2.11 | .020 | .011 | 3.10 | .042 | 6.40 | 9.22 | .36 | .0449 | .0090 | .531 | .765 | .030 |
| .10 | 2.53 | .028 | .032 | 3.72 | .040 | 6.71 | ---- | .32 | .0312 | .0087 | .556 | ----- | .027 |
| .10 | 3.17 | .041 | .114 | 4.65 | .038 | 8.40 | 9.48 | .29 | .0200 | .0082 | .697 | .786 | .024 |
| .10 | 3.59 | .049 | .155 | 5.26 | .035 | 9.27 | ---- | .32 | .0155 | .0076 | .769 | ----- | .027 |
| .10 | 4.22 | .059 | .181 | 6.19 | .031 | 9.76 | 8.99 | .36 | .0112 | .0066 | .810 | .746 | .030 |
| .10 | 4.64 | .068 | .188 | 6.21 | .029 | 9.88 | ---- | .40 | .0093 | .0063 | .820 | ----- | .033 |
| .10 | 5.28 | .081 | .201 | 7.74 | .027 | 10.14 | 8.65 | .41 | .0072 | .0058 | .841 | .718 | .034 |
| .10 | 6.33 | .090 | .255 | 9.29 | .021 | 11.19 | 8.32 | .44 | .0050 | .0045 | .928 | .690 | .036 |
| .10 | 7.39 | .116 | .280 | 10.84 | .020 | 11.61 | 8.00 | .46 | .0037 | .0043 | .964 | .664 | .038 |
| .10 | 8.44 | .141 | .304 | 12.39 | .019 | 12.03 | 7.80 | .49 | .0028 | .0040 | .997 | .647 | .041 |
| .10 | 9.50 | .169 | .395 | 13.94 | .017 | 13.69 | 7.73 | .49 | .0022 | .0037 | 1.136 | .641 | .041 |
| .10 | 10.55 | .204 | .403 | 15.49 | .017 | 13.54 | 7.60 | .50 | .0018 | .0037 | 1.123 | .630 | .042 |
| .10 | 11.61 | .247 | .464 | 17.04 | .017 | 14.55 | 7.44 | .52 | .0015 | .0037 | 1.208 | .617 | .043 |
| .10 | 12.66 | .294 | .535 | 18.59 | .017 | 15.66 | 7.52 | .53 | .0013 | .0037 | 1.300 | .624 | .044 |
| .10 | 13.72 | .338 | .593 | 20.13 | .017 | 16.06 | 7.49 | .52 | .0011 | .0036 | 1.359 | .622 | .043 |
| .10 | 14.77 | .385 | .683 | 21.68 | .016 | 17.70 | 7.29 | .52 | .0009 | .0035 | 1.469 | .605 | .043 |
| .10 | 15.83 | .439 | ----- | 23.23 | .016 | ----- | 7.29 | .52 | .0008 | .0035 | ----- | .605 | .043 |
| .20 | 0 | 0 | -.094 | 0 | ----- | 3.97 | 8.11 | .21 | ------ | ------ | .415 | .848 | .023 |
| .20 | .63 | .003 | -.080 | .83 | .044 | 4.10 | ---- | .20 | .9975 | .0150 | .428 | ----- | .021 |
| .20 | 1.06 | .012 | -.030 | 1.38 | .063 | 4.54 | 8.24 | .18 | .3594 | .0216 | .474 | .861 | .019 |
| .20 | 1.48 | .020 | 0 | 1.93 | .054 | 4.78 | ---- | .20 | .1833 | .0183 | .500 | ----- | .021 |
| .20 | 2.11 | .031 | .025 | 2.76 | .041 | 5.00 | 8.06 | .20 | .0898 | .0139 | .523 | .842 | .021 |
| .20 | 2.53 | .041 | .048 | 3.31 | .037 | 5.20 | ---- | .17 | .0624 | .0128 | .544 | ----- | .018 |
| .20 | 3.17 | .063 | .146 | 4.14 | .037 | 6.01 | 8.30 | .15 | .0399 | .0126 | .628 | .867 | .016 |
| .20 | 3.59 | .082 | .255 | 4.69 | .037 | 6.92 | ---- | .12 | .0311 | .0127 | .723 | ----- | .013 |
| .20 | 4.22 | .110 | .403 | 5.52 | .036 | 8.12 | 8.36 | .10 | .0225 | .0124 | .849 | .874 | .011 |
| .20 | 4.64 | .101 | .394 | 6.07 | .027 | 8.05 | ---- | .13 | .0186 | .0094 | .841 | ----- | .014 |
| .20 | 5.28 | .105 | .399 | 6.90 | .022 | 8.08 | 7.64 | .22 | .0144 | .0075 | .844 | .799 | .023 |
| .20 | 6.33 | .127 | .403 | 8.28 | .018 | 8.09 | 7.28 | .28 | .0100 | .0063 | .846 | .761 | .029 |
| .20 | 7.39 | .150 | .404 | 9.66 | .016 | 8.27 | 6.77 | .32 | .0073 | .0055 | .864 | .707 | .033 |
| .20 | 8.44 | .166 | .439 | 11.04 | .014 | 8.34 | 6.56 | .35 | .0056 | .0047 | .872 | .686 | .037 |
| .20 | 9.50 | .195 | .484 | 12.42 | .013 | 8.69 | 6.38 | .37 | .0044 | .0043 | .908 | .667 | .039 |
| .20 | 10.55 | .221 | .504 | 13.80 | .012 | 8.80 | 6.24 | .37 | .0036 | .0040 | .920 | .652 | .039 |
| .20 | 11.61 | .263 | .548 | 15.18 | .011 | 9.10 | 6.09 | .39 | .0030 | .0039 | .951 | .637 | .041 |
| .20 | 12.66 | .308 | .610 | 16.56 | .011 | 9.52 | 6.08 | .40 | .0025 | .0038 | .995 | .635 | .042 |
| .20 | 13.72 | .357 | .667 | 17.94 | .011 | 9.88 | 5.97 | .40 | .0021 | .0036 | 1.033 | .624 | .042 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.30 | 0 | 0 | -0.109 | 0 | ----- | 3.64 | 7.50 | 0.11 | ------ | ------ | 0.436 | 0.897 | 0.013 |
| .30 | .63 | .003 | -.094 | .77 | 0.033 | 3.71 | ---- | .10 | 1.4963 | 0.0150 | .444 | ----- | .012 |
| .30 | 1.06 | .016 | -.019 | 1.29 | .064 | 4.10 | 7.64 | .08 | .5391 | .0288 | .490 | .914 | .009 |
| .30 | 1.43 | .027 | .015 | 1.80 | .055 | 4.25 | ---- | .08 | .2750 | .0247 | .508 | ----- | .009 |
| .30 | 2.11 | .042 | .049 | 2.58 | .042 | 4.41 | 7.50 | .08 | .1348 | .0189 | .528 | .897 | .010 |
| .30 | 2.53 | .056 | .074 | 3.09 | .039 | 4.55 | ---- | .08 | .0936 | .0175 | .544 | ----- | .010 |
| .30 | 3.17 | .085 | .174 | 3.87 | .038 | 5.04 | 7.63 | .05 | .0599 | .0170 | .603 | .912 | .006 |
| .30 | 3.59 | .116 | .293 | 4.38 | .040 | 5.62 | ---- | .03 | .0466 | .0180 | .672 | ----- | .004 |
| .30 | 4.22 | .162 | .479 | 5.16 | .041 | 6.49 | 7.86 | -.01 | .0337 | .0182 | .777 | .940 | -.001 |
| .30 | 4.64 | .209 | .657 | 5.67 | .043 | 7.31 | ---- | -.02 | .0278 | .0194 | .874 | ----- | -.003 |
| .30 | 5.28 | .275 | ----- | 6.45 | .044 | ---- | 7.95 | -.05 | .0216 | .0198 | ----- | .951 | -.006 |
| .30 | 6.33 | .150 | .630 | 7.74 | .017 | 7.22 | 6.65 | .19 | .0150 | .0075 | .864 | .795 | .022 |
| .30 | 7.39 | .179 | ----- | 9.02 | .015 | ---- | 6.27 | .24 | .0110 | .0066 | ----- | .750 | .029 |
| .30 | 8.44 | .207 | .565 | 10.31 | .013 | 6.88 | 5.95 | .28 | .0084 | .0058 | .823 | .711 | .034 |
| .30 | 9.50 | .221 | .616 | 11.60 | .011 | 7.10 | 5.75 | .30 | .0067 | .0049 | .849 | .688 | .036 |
| .30 | 10.55 | .251 | .620 | 12.89 | .010 | 7.10 | 5.59 | .32 | .0054 | .0045 | .849 | .669 | .038 |
| .30 | 11.61 | .280 | .636 | 14.18 | .009 | 7.16 | 5.45 | .34 | .0044 | .0042 | .856 | .652 | .040 |
| .40 | 0 | 0 | -.112 | 0 | ----- | 3.41 | 7.09 | .04 | ------ | ------ | .449 | .934 | .005 |
| .40 | .63 | .005 | -.092 | .74 | .046 | 3.49 | ---- | .03 | 1.9950 | .0249 | .459 | ----- | .004 |
| .40 | 1.06 | .021 | -.004 | 1.23 | .069 | 3.77 | 7.22 | .01 | .7188 | .0377 | .497 | .951 | .001 |
| .40 | 1.48 | .034 | .036 | 1.72 | .057 | 3.91 | ---- | .01 | .3666 | .0312 | .515 | ----- | .002 |
| .40 | 2.11 | .053 | .074 | 2.46 | .044 | 4.05 | 7.11 | .03 | .1797 | .0238 | .533 | .936 | .003 |
| .40 | 2.53 | .071 | .104 | 2.96 | .041 | 4.15 | ---- | .01 | .1248 | .0221 | .546 | ----- | .002 |
| .40 | 3.17 | .107 | .201 | 3.70 | .039 | 4.46 | 7.19 | 0 | .0799 | .0214 | .587 | .947 | 0 |
| .40 | 3.59 | .148 | .304 | 4.19 | .042 | 4.81 | ---- | -.03 | .0622 | .0230 | .633 | ----- | -.004 |
| .40 | 4.22 | .238 | .484 | 4.93 | .049 | 5.38 | 7.43 | -.07 | .0449 | .0267 | .706 | .979 | -.010 |
| .40 | 4.64 | .320 | .619 | 5.42 | .055 | 5.79 | ---- | -.12 | .0371 | .0297 | .762 | ----- | -.015 |
| .40 | 5.28 | .280 | .828 | 6.16 | .037 | 6.49 | 7.59 | -.17 | .0288 | .0201 | .854 | 1.000 | -.023 |
| .40 | 6.33 | .193 | .922 | 7.39 | .018 | 6.83 | 6.45 | .10 | .0200 | .0096 | .900 | .850 | .013 |
| .40 | 7.39 | .201 | .828 | 8.62 | .014 | 6.52 | 5.81 | .18 | .0147 | .0074 | .859 | .765 | .024 |
| .40 | 8.44 | .231 | .786 | 9.85 | .012 | 6.36 | 5.70 | .22 | .0112 | .0065 | .838 | .750 | .029 |
| .50 | 0 | 0 | -.101 | 0 | ----- | 3.27 | 6.79 | -.02 | ------ | ------ | .464 | .964 | -.003 |
| .50 | .63 | .005 | -.074 | .71 | .040 | 3.34 | ---- | -.03 | 2.4938 | .0249 | .474 | ----- | -.004 |
| .50 | 1.06 | .026 | .011 | 1.18 | .074 | 3.56 | 6.88 | -.05 | .8985 | .0467 | .505 | .976 | -.007 |
| .50 | 1.48 | .044 | .066 | 1.66 | .064 | 3.69 | ---- | -.03 | .4583 | .0403 | .523 | ----- | -.005 |
| .50 | 2.11 | .066 | .104 | 2.37 | .047 | 3.78 | 6.81 | -.03 | .2246 | .0296 | .536 | .966 | -.004 |
| .50 | 2.53 | .088 | .144 | 2.84 | .044 | 3.88 | ---- | -.04 | .1560 | .0275 | .551 | ----- | -.006 |
| .50 | 3.17 | .137 | .218 | 3.55 | .043 | 4.07 | 6.87 | -.06 | .0999 | .0274 | .577 | .974 | -.008 |
| .50 | 3.59 | .183 | .280 | 4.03 | .045 | 4.21 | ---- | -.08 | .0777 | .0284 | .597 | ----- | -.011 |
| .50 | 4.22 | .360 | .525 | 4.74 | .064 | 4.79 | 7.05 | -.15 | .0562 | .0404 | .679 | 1.000 | -.021 |
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.374 | 0.075 |
| 0 | .63 | 0 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .075 |
| 0 | 1.06 | 0 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .306 | .075 |
| 0 | 1.48 | .001 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | .0008 | 9.046 | ----- | .075 |
| 0 | 2.11 | .002 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | .0010 | 4.164 | .306 | .075 |
| 0 | 2.53 | .001 | .007 | ----- | ----- | ---- | ---- | ---- | 0 | .0002 | 28.704 | ----- | .075 |
| 0 | 3.17 | .005 | .003 | ----- | ----- | ---- | ---- | ---- | 0 | .0010 | 1.354 | .284 | .074 |
| 0 | 3.59 | .009 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0014 | .500 | ----- | .074 |
| 0 | 4.22 | .013 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0014 | .500 | .320 | .074 |
| 0 | 4.64 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 5.28 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^{\circ}$ - Continued | | | | | | | | | | | | | |
| 0 | 6.33 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------ | ----- | ----- |
| 0 | 7.39 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------ | 0 | 0.083 |
| 0 | 8.44 | ----- | 0 | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------ | ----- | ----- |
| 0 | 9.50 | .002 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | 0.500 | 0 | .084 |
| 0 | 10.55 | ----- | .013 | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------ | ----- | ----- |
| 0 | 11.61 | .002 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | .500 | 0 | .084 |
| 0 | 12.67 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------ | ----- | ----- |
| 0 | 13.72 | .005 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0001 | .500 | 0 | .085 |
| 0 | 14.77 | .005 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0001 | .500 | 0 | .087 |
| 0 | 15.83 | .002 | .023 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | 12.950 | 0 | .085 |
| 0 | 16.88 | .006 | .013 | ----- | ----- | ---- | ---- | ---- | 0 | .0001 | 3.210 | 0 | .090 |
| .10 | 0 | 0 | -.120 | 0 | ----- | 3.43 | 7.16 | 0.51 | ------ | ------ | .265 | .594 | .043 |
| .10 | .63 | .002 | -.105 | .93 | 0.046 | 3.77 | ---- | .49 | .4983 | .0100 | .313 | ----- | .041 |
| .10 | 1.06 | .008 | -.093 | 1.55 | .067 | 4.02 | 7.14 | .49 | .1797 | .0144 | .333 | .592 | .041 |
| .10 | 1.48 | .011 | -.082 | 2.17 | .047 | 4.26 | ---- | .53 | .0917 | .0101 | .351 | ----- | .044 |
| .10 | 2.11 | .021 | -.129 | 3.10 | .042 | 3.30 | 6.95 | .53 | .0449 | .0090 | .274 | .577 | .044 |
| .10 | 2.53 | .026 | -.023 | 3.72 | .038 | 5.57 | ---- | .50 | .0312 | .0081 | .462 | ----- | .042 |
| .10 | 3.17 | .032 | 0 | 4.65 | .030 | 6.03 | 6.59 | .53 | .0200 | .0064 | .500 | .547 | .044 |
| .10 | 3.59 | .037 | 0 | 5.26 | .027 | 6.03 | ---- | .57 | .0155 | .0058 | .500 | ----- | .047 |
| .10 | 4.22 | .042 | 0 | 6.19 | .022 | 6.03 | 6.16 | .62 | .0112 | .0047 | .500 | .511 | .051 |
| .10 | 4.64 | .043 | -.008 | 6.21 | .019 | 5.87 | ---- | .68 | .0093 | .0040 | .487 | ----- | .056 |
| .10 | 5.28 | .050 | -.011 | 7.71 | .017 | 5.81 | 5.61 | .69 | .0072 | .0036 | .482 | .466 | .058 |
| .10 | 6.33 | .064 | -.012 | 9.29 | .015 | 5.78 | 5.38 | .72 | .0050 | .0032 | .482 | .447 | .060 |
| .10 | 7.39 | .080 | -.017 | 10.84 | .013 | 5.68 | 5.15 | .73 | .0037 | .0029 | .472 | .427 | .061 |
| .10 | 8.44 | .098 | -.020 | 12.39 | .013 | 5.65 | 5.05 | .75 | .0026 | .0028 | .469 | .419 | .062 |
| .10 | 9.50 | .117 | -.022 | 13.94 | .012 | 5.62 | 5.12 | .76 | .0022 | .0026 | .466 | .425 | .063 |
| .10 | 10.55 | .135 | -.028 | 15.49 | .011 | 5.50 | 5.05 | .76 | .0018 | .0024 | .456 | .419 | .063 |
| .10 | 11.61 | .155 | -.029 | 17.04 | .011 | 5.50 | 4.97 | .76 | .0015 | .0023 | .456 | .412 | .063 |
| .10 | 12.66 | .178 | -.062 | 18.59 | .010 | 4.94 | 4.89 | .76 | .0013 | .0022 | .410 | .406 | .063 |
| .10 | 13.72 | .195 | -.034 | 20.13 | .010 | 5.44 | 4.79 | .76 | .0011 | .0021 | .451 | .397 | .063 |
| .10 | 14.77 | .218 | -.079 | 21.68 | .009 | 4.73 | 4.66 | .76 | .0009 | .0020 | .392 | .387 | .063 |
| .10 | 15.83 | .244 | -.062 | 23.23 | .009 | 5.01 | 4.48 | .76 | .0008 | .0019 | .415 | .372 | .063 |
| .20 | 0 | 0 | -.201 | 0 | ----- | 3.04 | 6.56 | .28 | ------ | ------ | .318 | .686 | .029 |
| .20 | .63 | .005 | -.186 | .83 | .073 | 3.19 | ---- | .25 | .9975 | .0249 | .333 | ----- | .026 |
| .20 | 1.06 | .016 | -.145 | 1.38 | .084 | 3.53 | 6.66 | .26 | .3594 | .0288 | .369 | .694 | .027 |
| .20 | 1.48 | .020 | -.129 | 1.93 | .054 | 3.68 | ---- | .28 | .1833 | .0183 | .385 | ----- | .029 |
| .20 | 2.11 | .034 | -.073 | 2.76 | .045 | 4.17 | 6.46 | .28 | .0898 | .0153 | .436 | .675 | .029 |
| .20 | 2.53 | .043 | -.134 | 3.31 | .039 | 3.65 | ---- | .25 | .0624 | .0134 | .382 | ----- | .026 |
| .20 | 3.17 | .054 | .062 | 4.14 | .032 | 5.30 | 6.30 | .28 | .0399 | .0108 | .554 | .658 | .029 |
| .20 | 3.59 | .060 | .070 | 4.69 | .027 | 5.35 | ---- | .33 | .0311 | .0093 | .559 | ----- | .035 |
| .20 | 4.22 | .067 | .070 | 5.52 | .022 | 5.35 | 5.62 | .38 | .0225 | .0075 | .559 | .588 | .040 |
| .20 | 4.64 | .070 | .042 | 6.07 | .019 | 5.13 | ---- | .44 | .0186 | .0065 | .536 | ----- | .046 |
| .20 | 5.28 | .074 | .034 | 6.90 | .015 | 5.05 | 5.11 | .48 | .0144 | .0053 | .528 | .534 | .051 |
| .20 | 6.33 | .085 | .011 | 8.28 | .013 | 4.88 | 4.72 | .52 | .0100 | .0043 | .510 | .494 | .055 |
| .20 | 7.39 | .098 | 0 | 9.66 | .011 | 4.78 | 4.56 | .55 | .0073 | .0036 | .500 | .476 | .057 |
| .20 | 8.44 | .117 | -.024 | 11.04 | .010 | 4.59 | 4.48 | .58 | .0056 | .0033 | .480 | .468 | .060 |
| .20 | 9.50 | .139 | -.024 | 12.42 | .009 | 4.59 | 4.36 | .58 | .0044 | .0031 | .480 | .455 | .060 |
| .20 | 10.55 | .160 | -.038 | 13.80 | .008 | 4.49 | 4.19 | .59 | .0036 | .0029 | .469 | .438 | .061 |
| .20 | 11.61 | .186 | -.027 | 15.18 | .008 | 4.59 | 4.07 | .60 | .0030 | .0028 | .480 | .425 | .062 |
| .20 | 12.66 | .208 | -.052 | 16.56 | .008 | 4.39 | 4.09 | .60 | .0025 | .0026 | .459 | .427 | .062 |
| .20 | 13.72 | .237 | -.032 | 17.94 | .007 | 4.54 | 3.91 | .60 | .0021 | .0025 | .474 | .408 | .062 |
| .30 | 0 | 0 | -.241 | 0 | ----- | 2.96 | 6.27 | .14 | ------ | ------ | .354 | .750 | .017 |
| .30 | .63 | .005 | -.220 | .77 | .056 | 3.08 | ---- | .13 | 1.4963 | .0249 | .369 | ----- | .015 |
| .30 | 1.06 | .022 | -.170 | 1.29 | .086 | 3.32 | 6.38 | .13 | .5391 | .0395 | .397 | .763 | .016 |
| .30 | 1.48 | .032 | -.149 | 1.80 | .065 | 3.45 | ---- | .16 | .2750 | .0293 | .413 | ----- | .019 |
| .30 | 2.11 | .047 | -.083 | 2.58 | .047 | 3.77 | 6.19 | .16 | .1348 | .0211 | .451 | .741 | .019 |
| .30 | 2.53 | .061 | -.008 | 3.09 | .042 | 4.14 | ---- | .14 | .0936 | .0190 | .495 | ----- | .017 |
| .30 | 3.17 | .083 | .102 | 3.87 | .037 | 4.67 | 6.22 | .13 | .0599 | .0166 | .559 | .744 | .016 |
| .30 | 3.59 | .088 | .184 | 4.38 | .031 | 5.08 | ---- | .19 | .0466 | .0137 | .608 | ----- | .023 |
| .30 | 4.22 | .093 | .184 | 5.16 | .023 | 5.06 | 5.52 | .26 | .0337 | .0104 | .605 | .660 | .031 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.30 | 4.64 | 0.093 | 0.146 | 5.67 | 0.019 | 4.89 | ---- | 0.33 | 0.0278 | 0.0086 | 0.585 | ----- | 0.040 |
| .30 | 5.28 | .104 | .113 | 6.45 | .017 | 4.71 | 4.87 | .37 | .0216 | .0075 | .564 | 0.583 | .045 |
| .30 | 6.33 | .110 | .065 | 7.74 | .012 | 4.50 | 4.47 | .42 | .0150 | .0055 | .538 | .534 | .050 |
| .30 | 7.39 | .123 | .032 | 9.02 | .010 | 4.33 | 4.22 | .46 | .0110 | .0045 | .518 | .504 | .056 |
| .30 | 8.44 | .139 | 0 | 10.31 | .009 | 4.18 | 3.93 | .49 | .0084 | .0039 | .500 | .470 | .059 |
| .30 | 9.50 | .158 | -.014 | 11.60 | .008 | 4.11 | 3.93 | .50 | .0067 | .0035 | .492 | .470 | .060 |
| .30 | 10.55 | .182 | -.044 | 12.89 | .007 | 3.99 | 3.88 | .51 | .0054 | .0033 | .477 | .464 | .061 |
| .30 | 11.61 | .206 | -.034 | 14.18 | .007 | 4.03 | 3.72 | .52 | .0044 | .0031 | .482 | .444 | .062 |
| .40 | 0 | 0 | -.258 | 0 | ----- | 2.92 | 6.18 | .04 | ------ | ------ | .385 | .814 | .006 |
| .40 | .63 | .008 | -.238 | .74 | .073 | 2.98 | ---- | .04 | 1.9950 | .0399 | .392 | ----- | .005 |
| .40 | 1.06 | .030 | -.174 | 1.23 | .099 | 3.21 | 6.23 | .04 | .7188 | .0539 | .423 | .820 | .006 |
| .40 | 1.48 | .041 | -.150 | 1.72 | .069 | 3.29 | ---- | .06 | .3666 | .0376 | .433 | ----- | .008 |
| .40 | 2.11 | .056 | -.081 | 2.46 | .046 | 3.52 | 6.05 | .06 | .1797 | .0252 | .464 | .797 | .008 |
| .40 | 2.53 | .074 | .013 | 2.96 | .043 | 3.83 | ---- | .04 | .1248 | .0231 | .505 | ----- | .006 |
| .40 | 3.17 | .110 | .214 | 3.70 | .041 | 4.50 | 6.08 | .04 | .0799 | .0220 | .592 | .801 | .005 |
| .40 | 3.59 | .122 | .310 | 4.19 | .035 | 4.81 | ---- | .07 | .0622 | .0190 | .633 | ----- | .009 |
| .40 | 4.22 | .125 | .321 | 4.93 | .026 | 4.84 | 5.48 | .15 | .0449 | .0140 | .638 | .722 | .020 |
| .40 | 4.64 | .121 | .281 | 5.42 | .021 | 4.73 | ---- | .22 | .0371 | .0112 | .623 | ----- | .029 |
| .40 | 5.28 | .126 | .232 | 6.16 | .017 | 4.56 | 4.78 | .29 | .0288 | .0091 | .600 | .630 | .038 |
| .40 | 6.33 | .136 | .154 | 7.39 | .013 | 4.31 | 4.40 | .34 | .0200 | .0068 | .567 | .579 | .045 |
| .40 | 7.39 | .145 | .090 | 8.62 | .010 | 4.09 | 4.07 | .39 | .0147 | .0053 | .538 | .536 | .052 |
| .40 | 8.44 | .166 | .050 | 9.85 | .009 | 3.95 | 3.88 | .42 | .0112 | .0047 | .520 | .511 | .055 |
| .50 | 0 | 0 | -.247 | 0 | ----- | 2.89 | 6.06 | -.04 | ------ | ------ | .410 | .859 | -.005 |
| .50 | .63 | .008 | -.220 | .71 | .063 | 2.96 | ---- | -.05 | 2.4938 | .0399 | .420 | ----- | -.007 |
| .50 | 1.06 | .038 | -.164 | 1.18 | .108 | 3.11 | 6.08 | -.04 | .8985 | .0683 | .441 | .863 | -.006 |
| .50 | 1.48 | .051 | -.134 | 1.66 | .074 | 3.18 | ---- | -.03 | .4583 | .0467 | .451 | ----- | -.004 |
| .50 | 2.11 | .070 | -.062 | 2.37 | .050 | 3.36 | 5.87 | -.03 | .2246 | .0314 | .477 | .833 | -.004 |
| .50 | 2.53 | .093 | .054 | 2.84 | .046 | 3.65 | ---- | -.04 | .1560 | .0290 | .518 | ----- | -.006 |
| .50 | 3.17 | .134 | .275 | 3.55 | .043 | 4.21 | 6.01 | -.05 | .0999 | .0268 | .597 | .852 | -.007 |
| .50 | 3.59 | .164 | .441 | 4.03 | .040 | 4.61 | ---- | -.05 | .0777 | .0255 | .654 | ----- | -.007 |
| .50 | 4.22 | .153 | .489 | 4.74 | .027 | 4.74 | 5.50 | .02 | .0562 | .0172 | .672 | .780 | .003 |
| $\tau = 12^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.299 | 0.105 |
| 0 | .63 | 0 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .105 |
| 0 | 1.06 | 0 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .231 | .106 |
| 0 | 1.48 | 0 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .107 |
| 0 | 2.11 | 0 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .143 | .108 |
| 0 | 2.53 | 0 | -.008 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .108 |
| 0 | 3.17 | 0 | -.012 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .064 | .109 |
| 0 | 3.59 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 4.22 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 4.64 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 5.28 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 6.33 | 0 | -.013 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .112 |
| 0 | 7.39 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 8.44 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 9.50 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 10.55 | 0 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | ----- |
| 0 | 11.61 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 12.66 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 13.72 | .005 | -.027 | ----- | ----- | ---- | ---- | ---- | 0 | .0001 | -3.960 | 0 | .112 |
| 0 | 14.77 | .005 | -.034 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -5.070 | ----- | .094 |
| 0 | 15.83 | ----- | ------ | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 16.88 | .005 | -.052 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -9.020 | 0 | .110 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^\circ$ - Continued | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.146 | 0 | ----- | 2.81 | 6.08 | 0.68 | ------ | ------ | 0.233 | 0.504 | 0.056 |
| .10 | .63 | .002 | -.140 | .93 | 0.046 | 2.97 | ---- | .68 | 0.4988 | 0.0100 | .246 | ----- | .056 |
| .10 | 1.06 | .009 | -.131 | 1.55 | .075 | 3.21 | 6.10 | .71 | .1797 | .0162 | .267 | .506 | .059 |
| .10 | 1.43 | .014 | -.113 | 2.17 | .059 | 3.62 | ---- | .72 | .0917 | .0128 | .300 | ----- | .060 |
| .10 | 2.11 | .019 | -.086 | 3.10 | .039 | 4.20 | 5.82 | .74 | .0449 | .0085 | .349 | .483 | .061 |
| .10 | 2.53 | .023 | -.082 | 3.72 | .033 | 4.30 | ---- | .77 | .0312 | .0072 | .356 | ----- | .064 |
| .10 | 3.17 | .027 | -.092 | 4.65 | .025 | 4.11 | 5.10 | .83 | .0200 | .0054 | .341 | .423 | .069 |
| .10 | 3.59 | .027 | -.107 | 5.26 | .019 | 3.80 | ---- | .90 | .0155 | .0042 | .315 | ----- | .074 |
| .10 | 4.22 | .027 | -.123 | 6.19 | .014 | 3.46 | 4.33 | .95 | .0112 | .0030 | .287 | .359 | .079 |
| .10 | 4.64 | .025 | -.134 | 6.81 | .011 | 3.21 | ---- | .97 | .0093 | .0023 | .267 | ----- | .081 |
| .10 | 5.28 | .027 | -.154 | 7.74 | .009 | 2.81 | 3.76 | 1.00 | .0072 | .0019 | .233 | .312 | .083 |
| .10 | 6.33 | .026 | -.186 | 9.29 | .006 | 2.16 | 3.30 | 1.05 | .0050 | .0013 | .179 | .273 | .087 |
| .10 | 7.39 | .026 | -.206 | 10.84 | .005 | 1.73 | 2.78 | 1.07 | .0037 | .0010 | .144 | .231 | .089 |
| .10 | 8.44 | .027 | -.214 | 12.39 | .004 | 1.58 | 2.52 | 1.07 | .0028 | .0008 | .131 | .209 | .089 |
| .10 | 9.50 | .027 | -.235 | 13.94 | .003 | 1.14 | ---- | 1.09 | .0022 | .0006 | .095 | ----- | .090 |
| .10 | 10.55 | .028 | -.247 | 15.49 | .002 | .90 | ---- | 1.10 | .0018 | .0005 | .074 | ----- | .091 |
| .10 | 11.61 | .028 | -.255 | 17.04 | .002 | .71 | ---- | 1.14 | .0015 | .0004 | .059 | ----- | .095 |
| .10 | 12.66 | .028 | -.287 | 18.59 | .001 | .06 | .02 | 1.14 | .0013 | .0003 | .005 | .002 | .095 |
| .10 | 13.72 | .028 | -.275 | 20.13 | .001 | .28 | .02 | 1.13 | .0011 | .0003 | .023 | .002 | .094 |
| .10 | 14.77 | .027 | -.275 | 21.68 | .001 | .31 | .02 | 1.13 | .0009 | .0002 | .026 | .002 | .094 |
| .10 | 15.83 | .026 | -.281 | 23.23 | .001 | .16 | .02 | 1.12 | .0008 | .0002 | .013 | .002 | .093 |
| .20 | 0 | 0 | -.235 | 0 | ----- | 2.73 | 5.64 | .35 | ------ | ------ | .285 | .590 | .037 |
| .20 | .63 | .007 | -.217 | .83 | .102 | 2.90 | ---- | .34 | .9975 | .0349 | .303 | ----- | .036 |
| .20 | 1.06 | .019 | -.206 | 1.38 | .100 | 3.01 | 5.74 | .35 | .3594 | .0341 | .315 | .600 | .037 |
| .20 | 1.48 | .027 | -.182 | 1.93 | .072 | 3.23 | ---- | .37 | .1833 | .0247 | .338 | ----- | .039 |
| .20 | 2.11 | .042 | -.111 | 2.76 | .055 | 3.83 | 5.64 | .38 | .0898 | .0189 | .400 | .590 | .040 |
| .20 | 2.53 | .047 | -.086 | 3.31 | .043 | 4.08 | ---- | .40 | .0624 | .0147 | .426 | ----- | .042 |
| .20 | 3.17 | .052 | -.086 | 4.14 | .030 | 4.08 | 5.07 | .49 | .0399 | .0104 | .426 | .530 | .052 |
| .20 | 3.59 | .052 | -.104 | 4.69 | .024 | 3.92 | ---- | .56 | .0311 | .0081 | .410 | ----- | .058 |
| .20 | 4.22 | .055 | -.144 | 5.52 | .018 | 3.58 | 4.32 | .61 | .0225 | .0062 | .374 | .451 | .063 |
| .20 | 4.64 | .055 | -.167 | 6.07 | .015 | 3.41 | ---- | .66 | .0186 | .0051 | .356 | ----- | .069 |
| .20 | 5.28 | .055 | -.194 | 6.90 | .012 | 3.19 | 3.78 | .69 | .0144 | .0040 | .333 | .395 | .072 |
| .20 | 6.33 | .054 | -.246 | 8.28 | .008 | 2.75 | 3.39 | .74 | .0100 | .0027 | .287 | .355 | .077 |
| .20 | 7.39 | .051 | -.302 | 9.66 | .006 | 2.28 | 3.02 | .78 | .0073 | .0019 | .238 | .316 | .082 |
| .20 | 8.44 | .051 | -.321 | 11.04 | .004 | 2.13 | 2.76 | .79 | .0056 | .0014 | .223 | .288 | .083 |
| .20 | 9.50 | .052 | -.373 | 12.42 | .004 | 1.69 | 2.62 | .81 | .0044 | .0012 | .177 | .273 | .085 |
| .20 | 10.55 | .057 | -.387 | 13.80 | .003 | 1.60 | 2.21 | .82 | .0036 | .0010 | .167 | .231 | .086 |
| .20 | 11.61 | .058 | -.429 | 15.18 | .003 | 1.25 | 2.02 | .84 | .0030 | .0009 | .131 | .212 | .088 |
| .20 | 12.66 | .061 | -.439 | 16.55 | .002 | 1.18 | ---- | .84 | .0025 | .0008 | .123 | ----- | .088 |
| .20 | 13.72 | .064 | -.469 | 17.94 | .002 | .93 | .02 | .83 | .0021 | .0007 | .097 | .002 | .087 |
| .30 | 0 | 0 | -.287 | 0 | ----- | 2.72 | 5.53 | .17 | ------ | ------ | .326 | .662 | .020 |
| .30 | .63 | .007 | -.271 | .77 | .078 | 2.81 | ---- | .15 | 1.4963 | .0349 | .336 | ----- | .018 |
| .30 | 1.06 | .032 | -.250 | 1.29 | .128 | 2.93 | 5.66 | .18 | .5391 | .0575 | .351 | .677 | .021 |
| .30 | 1.48 | .036 | -.220 | 1.80 | .074 | 3.08 | ---- | .21 | 2750 | .0330 | .369 | ----- | .025 |
| .30 | 2.11 | .057 | -.129 | 2.58 | .057 | 3.56 | 5.52 | .20 | .1348 | .0256 | .426 | .660 | .024 |
| .30 | 2.53 | .071 | -.060 | 3.09 | .049 | 3.88 | ---- | .22 | .0936 | .0221 | .464 | ----- | .027 |
| .30 | 3.17 | .079 | -.036 | 3.87 | .035 | 4.00 | 4.97 | .30 | .0599 | .0158 | .479 | .594 | .036 |
| .30 | 3.59 | .083 | -.062 | 4.38 | .029 | 3.86 | ---- | .39 | .0466 | .0129 | .464 | ----- | .046 |
| .30 | 4.22 | .084 | -.107 | 5.16 | .021 | 3.66 | 4.27 | .46 | .0337 | .0094 | .438 | .511 | .055 |
| .30 | 4.64 | .084 | -.140 | 5.67 | .017 | 3.51 | ---- | .50 | .0278 | .0078 | .420 | ----- | .060 |
| .30 | 5.28 | .083 | -.190 | 6.45 | .013 | 3.25 | 3.73 | .55 | .0216 | .0060 | .390 | .447 | .065 |
| .30 | 6.33 | .084 | -.271 | 7.74 | .009 | 2.88 | 3.38 | .59 | .0150 | .0042 | .344 | .404 | .071 |
| .30 | 7.39 | .080 | -.348 | 9.02 | .006 | 2.51 | 3.04 | .63 | .0120 | .0029 | .300 | .363 | .076 |
| .30 | 8.44 | .079 | -.393 | 10.31 | .005 | 2.27 | 2.80 | .66 | .0084 | .0022 | .272 | .335 | .079 |
| .30 | 9.50 | .079 | -.455 | 11.60 | .004 | 1.99 | 2.77 | .67 | .0067 | .0018 | .238 | .331 | .080 |
| .30 | 10.55 | .085 | -.501 | 12.89 | .003 | 1.78 | 2.48 | .68 | .0054 | .0015 | .213 | .297 | .081 |
| .30 | 11.61 | .089 | -.531 | 14.18 | .003 | 1.63 | 2.41 | .71 | .0044 | .0013 | .195 | .288 | .085 |

[redacted]

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^{\circ}$ - Concluded | | | | | | | | | | | | | |
| 0.40 | 0 | 0 | -0.308 | 0 | ------ | 2.73 | 5.60 | 0.04 | ------- | ------- | 0.359 | 0.737 | 0.006 |
| .40 | .63 | .010 | -.288 | .74 | 0.092 | 2.80 | ---- | .03 | 1.9950 | 0.0499 | .369 | ----- | .004 |
| .40 | 1.06 | .041 | -.269 | 1.23 | .136 | 2.88 | 5.60 | .05 | .7188 | .0737 | .379 | .737 | .007 |
| .40 | 1.48 | .049 | -.235 | 1.72 | .083 | 3.00 | ---- | .09 | .3666 | .0449 | .395 | ----- | .011 |
| .40 | 2.11 | .074 | -.114 | 2.46 | .061 | 3.41 | 5.48 | .06 | .1797 | .0332 | .449 | .722 | .008 |
| .40 | 2.53 | .093 | -.040 | 2.96 | .053 | 3.66 | ---- | .08 | .1248 | .0290 | .482 | ----- | .010 |
| .40 | 3.17 | .106 | .042 | 3.70 | .039 | 3.93 | 5.03 | .17 | .0799 | .0212 | .518 | .662 | .022 |
| .40 | 3.59 | .111 | .021 | 4.19 | .032 | 3.87 | ---- | .24 | .0622 | .0173 | .510 | ----- | .032 |
| .40 | 4.22 | .114 | -.042 | 4.93 | .024 | 3.66 | 4.24 | .33 | .0449 | .0128 | .482 | .558 | .043 |
| .40 | 4.64 | .114 | -.087 | 5.42 | .020 | 3.51 | ---- | .38 | .0371 | .0106 | .462 | ----- | .050 |
| .40 | 5.28 | .112 | -.159 | 6.16 | .015 | 3.27 | 3.72 | .43 | .0288 | .0081 | .431 | .489 | .057 |
| .40 | 6.33 | .112 | -.271 | 7.39 | .010 | 2.90 | 3.31 | .51 | .0200 | .0056 | .382 | .436 | .067 |
| .40 | 7.39 | .114 | -.358 | 8.62 | .008 | 2.63 | 3.05 | .53 | .0147 | .0042 | .346 | .402 | .070 |
| .40 | 8.44 | .107 | -.426 | 9.85 | .006 | 2.39 | 2.79 | .56 | .0112 | .0030 | .315 | .367 | .073 |
| .50 | 0 | 0 | -.307 | 0 | ------ | 2.73 | 5.54 | -.05 | ------- | ------- | .387 | .786 | -.008 |
| .50 | .63 | .009 | -.287 | .71 | .071 | 2.78 | ---- | -.05 | 2.4938 | .0449 | .395 | ----- | -.006 |
| .50 | 1.06 | .050 | -.262 | 1.18 | .143 | 2.86 | 5.51 | -.03 | .8985 | .0898 | .405 | .782 | -.004 |
| .50 | 1.48 | .062 | -.226 | 1.66 | .090 | 2.96 | ---- | -.01 | .4583 | .0568 | .420 | ----- | -.001 |
| .50 | 2.11 | .088 | -.087 | 2.37 | .063 | 3.31 | 5.42 | -.02 | .2246 | .0395 | .469 | .769 | -.003 |
| .50 | 2.53 | .113 | .012 | 2.84 | .056 | 3.56 | ---- | -.01 | .1560 | .0353 | .505 | ----- | -.001 |
| .50 | 3.17 | .139 | .135 | 3.55 | .044 | 3.85 | 5.05 | .09 | .0999 | .0278 | .546 | .716 | .013 |
| .50 | 3.59 | .140 | .119 | 4.03 | .035 | 3.81 | ---- | .13 | .0777 | .0218 | .541 | ----- | .018 |
| .50 | 4.22 | .144 | .056 | 4.74 | .026 | 3.67 | 4.23 | .23 | .0562 | .0162 | .520 | .600 | .033 |
| $\tau = 16^{\circ}$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.077 | 0.139 |
| 0 | .63 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .140 |
| 0 | 1.06 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .043 | .140 |
| 0 | 1.48 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .140 |
| 0 | 2.11 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0004 | 0.500 | ----- | .140 |
| 0 | 2.53 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0003 | .500 | ----- | .140 |
| 0 | 3.17 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | .0002 | .500 | 0 | .140 |
| 0 | 3.59 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .139 |
| 0 | 4.22 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .139 |
| 0 | 4.64 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 5.28 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 6.33 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 7.39 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | .500 | 0 | .143 |
| 0 | 8.44 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 9.50 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 10.55 | ----- | -.011 | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | 0 | .142 |
| 0 | 11.61 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 12.66 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 13.72 | .002 | -.012 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -2.797 | .002 | .142 |
| 0 | 14.77 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 15.83 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 16.88 | .004 | -.022 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -3.346 | 0 | .140 |
| .10 | 0 | 0 | -.138 | 0 | ----- | 2.90 | 5.41 | 0.83 | ------ | ------ | .241 | .449 | .069 |
| .10 | .63 | .005 | -.135 | .93 | 0.116 | 3.06 | ---- | .82 | .4988 | .0249 | .254 | ----- | .068 |
| .10 | 1.06 | .014 | -.135 | 1.55 | .117 | 3.12 | 5.36 | .86 | .1797 | .0252 | .259 | .444 | .071 |
| .10 | 1.48 | .015 | -.119 | 2.17 | .064 | 3.46 | ---- | .87 | .0917 | .0137 | .287 | ----- | .072 |
| .10 | 2.11 | .019 | -.101 | 3.10 | .039 | 3.89 | 4.84 | .97 | .0449 | .0085 | .323 | .402 | .081 |
| .10 | 2.53 | .022 | -.191 | 3.72 | .032 | 2.01 | ---- | 1.05 | .0312 | .0069 | .167 | ----- | .087 |
| .10 | 3.17 | .021 | -.147 | 4.65 | .019 | 2.90 | 3.56 | 1.17 | .0200 | .0042 | .241 | .295 | .097 |
| .10 | 3.59 | .020 | -.167 | 5.26 | .014 | 2.47 | ---- | 1.23 | .0155 | .0031 | .205 | ----- | .102 |
| .10 | 4.22 | .019 | -.183 | 6.19 | .010 | 2.13 | 2.58 | 1.28 | .0112 | .0021 | .177 | .214 | .107 |
| .10 | 4.64 | .019 | -.195 | 6.81 | .008 | 1.88 | ---- | 1.31 | .0093 | .0018 | .156 | ----- | .108 |
| .10 | 5.28 | .018 | -.206 | 7.74 | .006 | 1.64 | 2.22 | 1.35 | .0072 | .0023 | .136 | .184 | .112 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{(\Delta/w)^{1/3}}$ | $\frac{l}{(\Delta/w)^{1/3}}$ | $\frac{h}{(\Delta/w)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| τ = 16° - Continued | | | | | | | | | | | | | |
| 0.10 | 6.33 | 0.019 | -0.222 | 9.29 | 0.004 | 1.30 | 1.75 | 1.40 | 0.0050 | 0.0009 | 0.108 | 0.145 | 0.116 |
| .10 | 7.39 | .019 | -.241 | 10.84 | .003 | .93 | 1.49 | 1.46 | .0037 | .0007 | .077 | .124 | .121 |
| .10 | 8.44 | .018 | -.251 | 12.39 | .002 | .68 | 1.08 | 1.49 | .0028 | .0005 | .056 | .090 | .124 |
| .10 | 9.50 | .019 | -.260 | 13.94 | .002 | .50 | 1.06 | 1.49 | .0022 | .0004 | .041 | .088 | .124 |
| .10 | 10.55 | .019 | -.271 | 15.49 | .001 | .28 | .98 | 1.50 | .0018 | .0003 | .023 | .081 | .125 |
| .10 | 11.61 | .019 | -.267 | 17.04 | .001 | .37 | .02 | 1.51 | .0015 | .0003 | .031 | .002 | .126 |
| .10 | 12.66 | .023 | -.271 | 18.59 | .001 | .34 | .59 | 1.51 | .0013 | .0003 | .028 | .049 | .126 |
| .10 | 13.72 | .021 | -.286 | 20.13 | .001 | -.05 | .02 | 1.51 | .0011 | .0002 | -.005 | .002 | .126 |
| .10 | 14.77 | .023 | -.287 | 21.68 | .001 | -.06 | .02 | 1.51 | .0009 | .0002 | -.005 | .002 | .126 |
| .10 | 15.83 | .022 | -.287 | 23.23 | .001 | 0 | .02 | 1.51 | .0008 | .0002 | 0 | .002 | .126 |
| .20 | 0 | 0 | -.237 | 0 | ----- | 2.67 | 5.17 | .44 | ------ | ------ | .279 | .541 | .046 |
| .20 | .63 | .009 | -.214 | .83 | .131 | 2.90 | ---- | .42 | .9975 | .0449 | .303 | ----- | .044 |
| .20 | 1.06 | .024 | -.211 | 1.38 | .126 | 2.97 | 5.21 | .48 | .3594 | .0431 | .310 | .545 | .050 |
| .20 | 1.48 | .032 | -.195 | 1.93 | .086 | 3.12 | ---- | .51 | .1833 | .0293 | .326 | ----- | .053 |
| .20 | 2.11 | .046 | -.161 | 2.76 | .061 | 3.43 | 4.76 | .59 | .0898 | .0207 | .359 | .498 | .062 |
| .20 | 2.53 | .050 | -.169 | 3.31 | .046 | 3.39 | ---- | .67 | .0624 | .0156 | .354 | ----- | .070 |
| .20 | 3.17 | .051 | -.208 | 4.14 | .030 | 3.06 | 3.80 | .78 | .0399 | .0102 | .320 | .397 | .081 |
| .20 | 3.59 | .048 | -.239 | 4.69 | .022 | 2.79 | ---- | .85 | .0311 | .0075 | .292 | ----- | .089 |
| .20 | 4.22 | .044 | -.283 | 5.52 | .014 | 2.40 | 3.13 | .92 | .0225 | .0049 | .251 | .327 | .096 |
| .20 | 4.64 | .041 | -.307 | 6.07 | .011 | 2.21 | ---- | .97 | .0186 | .0033 | .231 | ----- | .102 |
| .20 | 5.28 | .036 | -.336 | 6.90 | .008 | 1.94 | 2.41 | 1.02 | .0144 | .0026 | .203 | .252 | .107 |
| .20 | 6.33 | .037 | -.383 | 8.28 | .005 | 1.55 | 2.02 | 1.06 | .0100 | .0018 | .162 | .212 | .111 |
| .20 | 7.39 | .036 | -.427 | 9.66 | .004 | 1.18 | 1.84 | 1.14 | .0073 | .0013 | .123 | .192 | .119 |
| .20 | 8.44 | .037 | -.450 | 11.04 | .003 | .99 | 1.35 | 1.16 | .0056 | .0010 | .103 | .141 | .121 |
| .20 | 9.50 | .036 | -.471 | 12.42 | .002 | .81 | 1.33 | 1.19 | .0044 | .0008 | .085 | .139 | .123 |
| .20 | 10.55 | .037 | -.491 | 13.80 | .002 | .63 | 1.19 | 1.19 | .0035 | .0007 | .066 | .124 | .124 |
| .20 | 11.61 | .037 | -.497 | 15.18 | .001 | .59 | .92 | 1.19 | .0030 | .0005 | .062 | .096 | .124 |
| .20 | 12.66 | .039 | ----- | 16.56 | .001 | ---- | .99 | 1.20 | .0025 | .0005 | ----- | .103 | .125 |
| .20 | 13.72 | .037 | -.501 | 17.94 | .001 | .54 | .81 | 1.21 | .0021 | .0004 | .056 | .085 | .126 |
| .30 | 0 | 0 | -.287 | 0 | ----- | 2.67 | 5.14 | .23 | ------ | ------ | .320 | .615 | .027 |
| .30 | .63 | .010 | -.276 | .77 | .111 | 2.77 | ---- | .22 | 1.4953 | .0499 | .331 | ----- | .026 |
| .30 | 1.06 | .039 | -.274 | 1.29 | .156 | 2.81 | 5.06 | .27 | .5391 | .0701 | .336 | .605 | .033 |
| .30 | 1.48 | .048 | -.232 | 1.80 | .098 | 3.03 | ---- | .29 | .2750 | .0440 | .362 | ----- | .035 |
| .30 | 2.11 | .074 | -.176 | 2.58 | .074 | 3.32 | 4.79 | .34 | .1348 | .0332 | .397 | .573 | .041 |
| .30 | 2.53 | .078 | -.170 | 3.09 | .054 | 3.37 | ---- | .42 | .0936 | .0243 | .403 | ----- | .050 |
| .30 | 3.17 | .078 | -.216 | 3.87 | .035 | 3.13 | 3.93 | .55 | .0599 | .0156 | .374 | .470 | .066 |
| .30 | 3.59 | .080 | -.259 | 4.38 | .028 | 2.93 | ---- | .63 | .0466 | .0124 | .351 | ----- | .075 |
| .30 | 4.22 | .072 | -.321 | 5.16 | .018 | 2.62 | 3.27 | .70 | .0337 | .0081 | .313 | .391 | .084 |
| .30 | 4.64 | .069 | -.367 | 5.67 | .014 | 2.40 | ---- | .76 | .0278 | .0064 | .287 | ----- | .091 |
| .30 | 5.28 | .065 | -.427 | 6.45 | .010 | 2.10 | 2.70 | .80 | .0216 | .0047 | .251 | .323 | .096 |
| .30 | 6.33 | .059 | -.496 | 7.74 | .006 | 1.76 | 2.07 | .86 | .0150 | .0029 | .210 | .248 | .103 |
| .30 | 7.39 | .054 | -.561 | 9.02 | .004 | 1.41 | 1.89 | .93 | .0110 | .0020 | .169 | .226 | .112 |
| .30 | 8.44 | .054 | -.612 | 10.31 | .003 | 1.15 | 1.66 | .96 | .0084 | .0015 | .138 | .199 | .115 |
| .30 | 9.50 | .055 | -.629 | 11.60 | .003 | 1.10 | 1.52 | .98 | .0067 | .0012 | .131 | .182 | .117 |
| .30 | 10.55 | .059 | -.662 | 12.89 | .002 | .92 | 1.25 | .99 | .0054 | .0011 | .110 | .150 | .118 |
| .30 | 11.61 | .054 | -.670 | 14.18 | .002 | .88 | 1.18 | 1.00 | .0044 | .0008 | .105 | .141 | .119 |
| .40 | 0 | 0 | -.308 | 0 | ----- | 2.20 | 5.16 | .07 | ------ | ------ | .356 | .679 | .009 |
| .40 | .63 | .014 | -.297 | .74 | .129 | 2.76 | ---- | .06 | 1.9950 | .0698 | .364 | ----- | .008 |
| .40 | 1.06 | .051 | -.297 | 1.23 | .169 | 2.79 | 5.11 | .12 | .7188 | .0916 | .367 | .673 | .016 |
| .40 | 1.48 | .060 | -.255 | 1.72 | .101 | 2.75 | ---- | .15 | .3666 | .0550 | .362 | ----- | .020 |
| .40 | 2.11 | .098 | -.192 | 2.46 | .081 | 3.15 | 4.79 | .19 | .1797 | .0440 | .415 | .630 | .025 |
| .40 | 2.53 | .108 | -.147 | 2.96 | .062 | 3.31 | ---- | .26 | .1248 | .0337 | .436 | ----- | .034 |
| .40 | 3.17 | .110 | -.188 | 3.70 | .041 | 3.18 | 3.99 | .40 | .0799 | .0220 | .418 | .526 | .055 |
| .40 | 3.59 | .111 | -.237 | 4.19 | .032 | 3.01 | ---- | .48 | .0622 | .0173 | .397 | ----- | .064 |
| .40 | 4.22 | .106 | -.327 | 4.93 | .022 | 2.73 | 3.34 | .57 | .0449 | .0119 | .359 | .440 | .076 |
| .40 | 4.64 | .099 | -.401 | 5.42 | .017 | 2.48 | ---- | .64 | .0371 | .0092 | .326 | ----- | .084 |
| .40 | 5.28 | .093 | -.468 | 6.16 | .012 | 2.26 | 2.71 | .68 | .0288 | .0067 | .297 | .357 | .089 |
| .40 | 6.33 | .086 | -.572 | 7.39 | .008 | 1.89 | 2.39 | .74 | .0200 | .0043 | .249 | .314 | .098 |
| .40 | 7.39 | .075 | -.659 | 8.62 | .005 | 1.59 | 2.08 | .82 | .0147 | .0028 | .210 | .273 | .108 |
| .40 | 8.44 | .071 | -.736 | 9.85 | .004 | 1.32 | 1.75 | .84 | .0112 | .0020 | .174 | .231 | .111 |

TABLE III - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{F_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 16^{\circ}$ - Concluded | | | | | | | | | | | | | |
| 0.50 | 0 | 0 | -0.307 | 0 | ------ | 2.71 | 5.18 | -0.06 | ------- | ------- | 0.385 | 0.735 | -0.009 |
| .50 | .63 | .014 | -.296 | .71 | 0.111 | 2.75 | ---- | -.06 | 2.4938 | 0.0698 | .390 | ------ | -.009 |
| .50 | 1.06 | .064 | -.301 | 1.18 | .183 | 2.76 | 5.05 | 0 | .8985 | .1150 | .392 | .716 | .001 |
| .50 | 1.48 | .074 | -.241 | 1.66 | .108 | 2.91 | ---- | .01 | .4583 | .0678 | .413 | ------ | .002 |
| .50 | 2.11 | .120 | -.155 | 2.37 | .086 | 3.14 | 4.86 | .04 | .2246 | .0539 | .446 | .690 | .006 |
| .50 | 2.53 | .139 | -.113 | 2.84 | .069 | 3.26 | ---- | .12 | .1560 | .0434 | .462 | ------ | .017 |
| .50 | 3.17 | .146 | -.129 | 3.55 | .046 | 3.21 | 4.14 | .24 | .0999 | .0292 | .456 | .588 | .034 |
| .50 | 3.59 | .146 | -.196 | 4.03 | .036 | 3.05 | ---- | .34 | .0777 | .0227 | .433 | ------ | .049 |
| .50 | 4.22 | .142 | -.314 | 4.74 | .025 | 2.76 | 3.39 | .45 | .0562 | .0159 | .392 | .481 | .064 |
| $\tau = 20^{\circ}$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | ------- | ------- | ------ | 0 | 0.172 |
| 0 | .63 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | ------ | .173 |
| 0 | 1.06 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | 0 | .178 |
| 0 | 1.48 | 0 | -.012 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | ------ | .179 |
| 0 | 2.11 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | 0 | .186 |
| 0 | 2.53 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | ------ | .185 |
| 0 | 3.17 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | 0 | .186 |
| 0 | 3.59 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | ------ | .188 |
| 0 | 4.22 | 0 | 0 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | 0 | .188 |
| 0 | 4.64 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 5.28 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 6.33 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 7.39 | 0 | -.006 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | ------ | 0 | .190 |
| 0 | 8.44 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 9.50 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 10.55 | .002 | -.013 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | -2.367 | 0 | .189 |
| 0 | 11.61 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 12.66 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 13.72 | .002 | -.022 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | -4.477 | .002 | .188 |
| 0 | 14.77 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 15.83 | ------ | ------ | ------ | ------ | ---- | ---- | ------ | 0 | ------- | ------ | ------ | ------- |
| 0 | 16.88 | .002 | -.012 | ------ | ------ | ---- | ---- | ------ | 0 | 0 | -2.215 | 0 | .188 |
| .10 | 0 | 0 | -.147 | 0 | ------ | 2.63 | 4.95 | .97 | ------- | ------- | .218 | .410 | .081 |
| .10 | .63 | .007 | -.152 | .93 | .162 | 2.63 | ---- | .97 | .4988 | .0349 | .218 | ------ | .081 |
| .10 | 1.06 | ..016 | -.145 | 1.55 | .134 | 2.87 | 4.85 | 1.04 | .1797 | .0288 | .238 | .402 | .086 |
| .10 | 1.48 | .022 | -.141 | 2.17 | .094 | 3.03 | ---- | 1.10 | .0917 | .0202 | .251 | ------ | .091 |
| .10 | 2.11 | .023 | -.153 | 3.10 | .048 | 2.78 | 3.79 | 1.29 | .0449 | .0103 | .231 | .314 | .107 |
| .10 | 2.53 | .020 | -.163 | 3.72 | .029 | 2.53 | ---- | 1.40 | .0312 | .0062 | .210 | ------ | .116 |
| .10 | 3.17 | .019 | -.174 | 4.65 | .018 | 2.29 | 2.60 | 1.51 | .0200 | .0038 | .190 | .216 | .125 |
| .10 | 3.59 | .020 | -.195 | 5.26 | .014 | 1.85 | ---- | 1.59 | .0155 | .0031 | .154 | ------ | .132 |
| .10 | 4.22 | .019 | -.213 | 6.19 | .010 | 1.45 | 1.98 | 1.64 | .0112 | .0021 | .121 | .165 | .136 |
| .10 | 4.64 | .019 | -.215 | 6.81 | .008 | 1.42 | ---- | 1.68 | .0093 | .0018 | .118 | ------ | .139 |
| .10 | 5.28 | .019 | -.224 | 7.74 | .006 | 1.21 | 1.49 | 1.72 | .0072 | .0014 | .100 | .124 | .143 |
| .10 | 6.33 | .019 | -.247 | 9.29 | .004 | .74 | 1.24 | 1.76 | .0050 | .0009 | .062 | .103 | .146 |
| .10 | 7.39 | .021 | -.255 | 10.84 | .004 | .56 | .85 | 1.80 | .0037 | .0008 | .046 | .071 | .149 |
| .10 | 8.44 | .021 | -.255 | 12.39 | .003 | .56 | .85 | 1.81 | .0028 | .0006 | .046 | .071 | .150 |
| .10 | 9.50 | .022 | -.275 | 13.94 | .002 | .18 | .72 | 1.82 | .0022 | .0005 | .015 | .060 | .151 |
| .10 | 10.55 | .022 | -.275 | 15.49 | .002 | .18 | .77 | 1.82 | .0018 | .0004 | .015 | .064 | .151 |
| .10 | 11.61 | .023 | -.308 | 17.04 | .001 | -.46 | .02 | 1.83 | .0015 | .0003 | -.038 | .002 | .152 |
| .10 | 12.66 | .026 | -.311 | 18.59 | .001 | -.50 | .02 | 1.83 | .0013 | .0003 | -.041 | .002 | .152 |
| .10 | 13.72 | .026 | -.308 | 20.13 | .001 | -.43 | .02 | 1.85 | .0011 | .0003 | -.036 | .002 | .154 |
| .10 | 14.77 | .027 | -.311 | 21.68 | .001 | -.46 | .02 | 1.83 | .0009 | .0002 | -.038 | .002 | .152 |
| .10 | 15.83 | .027 | -.297 | 23.23 | .001 | -.15 | .02 | 1.85 | .0008 | .0002 | -.013 | .002 | .154 |

TABLE III - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 20° - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.247 | 0 | ----- | 2.53 | 4.82 | 0.50 | ------ | ------ | 0.264 | 0.504 | 0.052 |
| .20 | .63 | .013 | -.247 | .83 | 0.189 | 2.60 | ---- | .50 | 0.9975 | 0.0648 | .272 | ----- | .052 |
| .20 | 1.06 | .032 | -.244 | 1.38 | .168 | 2.67 | 4.80 | .56 | .3594 | .0575 | .279 | .502 | .059 |
| .20 | 1.48 | .044 | -.220 | 1.93 | .118 | 2.92 | ---- | .61 | .1833 | .0403 | .305 | ----- | .064 |
| .20 | 2.11 | .055 | -.228 | 2.76 | .072 | 2.90 | 4.01 | .78 | .0898 | .0247 | .303 | .419 | .081 |
| .20 | 2.53 | .052 | -.247 | 3.31 | .047 | 2.73 | ---- | .88 | .0624 | .0162 | .285 | ----- | .092 |
| .20 | 3.17 | .049 | -.287 | 4.14 | .029 | 2.38 | 3.02 | 1.01 | .0399 | .0095 | .249 | .316 | .106 |
| .20 | 3.59 | .046 | -.318 | 4.69 | .021 | 2.10 | ---- | 1.11 | .0310 | .0072 | .220 | ----- | .117 |
| .20 | 4.22 | .042 | -.360 | 5.52 | .014 | 1.74 | 2.27 | 1.20 | .0225 | .0047 | .182 | .237 | .125 |
| .20 | 4.64 | .041 | -.379 | 6.07 | .011 | 1.57 | ---- | 1.24 | .0186 | .0038 | .164 | ----- | .129 |
| .20 | 5.28 | .041 | -.401 | 6.90 | .008 | 1.40 | 1.78 | 1.27 | .0144 | .0029 | .146 | .186 | .133 |
| .20 | 6.33 | .042 | -.429 | 8.28 | .006 | 1.15 | 1.45 | 1.32 | .0100 | .0021 | .120 | .152 | .138 |
| .20 | 7.39 | .043 | -.460 | 9.66 | .005 | .91 | 1.27 | 1.36 | .0073 | .0016 | .095 | .132 | .142 |
| .20 | 8.44 | .043 | -.480 | 11.04 | .004 | .74 | 1.08 | 1.49 | .0056 | .0012 | .077 | .113 | .155 |
| .20 | 9.50 | .042 | -.489 | 12.42 | .003 | .64 | .98 | 1.41 | .0044 | .0009 | .067 | .103 | .147 |
| .20 | 10.55 | .041 | -.511 | 13.80 | .002 | .47 | .88 | 1.42 | .0036 | .0007 | .049 | .092 | .148 |
| .20 | 11.61 | .043 | -.542 | 15.18 | .002 | .22 | .71 | 1.42 | .0030 | .0006 | .023 | .075 | .148 |
| .20 | 12.66 | .044 | -.531 | 16.56 | .001 | .30 | .57 | 1.42 | .0025 | .0005 | .031 | .060 | .148 |
| .20 | 13.72 | .046 | -.567 | 17.94 | .001 | .03 | .68 | 1.44 | .0021 | .0005 | .003 | .071 | .151 |
| .30 | 0 | 0 | -.297 | 0 | ----- | 2.59 | 4.82 | .25 | ------ | ------ | .310 | .577 | .030 |
| .30 | .63 | .014 | -.296 | .77 | .156 | 2.63 | ---- | .25 | 1.4963 | .0698 | .315 | ----- | .030 |
| .30 | 1.06 | .049 | -.297 | 1.29 | .197 | 2.70 | 4.75 | .32 | .5391 | .0881 | .323 | .568 | .038 |
| .30 | 1.48 | .064 | -.251 | 1.80 | .131 | 2.93 | ---- | .36 | .2750 | .0587 | .351 | ----- | .044 |
| .30 | 2.11 | .089 | -.261 | 2.58 | .089 | 2.88 | 4.22 | .50 | .1348 | .0400 | .344 | .504 | .060 |
| .30 | 2.53 | .090 | -.276 | 3.09 | .063 | 2.81 | ---- | .61 | .0936 | .0281 | .336 | ----- | .073 |
| .30 | 3.17 | .084 | -.348 | 3.87 | .037 | 2.51 | 3.20 | .77 | .0599 | .0168 | .300 | .382 | .092 |
| .30 | 3.59 | .079 | -.400 | 4.38 | .027 | 2.25 | ---- | .86 | .0466 | .0123 | .269 | ----- | .103 |
| .30 | 4.22 | .073 | -.460 | 5.16 | .018 | 1.93 | 2.48 | .95 | .0337 | .0082 | .231 | .297 | .113 |
| .30 | 4.64 | .068 | -.489 | 5.67 | .014 | 1.78 | ---- | .99 | .0278 | .0063 | .213 | ----- | .119 |
| .30 | 5.28 | .064 | -.529 | 6.45 | .010 | 1.59 | 1.96 | 1.05 | .0216 | .0046 | .190 | .235 | .126 |
| .30 | 6.33 | .062 | -.596 | 7.74 | .007 | 1.25 | 1.63 | 1.11 | .0150 | .0031 | .149 | .194 | .132 |
| .30 | 7.39 | .064 | -.639 | 9.02 | .005 | 1.05 | 1.36 | 1.15 | .0110 | .0023 | .126 | .163 | .138 |
| .30 | 8.44 | .064 | -.680 | 10.31 | .004 | .84 | 1.18 | 1.18 | .0084 | .0018 | .100 | .141 | .141 |
| .30 | 9.50 | .064 | -.710 | 11.60 | .003 | .69 | 1.04 | 1.21 | .0067 | .0014 | .082 | .124 | .144 |
| .30 | 10.55 | .064 | -.732 | 12.89 | .003 | .58 | .91 | 1.21 | .0054 | .0012 | .069 | .109 | .145 |
| .30 | 11.61 | .063 | -.751 | 14.18 | .002 | .47 | .82 | 1.23 | .0044 | .0009 | .056 | .098 | .147 |
| .40 | 0 | 0 | -.316 | 0 | ----- | 2.65 | 4.87 | .07 | ------ | ------ | .349 | .641 | .010 |
| .40 | .63 | .017 | -.316 | .74 | .156 | 2.67 | ----- | .07 | 1.9950 | .0848 | .351 | ----- | .010 |
| .40 | 1.06 | .064 | -.336 | 1.23 | .212 | 2.65 | 4.75 | .15 | .7128 | .1150 | .349 | .626 | .020 |
| .40 | 1.48 | .079 | -.287 | 1.72 | .133 | 2.82 | ----- | .19 | .3666 | .0724 | .372 | ----- | .024 |
| .40 | 2.11 | .122 | -.276 | 2.46 | .101 | 2.90 | 4.22 | .32 | .1797 | .0548 | .382 | .556 | .043 |
| .40 | 2.53 | .125 | -.285 | 2.96 | .072 | 2.86 | ----- | .42 | .1248 | .0390 | .377 | ----- | .056 |
| .40 | 3.17 | .121 | -.368 | 3.70 | .045 | 2.59 | 3.31 | .60 | .0799 | .0242 | .341 | .436 | .079 |
| .40 | 3.59 | .113 | -.437 | 4.19 | .032 | 2.38 | ----- | .69 | .0622 | .0176 | .313 | ----- | .091 |
| .40 | 4.22 | .105 | -.521 | 4.93 | .022 | 2.08 | 2.60 | .80 | .0449 | .0118 | .274 | .342 | .105 |
| .40 | 4.64 | .100 | -.571 | 5.42 | .017 | 1.91 | ----- | .84 | .0371 | .0093 | .251 | ----- | .110 |
| .40 | 5.28 | .092 | -.638 | 6.16 | .012 | 1.67 | 2.08 | .90 | .0288 | .0066 | .220 | .273 | .119 |
| .40 | 6.33 | .086 | -.731 | 7.39 | .007 | 1.34 | 1.72 | .97 | .0200 | .0040 | .177 | .226 | .128 |
| .40 | 7.39 | .086 | -.809 | 8.62 | .006 | 1.09 | 1.47 | 1.01 | .0147 | .0032 | .144 | .194 | .133 |
| .40 | 8.44 | .088 | -.850 | 9.85 | .005 | .96 | 1.28 | 1.04 | .0112 | .0025 | .126 | .169 | .137 |
| .50 | 0 | 0 | -.324 | 0 | ----- | 2.66 | 4.91 | -.09 | ------ | ------ | .377 | .697 | -.013 |
| .50 | .63 | .024 | -.315 | .71 | .190 | 2.69 | ----- | -.10 | 2.4938 | .1197 | .382 | ----- | -.014 |
| .50 | 1.06 | .076 | -.343 | 1.18 | .217 | 2.66 | 4.78 | -.01 | .8985 | .1366 | .377 | .677 | -.001 |
| .50 | 1.48 | .092 | -.275 | 1.66 | .134 | 2.84 | ----- | .01 | .4583 | .0843 | .403 | ----- | .001 |
| .50 | 2.11 | .150 | -.284 | 2.37 | .107 | 2.84 | 4.32 | .14 | .2246 | .0674 | .403 | .613 | .020 |
| .50 | 2.53 | .163 | -.265 | 2.84 | .081 | 2.89 | ----- | .26 | .1560 | .0508 | .410 | ----- | .036 |
| .50 | 3.17 | .159 | -.358 | 3.55 | .050 | 2.65 | 3.45 | .42 | .0999 | .0317 | .377 | .489 | .060 |
| .50 | 3.59 | .155 | -.444 | 4.03 | .038 | 2.46 | ----- | .50 | .0777 | .0241 | .349 | ----- | .071 |
| .50 | 4.22 | .143 | -.549 | 4.74 | .026 | 2.19 | 2.73 | .63 | .0562 | .0161 | .310 | .387 | .090 |

TABLE IV

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{P_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ----- | ----- | ----- | ------ | ------ | ----- | 0.473 | 0.042 |
| 0 | .63 | 0 | .003 | ----- | ----- | ----- | ----- | ----- | 0 | 0 | ----- | ----- | .041 |
| 0 | 1.06 | .002 | .007 | ----- | ----- | ----- | ----- | ----- | 0 | .0036 | ----- | .480 | .041 |
| 0 | 1.48 | .003 | .007 | ----- | ----- | ----- | ----- | ----- | 0 | .0027 | ----- | ----- | .040 |
| 0 | 2.11 | .007 | .009 | ----- | ----- | ----- | ----- | ----- | 0 | .0031 | ----- | .519 | .040 |
| 0 | 2.53 | .014 | .009 | ----- | ----- | ----- | ----- | ----- | 0 | .0044 | ----- | ----- | .040 |
| 0 | 3.17 | .026 | .020 | ----- | ----- | ----- | ----- | ----- | 0 | .0052 | ----- | .705 | .037 |
| 0 | 3.59 | .035 | .040 | ----- | ----- | ----- | ----- | ----- | 0 | .0054 | ----- | ----- | .038 |
| 0 | 4.22 | .049 | .060 | ----- | ----- | ----- | ----- | ----- | 0 | .0055 | ----- | .807 | .037 |
| 0 | 4.64 | .059 | .074 | ----- | ----- | ----- | ----- | ----- | 0 | .0055 | ----- | ----- | .038 |
| 0 | 5.28 | .071 | .099 | ----- | ----- | ----- | ----- | ----- | 0 | .0051 | ----- | .823 | .038 |
| 0 | 6.33 | .096 | .149 | ----- | ----- | ----- | ----- | ----- | 0 | .0048 | ----- | ----- | .038 |
| 0 | 7.39 | .129 | .200 | ----- | ----- | ----- | ----- | ----- | 0 | .0047 | ----- | .823 | .038 |
| .10 | 0 | 0 | .010 | 0 | ----- | 7.51 | 13.34 | 0.38 | ------ | ------ | 0.515 | .915 | .026 |
| .10 | .63 | .002 | .015 | .93 | 0.046 | 7.63 | ----- | .40 | .4988 | .0100 | .524 | ----- | .027 |
| .10 | 1.06 | .007 | .044 | 1.55 | .058 | 8.22 | 13.21 | .37 | .1797 | .0126 | .564 | .906 | .025 |
| .10 | 1.48 | .011 | .065 | 2.17 | .047 | 8.68 | ----- | .38 | .0917 | .0101 | .596 | ----- | .026 |
| .10 | 2.11 | .022 | .084 | 3.10 | .046 | 9.12 | 13.21 | .38 | .0449 | .0099 | .625 | .906 | .026 |
| .10 | 2.53 | .033 | .092 | 3.72 | .048 | 9.27 | ----- | .38 | .0312 | .0103 | .636 | ----- | .026 |
| .10 | | | | | | | | | | | | | |
| .10 | 3.17 | .052 | .114 | 4.65 | .048 | 9.73 | 13.21 | .37 | .0200 | .0104 | .668 | .906 | .025 |
| .10 | 3.59 | .067 | .150 | 5.26 | .048 | 10.54 | ----- | .37 | .0155 | .0104 | .723 | ----- | .025 |
| .10 | 4.22 | .103 | .194 | 6.19 | .054 | 11.51 | 13.65 | .36 | .0112 | .0116 | .789 | .936 | .025 |
| .10 | 4.64 | .162 | .229 | 6.81 | .070 | 12.24 | ----- | .36 | .0093 | .0150 | .840 | ----- | .025 |
| .10 | 5.28 | .262 | .293 | 7.74 | .087 | 13.63 | 13.75 | .31 | .0072 | .0087 | .935 | .943 | .021 |
| .20 | 0 | 0 | .031 | 0 | ----- | 6.07 | 11.13 | .23 | ------ | ------ | .524 | .961 | .020 |
| .20 | .63 | .003 | .035 | .83 | .044 | 6.09 | ----- | .23 | .9975 | .0150 | .526 | ----- | .020 |
| .20 | 1.06 | .009 | .074 | 1.38 | .047 | 6.43 | 11.16 | .22 | .3594 | .0162 | .555 | .964 | .019 |
| .20 | 1.48 | .016 | .115 | 1.93 | .043 | 6.77 | ----- | .21 | .1833 | .0147 | .585 | ----- | .018 |
| .20 | 2.11 | .033 | .159 | 2.76 | .043 | 7.14 | 11.16 | .20 | .0898 | .0148 | .617 | .964 | .017 |
| .20 | 2.53 | .046 | .182 | 3.31 | .042 | 7.36 | ----- | .22 | .0624 | .0144 | .636 | ----- | .019 |
| .20 | 3.17 | .069 | .203 | 4.14 | .040 | 7.54 | 11.20 | .20 | .0399 | .0138 | .651 | .968 | .017 |
| .20 | 3.59 | .099 | .214 | 4.69 | .045 | 7.58 | ----- | .24 | .0311 | .0154 | .655 | ----- | .021 |
| .20 | 4.22 | .157 | .235 | 5.52 | .051 | 7.80 | 11.29 | .20 | .0225 | .0176 | .674 | .975 | .017 |
| .20 | 4.64 | .216 | .260 | 6.07 | .058 | 8.02 | ----- | .16 | .0186 | .0200 | .693 | ----- | .014 |
| .30 | 0 | 0 | .048 | 0 | ----- | 5.30 | 9.93 | .12 | ------ | ------ | .524 | .982 | .012 |
| .30 | .63 | .004 | .054 | .77 | .045 | 5.32 | ----- | .11 | 1.4963 | .0200 | .526 | ----- | .011 |
| .30 | 1.06 | .012 | .094 | 1.29 | .048 | 5.53 | 10.12 | .09 | .5391 | .0216 | .547 | 1.000 | .009 |
| .30 | 1.48 | .022 | .166 | 1.80 | .045 | 5.90 | ----- | .10 | .2750 | .0202 | .583 | ----- | .010 |
| .30 | 2.11 | .041 | .214 | 2.58 | .041 | 6.13 | 10.12 | .09 | .1348 | .0184 | .606 | 1.000 | .009 |
| .30 | 2.53 | .056 | .241 | 3.09 | .039 | 6.26 | ----- | .11 | .0936 | .0175 | .619 | ----- | .011 |
| .30 | 3.17 | .094 | .274 | 3.87 | .042 | 6.43 | 10.12 | .10 | .0599 | .0188 | .636 | 1.000 | .010 |
| .30 | 3.59 | .136 | .273 | 4.38 | .047 | 6.43 | ----- | .10 | .0466 | .0211 | .636 | ----- | .010 |
| .30 | 4.22 | .226 | .269 | 5.16 | .057 | 6.41 | 10.12 | .09 | .0337 | .0254 | .634 | 1.000 | .009 |
| .40 | 0 | 0 | .066 | 0 | ----- | 4.82 | 9.15 | .05 | ------ | ------ | .524 | .996 | .006 |
| .40 | .63 | .004 | .067 | .74 | .037 | 4.83 | ----- | .03 | 1.9950 | .0200 | .526 | ----- | .003 |
| .40 | 1.06 | .014 | .115 | 1.23 | .046 | 4.99 | 9.19 | .02 | .7288 | .0252 | .543 | 1.000 | .002 |
| .40 | 1.48 | .028 | .200 | 1.72 | .047 | 5.28 | ----- | 0 | .3666 | .0257 | .575 | ----- | 0 |
| .40 | 2.11 | .054 | .249 | 2.46 | .045 | 5.43 | 9.19 | .01 | .1797 | .0243 | .591 | 1.000 | .001 |
| .40 | 2.53 | .079 | .283 | 2.96 | .045 | 5.55 | ----- | .02 | .1248 | .0246 | .604 | ----- | .002 |
| .40 | 3.17 | .139 | .309 | 3.70 | .051 | 5.65 | 9.19 | 0 | .0799 | .0278 | .615 | 1.000 | 0 |
| .40 | 3.59 | .207 | .289 | 4.19 | .059 | 5.57 | ----- | .01 | .0622 | .0322 | .606 | ----- | .001 |
| .40 | 4.22 | .331 | .259 | 4.93 | .069 | 5.48 | 9.19 | -.04 | .0449 | .0372 | .596 | 1.000 | -.005 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.50 | 0 | 0 | 0.085 | 0 | ----- | 4.49 | 8.53 | 0 | ------ | ------ | 0.526 | 1.000 | 0 |
| .50 | .63 | .004 | .082 | .71 | 0.032 | 4.47 | ----- | -.01 | 2.4932 | 0.0200 | .524 | ----- | -.002 |
| .50 | 1.06 | .016 | .137 | 1.18 | .046 | 4.62 | 8.53 | -.04 | .8985 | .0288 | .541 | 1.000 | -.004 |
| .50 | 1.48 | .033 | .223 | 1.66 | .048 | 4.83 | ----- | -.05 | .4583 | .0302 | .566 | ----- | -.005 |
| .50 | 2.11 | .066 | .270 | 2.37 | .047 | 4.96 | 8.53 | -.05 | .2246 | .0296 | .581 | 1.000 | -.006 |
| .50 | 2.53 | .101 | .304 | 2.84 | .050 | 5.03 | ----- | -.04 | .1560 | .0315 | .589 | ----- | -.004 |
| .50 | 3.17 | .169 | .289 | 3.55 | .053 | 4.99 | 8.53 | -.05 | .0999 | .0337 | .585 | 1.000 | -.006 |
| .50 | 3.59 | .245 | .254 | 4.03 | .060 | 4.91 | ----- | -.07 | .0777 | .0381 | .575 | ----- | -.008 |
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | ------ | ----- | 0.433 | 0.051 |
| 0 | .63 | .001 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | 0.0050 | 0.500 | ----- | .050 |
| 0 | 1.06 | .002 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | .0036 | .500 | .470 | .050 |
| 0 | 1.48 | .002 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | .0018 | .500 | ----- | .049 |
| 0 | 2.11 | .007 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | .0031 | .500 | .482 | .047 |
| 0 | 2.53 | .012 | 0 | ----- | ----- | ----- | ----- | ---- | 0 | .0037 | .500 | ----- | .047 |
| 0 | 3.17 | .020 | .005 | ----- | ----- | ----- | ----- | ---- | 0 | .0040 | .994 | .505 | .045 |
| 0 | 3.59 | .026 | .010 | ----- | ----- | ----- | ----- | ---- | 0 | .0040 | 1.448 | ----- | .045 |
| 0 | 4.22 | .033 | .020 | ----- | ----- | ----- | ----- | ---- | 0 | .0037 | 1.798 | .523 | .045 |
| 0 | 4.64 | .041 | .025 | ----- | ----- | ----- | ----- | ---- | 0 | .0038 | 1.787 | ----- | .045 |
| 0 | 5.28 | .049 | .040 | ----- | ----- | ----- | ----- | ---- | 0 | .0035 | 2.243 | .526 | .045 |
| 0 | 6.33 | .063 | .066 | ----- | ----- | ----- | ----- | ---- | 0 | .0031 | 2.733 | .523 | .044 |
| 0 | 7.39 | .087 | .080 | ----- | ----- | ----- | ----- | ---- | 0 | .0032 | 2.472 | .510 | .044 |
| 0 | 8.44 | .113 | .114 | ----- | ----- | ----- | ----- | ---- | 0 | .0032 | 2.646 | .523 | .043 |
| 0 | 9.50 | .145 | .139 | ----- | ----- | ----- | ----- | ---- | 0 | .0032 | 2.542 | .526 | .046 |
| 0 | 10.55 | .179 | .174 | ----- | ----- | ----- | ----- | ---- | 0 | .0032 | 2.580 | .523 | .046 |
| 0 | 11.61 | .219 | .214 | ----- | ----- | ----- | ----- | ---- | 0 | .0033 | 2.589 | .523 | .045 |
| 0 | 12.66 | .247 | .249 | ----- | ----- | ----- | ----- | ---- | 0 | .0031 | 2.650 | .519 | .046 |
| 0 | 13.72 | .290 | .289 | ----- | ----- | ----- | ----- | ---- | 0 | .0031 | 2.631 | .523 | .045 |
| 0 | 14.77 | .326 | .324 | ----- | ----- | ----- | ----- | ---- | 0 | .0030 | 2.616 | .523 | .044 |
| 0 | 15.83 | .374 | .364 | ----- | ----- | ----- | ----- | ---- | 0 | .0030 | 2.572 | .523 | .045 |
| 0 | 16.88 | .423 | .409 | ----- | ----- | ----- | ----- | ---- | 0 | .0030 | 2.559 | .512 | .044 |
| .10 | 0 | 0 | -.110 | 0 | ----- | 4.91 | 10.20 | 0.43 | ------ | ------ | .337 | .699 | .030 |
| .10 | .63 | .002 | -.105 | .93 | 0.046 | 5.04 | ----- | .43 | 0.4988 | .0100 | .346 | ----- | .030 |
| .10 | 1.06 | .006 | -.080 | 1.55 | .050 | 5.57 | 10.10 | .42 | .1797 | .0108 | .382 | .692 | .029 |
| .10 | 1.48 | .012 | -.069 | 2.17 | .051 | 5.81 | ----- | .42 | .0917 | .0110 | .399 | ----- | .029 |
| .10 | 2.11 | .021 | -.049 | 3.10 | .044 | 7.17 | 9.82 | .42 | .0449 | .0094 | .492 | .673 | .029 |
| .10 | 2.53 | .029 | -.045 | 3.72 | .042 | 7.21 | ----- | .41 | .0312 | .0090 | .494 | ----- | .028 |
| .10 | 3.17 | .040 | 0 | 4.65 | .037 | 7.29 | 9.99 | .38 | .0200 | .0080 | .500 | .685 | .026 |
| .10 | 3.59 | .045 | .049 | 5.26 | .032 | 7.38 | ----- | .39 | .0155 | .0070 | .506 | ----- | .027 |
| .10 | 4.22 | .054 | .095 | 6.19 | .028 | 9.27 | 9.97 | .39 | .0112 | .0061 | .636 | .683 | .027 |
| .10 | 4.64 | .058 | .103 | 6.81 | .025 | 9.42 | ----- | .43 | .0093 | .0054 | .647 | ----- | .030 |
| .10 | 5.28 | .066 | .119 | 7.74 | .022 | 9.73 | 9.38 | .45 | .0072 | .0047 | .668 | .643 | .031 |
| .10 | 6.33 | .085 | .129 | 9.29 | .019 | 9.92 | 8.81 | .50 | .0050 | .0042 | .681 | .604 | .034 |
| .10 | 7.39 | .102 | .144 | 10.84 | .017 | 10.20 | 8.45 | .51 | .0037 | .0037 | .700 | .579 | .035 |
| .10 | 8.44 | .132 | .163 | 12.39 | .017 | 10.55 | 8.45 | .52 | .0028 | .0037 | .723 | .579 | .036 |
| .10 | 9.50 | .165 | .189 | 13.94 | .017 | 10.97 | 8.14 | .56 | .0022 | .0037 | .753 | .558 | .038 |
| .10 | 10.55 | .193 | .219 | 15.49 | .016 | 11.50 | 8.14 | .57 | .0018 | .0035 | .789 | .558 | .039 |
| .10 | 11.61 | .230 | .255 | 17.04 | .015 | 12.02 | 8.06 | .56 | .0015 | .0034 | .825 | .553 | .038 |
| .10 | 12.66 | .267 | .279 | 18.59 | .015 | 12.36 | 8.06 | .57 | .0013 | .0033 | .848 | .553 | .039 |
| .10 | 13.72 | .308 | .323 | 20.13 | .015 | 13.01 | 7.83 | .57 | .0011 | .0033 | .893 | .537 | .039 |
| .10 | 14.77 | .362 | .360 | 21.68 | .015 | 13.48 | 7.63 | .57 | .0009 | .0033 | .924 | .523 | .039 |
| .10 | 15.83 | .390 | .394 | 23.23 | .014 | 13.94 | ----- | .57 | .0008 | .0031 | .956 | ----- | .039 |

[redacted]

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.180 | 0 | ----- | 4.25 | 9.00 | 0.24 | ------ | ------ | 0.367 | 0.777 | 0.021 |
| .20 | .63 | .003 | -.170 | .83 | 0.044 | 4.34 | ---- | .25 | 0.9975 | 0.0150 | .375 | ----- | .020 |
| .20 | 1.06 | .009 | -.127 | 1.38 | .047 | 4.71 | 9.12 | .22 | .3594 | .0162 | .407 | .788 | .019 |
| .20 | 1.48 | .018 | -.105 | 1.93 | .048 | 4.89 | ---- | .23 | .1833 | .0165 | .422 | ----- | .020 |
| .20 | 2.11 | .031 | -.079 | 2.76 | .041 | 5.13 | 8.83 | .24 | .0898 | .0139 | .443 | .763 | .021 |
| .20 | 2.53 | .040 | -.060 | 3.31 | .037 | 5.28 | ---- | .23 | .0624 | .0125 | .456 | ----- | .020 |
| .20 | 3.17 | .058 | 0 | 4.14 | .034 | 5.79 | 8.91 | .20 | .0399 | .0116 | .500 | .770 | .017 |
| .20 | 3.59 | .071 | .075 | 4.69 | .032 | 6.43 | ---- | .20 | .0311 | .0110 | .555 | ----- | .017 |
| .20 | 4.22 | .082 | .214 | 5.52 | .027 | 7.58 | 9.12 | .19 | .0225 | .0092 | .655 | .788 | .016 |
| .20 | 4.64 | .086 | .264 | 6.07 | .023 | 8.00 | ---- | .19 | .0186 | .0080 | .691 | ----- | .016 |
| .20 | 5.28 | .095 | .283 | 6.90 | .020 | 8.15 | 8.51 | .25 | .0144 | .0068 | .704 | .735 | .021 |
| .20 | 6.33 | .101 | .279 | 8.28 | .015 | 8.11 | 7.91 | .31 | .0100 | .0050 | .700 | .683 | .027 |
| .20 | 7.39 | .125 | .264 | 9.66 | .013 | 7.98 | 7.48 | .35 | .0073 | .0046 | .689 | .646 | .030 |
| .20 | 8.44 | .155 | .264 | 11.04 | .013 | 7.96 | 7.12 | .37 | .0056 | .0044 | .687 | .615 | .032 |
| .20 | 9.50 | .181 | .269 | 12.42 | .012 | 7.98 | 7.03 | .40 | .0044 | .0040 | .689 | .607 | .035 |
| .20 | 10.55 | .216 | .294 | 13.80 | .011 | 8.15 | 6.73 | .41 | .0036 | .0039 | .704 | .581 | .036 |
| .20 | 11.61 | .250 | .315 | 15.18 | .011 | 8.30 | 6.67 | .43 | .0030 | .0037 | .717 | .576 | .038 |
| .20 | 12.66 | .287 | .339 | 16.56 | .011 | 8.44 | 6.52 | .44 | .0025 | .0036 | .729 | .563 | .038 |
| .20 | 13.72 | .327 | .375 | 17.94 | .010 | 8.67 | 6.48 | .44 | .0021 | .0035 | .749 | .560 | .038 |
| .30 | 0 | 0 | -.220 | 0 | ----- | 3.97 | 8.50 | .13 | ------ | ------ | .392 | .841 | .013 |
| .30 | .63 | .003 | -.204 | .77 | .033 | 4.06 | ---- | .12 | 1.4963 | .0150 | .401 | ----- | .012 |
| .30 | 1.06 | .012 | -.149 | 1.29 | .048 | 4.31 | 8.56 | .10 | .5391 | .0216 | .426 | .846 | .010 |
| .30 | 1.48 | .024 | -.114 | 1.80 | .049 | 4.50 | ---- | .12 | .2750 | .0220 | .445 | ----- | .012 |
| .30 | 2.11 | .040 | -.080 | 2.58 | .040 | 4.67 | 8.38 | .13 | .1348 | .0180 | .462 | .828 | .013 |
| .30 | 2.53 | .051 | -.028 | 3.09 | .035 | 4.94 | ---- | .12 | .0936 | .0159 | .488 | ----- | .012 |
| .30 | 3.17 | .073 | .005 | 3.87 | .033 | 5.08 | 8.32 | .11 | .0599 | .0146 | .502 | .823 | .011 |
| .30 | 3.59 | .093 | .102 | 4.38 | .032 | 5.55 | ---- | .09 | .0466 | .0145 | .549 | ----- | .009 |
| .30 | 4.22 | .121 | .289 | 5.16 | .030 | 6.47 | 8.56 | .07 | .0337 | .0136 | .640 | .846 | .007 |
| .30 | 4.64 | .130 | .419 | 5.67 | .027 | 7.10 | ---- | .07 | .0278 | .0121 | .702 | ----- | .006 |
| .30 | 5.28 | .129 | .516 | 6.45 | .021 | 7.57 | 8.21 | .11 | .0216 | .0093 | .748 | .812 | .011 |
| .30 | 6.33 | .136 | .475 | 7.74 | .015 | 7.35 | 7.61 | .20 | .0150 | .0068 | .727 | .752 | .020 |
| .30 | 7.39 | .141 | .434 | 9.02 | .012 | 7.16 | 6.95 | .24 | .0110 | .0052 | .708 | .687 | .023 |
| .30 | 8.44 | .172 | .403 | 10.31 | .011 | 6.99 | 6.72 | .28 | .0084 | .0048 | .691 | .664 | .028 |
| .30 | 9.50 | .204 | .395 | 11.60 | .010 | 6.95 | 6.36 | .31 | .0067 | .0045 | .687 | .629 | .031 |
| .30 | 10.55 | .233 | .384 | 12.89 | .009 | 6.89 | 6.18 | .34 | .0054 | .0042 | .681 | .611 | .033 |
| .30 | 11.61 | .268 | .395 | 14.18 | .009 | 6.93 | 6.04 | .35 | .0044 | .0040 | .685 | .597 | .035 |
| .40 | 0 | 0 | -.229 | 0 | ----- | 3.82 | 8.14 | .05 | ------ | ------ | .416 | .886 | .005 |
| .40 | .63 | .005 | -.209 | .74 | .046 | 3.90 | ---- | .04 | 1.9950 | .0249 | .424 | ----- | .004 |
| .40 | 1.06 | .016 | -.145 | 1.23 | .053 | 4.11 | 8.22 | .02 | .7188 | .0288 | .447 | .894 | .003 |
| .40 | 1.48 | .031 | -.101 | 1.72 | .052 | 4.26 | ---- | .04 | .3666 | .0284 | .464 | ----- | .004 |
| .40 | 2.11 | .049 | -.006 | 2.46 | .041 | 4.58 | 8.05 | .04 | .1797 | .0220 | .498 | .876 | .005 |
| .40 | 2.53 | .062 | -.039 | 2.96 | .036 | 4.46 | ---- | .04 | .1248 | .0193 | .485 | ----- | .005 |
| .40 | 3.17 | .088 | .029 | 3.70 | .032 | 4.70 | 8.05 | .02 | .0799 | .0176 | .511 | .876 | .003 |
| .40 | 3.59 | .113 | .123 | 4.19 | .032 | 5.01 | ---- | .01 | .0622 | .0176 | .545 | ----- | .001 |
| .40 | 4.22 | .146 | 318 | 4.93 | .030 | 5.65 | 8.22 | -.02 | .0449 | .0164 | .615 | .894 | -.002 |
| .40 | 4.64 | .181 | .528 | 5.42 | .031 | 6.33 | ---- | -.03 | .0371 | .0168 | .689 | ----- | -.003 |
| .40 | 5.28 | .197 | .744 | 6.16 | .026 | 7.05 | 8.18 | -.02 | .0288 | .0142 | .767 | .890 | -.003 |
| .40 | 6.33 | .162 | .703 | 7.39 | .015 | 6.92 | 7.35 | .10 | .0200 | .0081 | .753 | .800 | .011 |
| .40 | 7.39 | .186 | .636 | 8.62 | .013 | 6.70 | 6.78 | .17 | .0147 | .0068 | .729 | .738 | .019 |
| .40 | 8.44 | .188 | .574 | 9.85 | .010 | 6.49 | 6.34 | .22 | .0112 | .0053 | .706 | .690 | .024 |
| .50 | 0 | 0 | -.209 | 0 | ----- | 3.75 | 7.88 | -.02 | ------ | ------ | .439 | .924 | -.002 |
| .50 | .63 | .005 | -.189 | .71 | .040 | 3.80 | ---- | -.02 | 2.4938 | .0249 | .445 | ----- | -.002 |
| .50 | 1.06 | .019 | -.120 | 1.18 | .054 | 3.96 | 7.94 | -.03 | .8985 | .0341 | .464 | .931 | -.003 |
| .50 | 1.48 | .036 | -.079 | 1.66 | .052 | 4.07 | ---- | -.02 | .4583 | .0330 | .477 | ----- | -.002 |
| .50 | 2.11 | .060 | -.045 | 2.37 | .043 | 4.16 | 7.75 | 0 | .2246 | .0270 | .488 | .908 | 0 |
| .50 | 2.53 | .074 | 0 | 2.84 | .037 | 4.27 | ---- | -.01 | .1560 | .0231 | .500 | ----- | -.001 |
| .50 | 3.17 | .105 | .066 | 3.55 | .033 | 4.43 | 7.77 | -.02 | .0999 | .0210 | .519 | .911 | -.003 |
| .50 | 3.59 | .134 | .159 | 4.03 | .033 | 4.67 | ---- | -.04 | .0777 | .0208 | .547 | ----- | -.005 |
| .50 | 4.22 | .187 | .380 | 4.74 | .033 | 5.21 | 7.93 | -.07 | .0562 | .0210 | .611 | .929 | -.008 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.314 | 0.070 |
| 0 | .63 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .076 |
| 0 | 1.06 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .080 |
| 0 | 1.48 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .082 |
| 0 | 2.11 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .082 |
| 0 | 2.53 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 3.17 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .077 |
| 0 | 3.59 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 4.22 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .076 |
| 0 | 4.64 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 5.28 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 6.33 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 7.39 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .077 |
| 0 | 8.44 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 9.50 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .077 |
| 0 | 10.55 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 11.61 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 12.66 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | 0 | ----- |
| 0 | 13.72 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .079 |
| 0 | 14.77 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 15.83 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | 0 | ----- |
| 0 | 16.88 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .079 |
| .10 | 0 | 0 | -.170 | 0 | ----- | 3.58 | 7.80 | 0.61 | ------ | ------ | 0.246 | 0.535 | .042 |
| .10 | .63 | .002 | -.159 | .93 | 0.046 | 4.54 | ---- | .59 | .4988 | .0100 | .312 | ----- | .041 |
| .10 | 1.06 | .007 | -.147 | 1.55 | .058 | 4.30 | 7.70 | .61 | .1797 | .0126 | .295 | .528 | .042 |
| .10 | 1.48 | .012 | -.141 | 2.17 | .051 | 4.26 | ---- | .62 | .0917 | .0110 | .293 | ----- | .042 |
| .10 | 2.11 | .018 | -.126 | 3.10 | .038 | 4.61 | 7.40 | .62 | .0449 | .0081 | .316 | .507 | .042 |
| .10 | 2.53 | .023 | -.101 | 3.72 | .033 | 5.19 | ---- | .61 | .0312 | .0072 | .356 | ----- | .042 |
| .10 | 3.17 | .028 | -.079 | 4.65 | .026 | 5.66 | 7.13 | .62 | .0200 | .0056 | .398 | .489 | .043 |
| .10 | 3.59 | .031 | -.074 | 5.26 | .022 | 5.75 | ---- | .68 | .0155 | .0048 | .394 | ----- | .047 |
| .10 | 4.22 | .034 | -.079 | 6.19 | .018 | 5.66 | 6.41 | .72 | .0112 | .0038 | .388 | .440 | .050 |
| .10 | 4.64 | .038 | -.086 | 6.81 | .016 | 5.53 | ---- | .73 | .0093 | .0035 | .379 | ----- | .050 |
| .10 | 5.28 | .041 | -.090 | 7.74 | .013 | 5.44 | 5.92 | .76 | .0072 | .0029 | .373 | .406 | .052 |
| .10 | 6.33 | .046 | -.115 | 9.29 | .011 | 4.94 | 5.51 | .80 | .0050 | .0023 | .339 | .378 | .055 |
| .10 | 7.39 | .056 | -.145 | 10.84 | .010 | 4.36 | 4.97 | .84 | .0037 | .0021 | .299 | .341 | .058 |
| .10 | 8.44 | .059 | -.174 | 12.39 | .008 | 3.77 | 4.78 | .88 | .0028 | .0017 | .259 | .328 | .060 |
| .10 | 9.50 | .070 | -.209 | 13.94 | .007 | 3.15 | 4.58 | .88 | .0022 | .0016 | .216 | .314 | .060 |
| .10 | 10.55 | .075 | -.209 | 15.49 | .006 | 3.59 | 4.26 | .90 | .0018 | .0013 | .246 | .293 | .062 |
| .10 | 11.61 | .082 | -.249 | 17.04 | .006 | 2.41 | 4.09 | .91 | .0015 | .0012 | .165 | .281 | .062 |
| .10 | 12.66 | .082 | -.260 | 18.59 | .005 | 2.22 | 4.07 | .93 | .0013 | .0010 | .153 | .279 | .064 |
| .10 | 13.72 | .088 | -.279 | 20.13 | .004 | 1.88 | 3.63 | .93 | .0011 | .0009 | .129 | .249 | .064 |
| .10 | 14.77 | .089 | -.291 | 21.68 | .004 | 1.66 | 3.30 | .93 | .0009 | .0008 | .114 | .225 | .064 |
| .10 | 15.83 | .088 | -.289 | 23.23 | .003 | 1.67 | 3.14 | .93 | .0008 | .0007 | .114 | .215 | .064 |
| .20 | 0 | 0 | -.269 | 0 | ----- | 3.46 | 7.30 | .31 | ------ | ------ | .299 | .630 | .027 |
| .20 | .63 | .004 | -.259 | .83 | .058 | 3.56 | ---- | .30 | .9975 | .0200 | .307 | ----- | .026 |
| .20 | 1.06 | .013 | -.231 | 1.38 | .068 | 3.81 | 7.14 | .31 | .3594 | .0234 | .329 | .616 | .027 |
| .20 | 1.48 | .019 | -.225 | 1.93 | .051 | 3.88 | ---- | .31 | .1833 | .0174 | .335 | ----- | .027 |
| .20 | 2.11 | .029 | -.194 | 2.76 | .038 | 4.15 | 7.12 | .32 | .0898 | .0130 | .358 | .615 | .028 |
| .20 | 2.53 | .039 | -.150 | 3.31 | .036 | 4.54 | ---- | .31 | .0624 | .0122 | .392 | ----- | .027 |
| .20 | 3.17 | .050 | -.075 | 4.14 | .029 | 5.15 | 6.75 | .31 | .0399 | .0100 | .445 | .583 | .027 |
| .20 | 3.59 | .053 | -.054 | 4.69 | .024 | 5.35 | ---- | .37 | .0311 | .0082 | .462 | ----- | .032 |
| .20 | 4.22 | .060 | -.050 | 5.52 | .020 | 5.37 | 6.26 | .41 | .0225 | .0067 | .464 | .540 | .035 |
| .20 | 4.64 | .063 | -.060 | 6.07 | .017 | 5.30 | ---- | .45 | .0186 | .0058 | .458 | ----- | .039 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{(\Delta/w)^{1/3}}$ | $\frac{l}{(\Delta/w)^{1/3}}$ | $\frac{h}{(\Delta/w)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 5.28 | 0.068 | -0.080 | 6.90 | 0.014 | 5.13 | 5.69 | 0.49 | 0.0144 | 0.0049 | 0.443 | 0.491 | 0.042 |
| .20 | 6.33 | .073 | -.125 | 8.28 | .011 | 4.76 | 5.17 | .54 | .0100 | .0036 | .421 | .447 | .046 |
| .20 | 7.39 | .082 | -.164 | 9.66 | .009 | 4.42 | 4.83 | .58 | .0073 | .0030 | .382 | .417 | .050 |
| .20 | 8.44 | .087 | -.204 | 11.04 | .007 | 4.17 | 4.56 | .62 | .0056 | .0024 | .356 | .394 | .054 |
| .20 | 9.50 | .103 | -.261 | 12.42 | .007 | 3.68 | 4.27 | .64 | .0044 | .0023 | .318 | .369 | .055 |
| .20 | 10.55 | .118 | -.275 | 13.80 | .006 | 3.59 | 4.19 | .65 | .0036 | .0021 | .310 | .362 | .056 |
| .20 | 11.61 | .130 | -.331 | 15.18 | .006 | 3.16 | 3.95 | .65 | .0030 | .0019 | .273 | .341 | .056 |
| .20 | 12.66 | .142 | -.371 | 16.56 | .005 | 2.87 | 3.87 | .66 | .0025 | .0018 | .248 | .334 | .057 |
| .20 | 13.72 | .157 | -.397 | 17.94 | .005 | 2.70 | 3.66 | .67 | .0021 | .0017 | .233 | .316 | .058 |
| .30 | 0 | 0 | -.330 | 0 | ------ | 3.39 | 6.95 | .16 | ------ | ------ | .335 | .687 | .016 |
| .30 | .63 | .005 | -.320 | .77 | .056 | 3.45 | ---- | .13 | 1.4963 | .0249 | .341 | ----- | .013 |
| .30 | 1.06 | .019 | -.285 | 1.29 | .076 | 3.64 | 6.98 | .15 | .5391 | .0341 | .360 | .690 | .014 |
| .30 | 1.48 | .028 | -.269 | 1.80 | .057 | 3.73 | ---- | .16 | .2750 | .0257 | .369 | ----- | .016 |
| .30 | 2.11 | .041 | -.229 | 2.58 | .041 | 3.92 | 6.72 | .17 | .1348 | .0184 | .388 | .664 | .017 |
| .30 | 2.53 | .053 | -.170 | 3.09 | .037 | 4.23 | ---- | .16 | .0936 | .0165 | .418 | ----- | .016 |
| .30 | 3.17 | .069 | -.049 | 3.87 | .031 | 4.83 | 6.74 | .15 | .0599 | .0138 | .477 | .666 | .015 |
| .30 | 3.59 | .078 | 0 | 4.38 | .027 | 5.06 | ---- | .19 | .0466 | .0121 | .500 | ----- | .019 |
| .30 | 4.22 | .085 | .011 | 5.16 | .021 | 5.11 | 6.20 | .24 | .0337 | .0095 | .505 | .613 | .023 |
| .30 | 4.64 | .088 | 0 | 5.67 | .018 | 5.06 | ---- | .29 | .0278 | .0082 | .500 | ----- | .029 |
| .30 | 5.28 | .095 | -.019 | 6.45 | .015 | 4.98 | 5.50 | .35 | .0216 | .0068 | .492 | .544 | .035 |
| .30 | 6.33 | .101 | -.081 | 7.74 | .011 | 4.67 | 5.06 | .40 | .0150 | .0050 | .462 | .500 | .040 |
| .30 | 7.39 | .107 | -.145 | 9.02 | .009 | 4.35 | 4.72 | .45 | .0110 | .0039 | .430 | .466 | .044 |
| .30 | 8.44 | .120 | -.210 | 10.31 | .008 | 4.06 | 4.39 | .49 | .0084 | .0034 | .401 | .434 | .049 |
| .30 | 9.50 | .133 | -.280 | 11.60 | .006 | 3.73 | 4.16 | .52 | .0067 | .0029 | .369 | .411 | .052 |
| .30 | 10.55 | .147 | -.300 | 12.89 | .006 | 3.64 | 3.89 | .53 | .0054 | .0026 | .360 | .385 | .053 |
| .30 | 11.61 | .163 | -.356 | 14.18 | .005 | 3.39 | 3.80 | .55 | .0044 | .0024 | .335 | .376 | .055 |
| .40 | 0 | 0 | -.355 | 0 | ------ | 3.37 | 6.94 | .05 | ------ | ------ | .367 | .756 | .005 |
| .40 | .63 | .007 | -.340 | .74 | .064 | 3.43 | ---- | .03 | 1.9950 | .0349 | .373 | ----- | .003 |
| .40 | 1.06 | .026 | -.306 | 1.23 | .086 | 3.57 | 6.89 | .05 | .7188 | .0467 | .388 | .750 | .005 |
| .40 | 1.48 | .040 | -.285 | 1.72 | .068 | 3.62 | ---- | .07 | .3666 | .0367 | .394 | ----- | .008 |
| .40 | 2.11 | .054 | -.239 | 2.46 | .045 | 3.80 | 6.70 | .08 | .1797 | .0243 | .413 | .729 | .009 |
| .40 | 2.53 | .066 | -.170 | 2.96 | .038 | 4.03 | ---- | .05 | .1248 | .0206 | .439 | ----- | .006 |
| .40 | 3.17 | .089 | -.019 | 3.70 | .033 | 4.54 | 6.73 | .05 | .0799 | .0178 | .494 | .733 | .005 |
| .40 | 3.59 | .100 | .070 | 4.19 | .029 | 4.83 | ---- | .06 | .0622 | .0155 | .526 | ----- | .007 |
| .40 | 4.22 | .107 | .115 | 4.93 | .022 | 4.97 | 6.21 | .13 | .0449 | .0120 | .541 | .676 | .014 |
| .40 | 4.64 | .114 | .105 | 5.42 | .020 | 4.94 | ---- | .18 | .0371 | .0106 | .538 | ----- | .019 |
| .40 | 5.28 | .122 | .067 | 6.16 | .016 | 4.82 | 5.48 | .24 | .0288 | .0088 | .524 | .597 | .026 |
| .40 | 6.33 | .130 | -.079 | 7.39 | .012 | 4.35 | 4.97 | .32 | .0200 | .0065 | .473 | .540 | .034 |
| .40 | 7.39 | .139 | -.094 | 8.62 | .009 | 4.25 | 4.64 | .37 | .0147 | .0051 | .462 | .505 | .041 |
| .40 | 8.44 | .141 | -.180 | 9.85 | .007 | 4.02 | 4.32 | .41 | .0112 | .0040 | .437 | .470 | .045 |
| .50 | 0 | 0 | -.346 | 0 | ------ | 3.38 | 6.87 | -.04 | ------ | ------ | .396 | .805 | -.004 |
| .50 | .63 | .007 | -.336 | .71 | .055 | 3.41 | ---- | -.05 | 2.4938 | .0349 | .401 | ----- | -.005 |
| .50 | 1.06 | .030 | -.306 | 1.18 | .086 | 3.49 | 6.83 | -.03 | .8985 | .0539 | .409 | .800 | -.004 |
| .50 | 1.48 | .045 | -.280 | 1.66 | .065 | 3.57 | ---- | 0 | .4583 | .0412 | .418 | ----- | 0 |
| .50 | 2.11 | .062 | -.221 | 2.37 | .044 | 3.71 | 6.59 | 0 | .2246 | .0279 | .435 | .772 | 0 |
| .50 | 2.53 | .078 | -.139 | 2.84 | .039 | 3.92 | ---- | -.01 | .1560 | .0243 | .460 | ----- | -.001 |
| .50 | 3.17 | .110 | .015 | 3.55 | .035 | 4.31 | 6.63 | -.02 | .0999 | .0220 | .505 | .777 | -.003 |
| .50 | 3.59 | .125 | .124 | 4.03 | .031 | 4.57 | ---- | -.02 | .0777 | .0194 | .536 | ----- | -.003 |
| .50 | 4.22 | .134 | .241 | 4.74 | .024 | 4.86 | 6.24 | .04 | .0562 | .0150 | .570 | .731 | .004 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ------- | 0.154 | 0.105 |
| 0 | .63 | .002 | -.014 | ----- | ----- | ---- | ---- | ---- | 0 | 0.0100 | -5.064 | ----- | .105 |
| 0 | 1.06 | .002 | -.014 | ----- | ----- | ---- | ---- | ---- | 0 | .0036 | -3.952 | .178 | .106 |
| 0 | 1.48 | .003 | -.011 | ----- | ----- | ---- | ---- | ---- | 0 | .0027 | -3.210 | ----- | .108 |
| 0 | 2.11 | .002 | -.009 | ----- | ----- | ---- | ---- | ---- | 0 | .0009 | -2.256 | .095 | .113 |
| 0 | 2.53 | .001 | -.014 | ----- | ----- | ---- | ---- | ---- | 0 | .0003 | -10.630 | ----- | .116 |
| 0 | 3.17 | 0 | -.015 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .004 | .119 |
| 0 | 3.59 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | .120 |
| 0 | 4.22 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .025 | .121 |
| 0 | 4.64 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | .122 |
| 0 | 5.28 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .004 | .122 |
| 0 | 6.33 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | 0 | .122 |
| 0 | 7.39 | 0 | -.019 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | 0 | .122 |
| 0 | 8.44 | .001 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -.500 | 0 | .121 |
| 0 | 9.50 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 10.55 | .002 | -.029 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -8.828 | .004 | .120 |
| 0 | 11.61 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 12.66 | .002 | -.020 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -5.860 | .002 | .118 |
| 0 | 13.72 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 14.77 | .002 | -.009 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -2.256 | 0 | .118 |
| 0 | 15.83 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 16.88 | .004 | -.089 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -17.121 | 0 | .118 |
| .10 | 0 | 0 | -.185 | 0 | ----- | 3.21 | 6.57 | 0.79 | ------ | ------ | .220 | .450 | .054 |
| .10 | .63 | .005 | -.180 | .93 | 0.116 | 3.37 | ---- | .79 | 0.4988 | .0249 | .231 | ----- | .054 |
| .10 | 1.06 | .012 | -.180 | 1.55 | .100 | 3.43 | 6.41 | .84 | .1797 | .0216 | .235 | .440 | .058 |
| .10 | 1.48 | .015 | -.169 | 2.17 | .064 | 3.68 | ---- | .86 | .0917 | .0137 | .252 | ----- | .059 |
| .10 | 2.11 | .022 | -.159 | 3.10 | .046 | 3.92 | 6.03 | .88 | .0449 | .0099 | .269 | .413 | .061 |
| .10 | 2.53 | .021 | -.153 | 3.72 | .031 | 4.08 | ---- | .95 | .0312 | .0066 | .280 | ----- | .065 |
| .10 | 3.17 | .021 | -.165 | 4.65 | .019 | 3.83 | 5.02 | 1.03 | .0200 | .0042 | .263 | .344 | .070 |
| .10 | 3.59 | .024 | -.180 | 5.26 | .017 | 3.52 | ---- | 1.09 | .0155 | .0037 | .242 | ----- | .075 |
| .10 | 4.22 | .022 | -.200 | 6.19 | .012 | 3.09 | 4.20 | 1.16 | .0112 | .0025 | .212 | .288 | .079 |
| .10 | 4.64 | .022 | -.220 | 6.81 | .009 | 2.66 | ---- | 1.20 | .0093 | .0020 | .182 | ----- | .082 |
| .10 | 5.28 | .021 | -.229 | 7.74 | .007 | 2.47 | 3.24 | 1.25 | .0072 | .0015 | .170 | .222 | .086 |
| .10 | 6.33 | .022 | -.254 | 9.29 | .005 | 1.95 | 2.48 | 1.31 | .0050 | .0011 | .134 | .170 | .090 |
| .10 | 7.39 | .022 | -.280 | 10.84 | .004 | 1.39 | 2.21 | 1.32 | .0037 | .0008 | .095 | .152 | .091 |
| .10 | 8.44 | .022 | -.289 | 12.39 | .003 | 1.20 | 1.96 | 1.35 | .0028 | .0006 | .083 | .134 | .093 |
| .10 | 9.50 | .021 | -.320 | 13.94 | .002 | .56 | 1.70 | 1.38 | .0022 | .0005 | .038 | .117 | .093 |
| .10 | 10.55 | .024 | -.325 | 15.49 | .002 | .46 | 1.44 | 1.32 | .0018 | .0004 | .032 | .099 | .094 |
| .10 | 11.61 | .022 | -.310 | 17.04 | .001 | .77 | 1.18 | 1.39 | .0015 | .0003 | .053 | .081 | .095 |
| .10 | 12.66 | .022 | -.350 | 18.59 | .001 | -.09 | 1.13 | 1.39 | .0013 | .0003 | -.006 | .078 | .095 |
| .10 | 13.72 | .024 | -.360 | 20.13 | .001 | -.28 | .98 | 1.40 | .0011 | .0003 | -.019 | .067 | .096 |
| .10 | 14.77 | .025 | -.350 | 21.68 | .001 | -.06 | .71 | 1.40 | .0009 | .0002 | -.004 | .049 | .096 |
| .10 | 15.83 | .022 | -.350 | 23.23 | .001 | -.09 | .80 | 1.39 | .0008 | .0002 | -.006 | .055 | .095 |
| .20 | 0 | 0 | -.295 | 0 | ----- | 3.20 | 6.30 | .41 | ------ | ------ | .276 | .544 | .036 |
| .20 | .63 | .007 | -.289 | .83 | .102 | 3.27 | ---- | .41 | .9975 | .0349 | .282 | ----- | .036 |
| .20 | 1.06 | .021 | -.281 | 1.38 | .110 | 3.39 | 6.25 | .45 | .3594 | .0377 | .293 | .540 | .039 |
| .20 | 1.48 | .026 | -.269 | 1.93 | .070 | 3.51 | ---- | .49 | .1833 | .0238 | .303 | ----- | .042 |
| .20 | 2.11 | .041 | -.236 | 2.75 | .054 | 3.81 | 6.01 | .49 | .0898 | .0184 | .329 | .519 | .042 |
| .20 | 2.53 | .045 | -.220 | 3.31 | .041 | 3.95 | ---- | .54 | .0624 | .0140 | .341 | ----- | .046 |
| .20 | 3.17 | .047 | -.224 | 4.14 | .027 | 3.93 | 5.20 | .62 | .0399 | .0094 | .339 | .449 | .054 |
| .20 | 3.59 | .048 | -.245 | 4.69 | .022 | 3.75 | ---- | .69 | .0311 | .0075 | .324 | ----- | .060 |
| .20 | 4.22 | .049 | -.295 | 5.52 | .016 | 3.44 | 4.38 | .76 | .0225 | .0055 | .297 | .378 | .066 |
| .20 | 4.64 | .048 | -.300 | 6.07 | .013 | 3.29 | ---- | .82 | .0156 | .0045 | .284 | ----- | .070 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^{\circ}$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 5.28 | 0.046 | -0.340 | 6.90 | 0.010 | 2.94 | 3.64 | 0.87 | 0.0144 | 0.0033 | 0.254 | 0.314 | 0.075 |
| .20 | 6.33 | .045 | -.402 | 8.28 | .006 | 2.41 | 3.13 | .93 | .0100 | .0022 | .208 | .270 | .080 |
| .20 | 7.39 | .043 | -.462 | 9.66 | .005 | 1.93 | 2.74 | .96 | .0073 | .0016 | .167 | .237 | .083 |
| .20 | 8.44 | .045 | -.493 | 11.04 | .004 | 1.64 | 2.37 | .99 | .0056 | .0013 | .142 | .205 | .086 |
| .20 | 9.50 | .045 | -.523 | 12.42 | .003 | 1.40 | 2.17 | 1.01 | .0044 | .0010 | .121 | .187 | .087 |
| .20 | 10.55 | .043 | -.553 | 13.80 | .002 | 1.16 | 1.96 | 1.03 | .0036 | .0008 | .100 | .170 | .089 |
| .20 | 11.61 | .045 | -.576 | 15.18 | .002 | .94 | 1.66 | 1.04 | .0030 | .0007 | .081 | .143 | .090 |
| .20 | 12.66 | .045 | -.583 | 16.56 | .002 | .88 | 1.55 | 1.05 | .0025 | .0006 | .076 | .134 | .091 |
| .20 | 13.72 | .047 | -.625 | 17.94 | .001 | .59 | 1.35 | 1.05 | .0021 | .0005 | .051 | .117 | .091 |
| .30 | 0 | 0 | -.361 | 0 | ------ | 3.22 | 6.22 | .21 | ------ | ------ | .318 | .615 | .021 |
| .30 | .63 | .009 | -.355 | .77 | .100 | 3.26 | ---- | .21 | 1.4963 | .0449 | .322 | ------ | .021 |
| .30 | 1.06 | .031 | -.350 | 1.29 | .124 | 3.30 | 6.18 | .25 | .5391 | .0557 | .326 | .611 | .024 |
| .30 | 1.48 | .038 | -.336 | 1.80 | .078 | 3.39 | ---- | .27 | .2750 | .0348 | .335 | ------ | .027 |
| .30 | 2.11 | .055 | -.276 | 2.58 | .055 | 3.71 | 5.98 | .28 | .1348 | .0247 | .367 | .592 | .028 |
| .30 | 2.53 | .068 | -.260 | 3.09 | .047 | 3.79 | ---- | .32 | .0936 | .0212 | .375 | ------ | .031 |
| .30 | 3.17 | .074 | -.229 | 3.87 | .033 | 3.95 | 5.34 | .39 | .0599 | .0148 | .390 | .528 | .039 |
| .30 | 3.59 | .075 | -.250 | 4.38 | .026 | 3.86 | ---- | .46 | .0466 | .0117 | .382 | ------ | .046 |
| .30 | 4.22 | .079 | -.306 | 5.16 | .020 | 3.58 | 4.45 | .56 | .0337 | .0089 | .354 | .440 | .055 |
| .30 | 4.64 | .073 | -.336 | 5.67 | .015 | 3.43 | ---- | .61 | .0278 | .0068 | .339 | ------ | .060 |
| .30 | 5.28 | .073 | -.397 | 6.45 | .011 | 3.14 | 3.85 | .67 | .0216 | .0052 | .310 | .381 | .066 |
| .30 | 6.33 | .073 | -.482 | 7.74 | .008 | 2.72 | 3.32 | .74 | .0150 | .0036 | .269 | .328 | .073 |
| .30 | 7.39 | .066 | -.596 | 9.02 | .005 | 2.16 | 2.97 | .76 | .0110 | .0024 | .214 | .293 | .075 |
| .30 | 8.44 | .068 | -.624 | 10.31 | .004 | 2.01 | 2.61 | .80 | .0084 | .0019 | .199 | .258 | .079 |
| .30 | 9.50 | .067 | -.683 | 11.60 | .003 | 1.24 | 2.43 | .83 | .0067 | .0015 | .172 | .240 | .082 |
| .30 | 10.55 | .071 | -.742 | 12.89 | .003 | 1.46 | 2.20 | .86 | .0054 | .0013 | .144 | .217 | .085 |
| .30 | 11.61 | .071 | -.772 | 14.18 | .002 | 1.30 | 1.89 | .87 | .0044 | .0011 | .129 | .187 | .086 |
| .40 | 0 | 0 | -.391 | 0 | ------ | 3.24 | 6.26 | .06 | ------ | ------ | .352 | .682 | .007 |
| .40 | .63 | .011 | -.387 | .74 | .101 | 3.25 | ---- | .06 | 1.9950 | .0549 | .354 | ------ | .007 |
| .40 | 1.06 | .039 | -.387 | 1.23 | .129 | 3.27 | 6.10 | .09 | .7188 | .0701 | .356 | .664 | .010 |
| .40 | 1.48 | .049 | -.362 | 1.72 | .083 | 3.37 | ---- | .12 | .3666 | .0449 | .367 | ------ | .013 |
| .40 | 2.11 | .068 | -.279 | 2.46 | .056 | 3.67 | 5.97 | .13 | .1797 | .0305 | .399 | .650 | .014 |
| .40 | 2.53 | .090 | -.270 | 2.96 | .052 | 3.70 | ---- | .16 | .1248 | .0281 | .403 | ------ | .017 |
| .40 | 3.17 | .099 | -.210 | 3.70 | .036 | 3.90 | 5.42 | .23 | .0799 | .0198 | .424 | .590 | .025 |
| .40 | 3.59 | .101 | -.220 | 4.19 | .029 | 3.88 | ---- | .31 | .0622 | .0157 | .422 | ------ | .034 |
| .40 | 4.22 | .102 | -.279 | 4.93 | .021 | 3.69 | 4.60 | .40 | .0449 | .0115 | .401 | .500 | .043 |
| .40 | 4.64 | .105 | -.336 | 5.42 | .018 | 3.48 | ---- | .46 | .0371 | .0097 | .379 | ------ | .050 |
| .40 | 5.28 | .101 | -.416 | 6.16 | .013 | 3.24 | 3.91 | .53 | .0288 | .0073 | .352 | .426 | .057 |
| .40 | 6.33 | .098 | -.523 | 7.39 | .009 | 2.87 | 3.37 | .60 | .0200 | .0049 | .312 | .367 | .065 |
| .40 | 7.39 | .096 | -.635 | 8.62 | .006 | 2.49 | 3.13 | .63 | .0147 | .0035 | .271 | .341 | .068 |
| .40 | 8.44 | .092 | -.722 | 9.85 | .005 | 2.21 | 2.86 | .67 | .0112 | .0026 | .240 | .311 | .073 |
| .50 | 0 | 0 | -.391 | 0 | ------ | 3.26 | 6.27 | -.06 | ------ | ------ | .382 | .735 | -.007 |
| .50 | .63 | .012 | -.381 | .71 | .095 | 3.29 | ---- | -.05 | 2.4938 | .0599 | .386 | ------ | -.006 |
| .50 | 1.06 | .048 | -.391 | 1.18 | .137 | 3.28 | 6.12 | -.01 | .8985 | .0563 | .384 | .717 | -.001 |
| .50 | 1.48 | .060 | -.360 | 1.66 | .087 | 3.36 | ---- | .02 | .4583 | .0550 | .394 | ------ | .003 |
| .50 | 2.11 | .085 | -.260 | 2.37 | .061 | 3.62 | 5.96 | .02 | .2246 | .0382 | .424 | .699 | .003 |
| .50 | 2.53 | .107 | -.204 | 2.84 | .053 | 3.76 | ---- | .03 | .1560 | .0334 | .441 | ------ | .004 |
| .50 | 3.17 | .122 | -.170 | 3.55 | .039 | 3.86 | 5.50 | .14 | .0999 | .0244 | .452 | .645 | .016 |
| .50 | 3.59 | .130 | -.161 | 4.03 | .032 | 3.87 | ---- | .20 | .0777 | .0202 | .454 | ------ | .023 |
| .50 | 4.22 | .134 | -.224 | 4.74 | .024 | 3.73 | 4.76 | .33 | .0562 | .0150 | .437 | .558 | .038 |
| $\tau = 16^{\circ}$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | ------ | ------ | ------ | 0.078 | 0.139 |
| 0 | .63 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | ------ | .138 |
| 0 | 1.06 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | .028 | .138 |
| 0 | 1.48 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | ------ | .138 |
| 0 | 2.11 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | .002 | .142 |
| 0 | 2.53 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | ------ | .142 |
| 0 | 3.17 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | 0 | .143 |
| 0 | 3.59 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | ------ | .143 |
| 0 | 4.22 | 0 | 0 | ------ | ------ | ---- | ---- | ---- | 0 | 0 | ------ | 0 | .143 |
| 0 | 4.64 | ------ | ------ | ------ | ------ | ---- | ---- | ---- | 0 | ------ | ------ | ------ | ------ |
| 0 | 5.28 | ------ | ------ | ------ | ------ | ---- | ---- | ---- | 0 | ------ | ------ | ------ | ------ |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 16° - Continued | | | | | | | | | | | | | |
| 0 | 6.33 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | 0.142 |
| 0 | 7.39 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 8.44 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 9.50 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 10.55 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | 0 | ----- |
| 0 | 11.61 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 12.66 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 13.72 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .002 | .138 |
| 0 | 14.77 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 15.83 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ----- | ----- | ----- |
| 0 | 16.88 | 0 | -.101 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | 0 | .138 |
| .10 | 0 | 0 | -.185 | 0 | ----- | 3.12 | 5.87 | 1.01 | ------ | ------ | 0.214 | .403 | .069 |
| .10 | .63 | .007 | -.192 | .93 | 0.162 | 3.06 | ---- | 1.01 | .4958 | .0349 | .210 | ----- | .069 |
| .10 | 1.06 | .012 | -.186 | 1.55 | .100 | 3.24 | 5.82 | 1.07 | .1797 | .0216 | .223 | .399 | .074 |
| .10 | 1.48 | .019 | -.185 | 2.17 | .081 | 3.37 | ---- | 1.10 | .0917 | .0174 | .231 | ----- | .075 |
| .10 | 2.11 | .024 | -.194 | 3.10 | .050 | 3.21 | 4.97 | 1.20 | .0449 | .0108 | .220 | .341 | .083 |
| .10 | 2.53 | .021 | -.194 | 3.72 | .031 | 3.18 | ---- | 1.34 | .0312 | .0066 | .218 | ----- | .092 |
| .10 | 3.17 | .022 | -.214 | 4.65 | .020 | 2.78 | 3.71 | 1.45 | .0200 | .0044 | .191 | .254 | .100 |
| .10 | 3.59 | .022 | -.229 | 5.26 | .016 | 2.48 | ---- | 1.54 | .0155 | .0034 | .170 | ----- | .106 |
| .10 | 4.22 | .021 | -.247 | 6.19 | .011 | 2.07 | 2.73 | 1.65 | .0112 | .0024 | .142 | .187 | .113 |
| .10 | 4.64 | .021 | -.250 | 6.81 | .009 | 2.01 | ---- | 1.70 | .0093 | .0019 | .138 | ----- | .117 |
| .10 | 5.23 | .020 | -.260 | 7.74 | .006 | 1.76 | 1.93 | 1.75 | .0072 | .0014 | .121 | .132 | .120 |
| .10 | 6.33 | .020 | -.296 | 9.29 | .005 | .99 | 1.60 | 1.69 | .0050 | .0010 | .068 | .109 | .116 |
| .10 | 7.39 | .021 | -.301 | 10.84 | .004 | .93 | 1.18 | 1.78 | .0037 | .0008 | .064 | .081 | .122 |
| .10 | 8.44 | .021 | -.306 | 12.39 | .003 | .80 | 1.08 | 1.79 | .0028 | .0006 | .055 | .074 | .123 |
| .10 | 9.50 | .021 | -.330 | 13.94 | .002 | .31 | .93 | 1.83 | .0022 | .0005 | .021 | .064 | .125 |
| .10 | 10.55 | .022 | -.310 | 15.49 | .002 | .77 | .83 | 1.83 | .0018 | .0004 | .053 | .060 | .125 |
| .10 | 11.61 | .024 | -.336 | 17.04 | .002 | .25 | .67 | 1.84 | .0015 | .0004 | .017 | .046 | .126 |
| .10 | 12.66 | .024 | -.352 | 18.59 | .001 | -.09 | .77 | 1.85 | .0013 | .0003 | -.006 | .053 | .127 |
| .10 | 13.72 | .025 | -.352 | 20.13 | .001 | -.09 | 0 | 1.87 | .0011 | .0003 | -.006 | 0 | .128 |
| .10 | 14.77 | .025 | -.361 | 21.68 | .001 | -.28 | .26 | 1.86 | .0009 | .0002 | -.019 | .018 | .128 |
| .10 | 15.83 | .024 | -.381 | 23.23 | .001 | -.71 | .49 | 1.85 | .0008 | .0002 | -.049 | .034 | .127 |
| .20 | 0 | 0 | -.304 | 0 | ----- | 3.07 | 5.79 | .53 | ------ | ------ | .265 | .500 | .046 |
| .20 | .63 | .010 | -.303 | .83 | .146 | 3.14 | ---- | .52 | .9975 | .0499 | .271 | ----- | .045 |
| .20 | 1.06 | .025 | -.316 | 1.38 | .131 | 3.07 | 5.68 | .58 | .3594 | .0449 | .265 | .491 | .051 |
| .20 | 1.48 | .033 | -.290 | 1.93 | .088 | 3.34 | ---- | .61 | .1833 | .0302 | .288 | ----- | .052 |
| .20 | 2.11 | .047 | -.303 | 2.76 | .062 | 3.27 | 5.10 | .70 | .0898 | .0211 | .282 | .440 | .061 |
| .20 | 2.53 | .049 | -.295 | 3.31 | .045 | 3.34 | ---- | .81 | .0624 | .0153 | .286 | ----- | .070 |
| .20 | 3.17 | .049 | -.326 | 4.14 | .029 | 3.09 | 4.15 | .94 | .0399 | .0098 | .267 | .358 | .081 |
| .20 | 3.59 | .049 | -.360 | 4.69 | .022 | 2.80 | ---- | 1.02 | .0311 | .0076 | .242 | ----- | .088 |
| .20 | 4.22 | .047 | -.405 | 5.52 | .015 | 2.41 | 3.18 | 1.12 | .0225 | .0053 | .208 | .275 | .097 |
| .20 | 4.64 | .045 | -.431 | 6.07 | .012 | 2.19 | ---- | 1.14 | .0186 | .0042 | .189 | ----- | .099 |
| .20 | 5.28 | .043 | -.468 | 6.90 | .009 | 1.86 | 2.58 | 1.20 | .0144 | .0031 | .161 | .222 | .104 |
| .20 | 6.33 | .043 | -.509 | 8.26 | .006 | 1.52 | 2.00 | 1.23 | .0100 | .0021 | .131 | .173 | .106 |
| .20 | 7.39 | .043 | -.547 | 9.66 | .005 | 1.20 | 1.72 | 1.31 | .0073 | .0016 | .104 | .148 | .113 |
| .20 | 8.44 | .041 | -.551 | 11.04 | .004 | 1.16 | 1.35 | 1.35 | .0056 | .0012 | .100 | .117 | .116 |
| .20 | 9.50 | .040 | -.591 | 12.42 | .003 | .81 | 1.15 | 1.38 | .0044 | .0009 | .070 | .099 | .119 |
| .20 | 10.55 | .040 | -.601 | 13.80 | .002 | .71 | 1.03 | 1.39 | .0036 | .0007 | .061 | .094 | .120 |
| .20 | 11.61 | .042 | -.616 | 15.18 | .002 | .61 | .94 | 1.40 | .0030 | .0006 | .053 | .081 | .121 |
| .20 | 12.66 | .045 | -.655 | 16.56 | .002 | .29 | 0 | 1.41 | .0025 | .0006 | .025 | 0 | .122 |
| .20 | 13.72 | .046 | -.649 | 17.94 | .001 | .37 | .72 | 1.40 | .0021 | .0005 | .032 | .062 | .121 |
| .30 | 0 | 0 | -.381 | 0 | ----- | 3.07 | 5.79 | .26 | ------ | ------ | .303 | .572 | .026 |
| .30 | .63 | .010 | -.377 | .77 | .111 | 3.14 | ---- | .26 | 1.4963 | .0499 | .310 | ----- | .025 |
| .30 | 1.06 | .035 | -.357 | 1.29 | .140 | 3.11 | 5.60 | .34 | .5391 | .0629 | .307 | .554 | .033 |
| .30 | 1.48 | .043 | -.361 | 1.80 | .086 | 3.26 | ---- | .35 | .2750 | .0394 | .322 | ----- | .034 |
| .30 | 2.11 | .069 | -.373 | 2.58 | .069 | 3.24 | 5.16 | .44 | .1348 | .0310 | .320 | .510 | .043 |
| .30 | 2.53 | .078 | -.357 | 3.09 | .054 | 3.35 | ---- | .53 | .0936 | .0243 | .331 | ----- | .053 |
| .30 | 3.17 | .080 | -.387 | 3.87 | .036 | 3.20 | 4.29 | .66 | .0599 | .0160 | .316 | .424 | .065 |
| .30 | 3.59 | .078 | -.428 | 4.38 | .027 | 3.00 | ---- | .76 | .0466 | .0121 | .297 | ----- | .075 |
| .30 | 4.22 | .075 | -.496 | 5.16 | .019 | 2.66 | 3.41 | .86 | .0337 | .0084 | .263 | .337 | .085 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{P_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| τ = 16° - Concluded | | | | | | | | | | | | | |
| 0.30 | 4.64 | 0.071 | -0.537 | 5.67 | 0.015 | 2.45 | ---- | 0.93 | 0.0278 | 0.0066 | 0.242 | ----- | 0.092 |
| .30 | 5.28 | .068 | -.597 | 6.45 | .011 | 2.16 | 2.80 | .98 | .0216 | .0049 | .214 | 0.277 | .097 |
| .30 | 6.33 | .066 | -.679 | 7.74 | .007 | 1.74 | 2.29 | .99 | .0150 | .0033 | .172 | .226 | .098 |
| .30 | 7.39 | .065 | -.747 | 9.02 | .005 | 1.42 | 1.89 | 1.07 | .0110 | .0024 | .140 | .187 | .106 |
| .30 | 8.44 | .063 | -.766 | 10.31 | .004 | 1.30 | 1.63 | 1.12 | .0084 | .0018 | .129 | .161 | .111 |
| .30 | 9.50 | .062 | -.832 | 11.60 | .003 | .99 | 1.38 | 1.14 | .0067 | .0014 | .098 | .136 | .112 |
| .30 | 10.55 | .061 | -.852 | 12.89 | .002 | .90 | 1.29 | 1.17 | .0054 | .0011 | .089 | .127 | .115 |
| .30 | 11.61 | .061 | -.902 | 14.18 | .002 | .65 | 1.04 | 1.18 | .0044 | .0009 | .064 | .102 | .117 |
| .40 | 0 | 0 | -.409 | 0 | ----- | 3.15 | 5.78 | .07 | ------ | ------ | .343 | .629 | .008 |
| .40 | .63 | .014 | -.409 | .74 | .129 | 3.18 | ---- | .08 | 1.9950 | .0698 | .346 | ----- | .009 |
| .40 | 1.06 | .047 | -.427 | 1.23 | .156 | 3.13 | 5.58 | .16 | .7188 | .0845 | .341 | .607 | .017 |
| .40 | 1.48 | .059 | -.387 | 1.72 | .100 | 3.29 | ---- | .16 | .3666 | .0541 | .358 | ----- | .018 |
| .40 | 2.11 | .093 | -.346 | 2.45 | .077 | 3.45 | 5.35 | .20 | .1797 | .0418 | .375 | .563 | .021 |
| .40 | 2.53 | .103 | -.391 | 2.96 | .059 | 3.31 | ---- | .34 | .1248 | .0321 | .360 | ----- | .038 |
| .40 | 3.17 | .108 | -.401 | 3.70 | .040 | 3.27 | 4.48 | .46 | .0799 | .0216 | .356 | .487 | .050 |
| .40 | 3.59 | .110 | -.457 | 4.19 | .031 | 3.10 | ---- | .55 | .0622 | .0171 | .337 | ----- | .060 |
| .40 | 4.22 | .103 | -.539 | 4.93 | .021 | 2.82 | 3.59 | .67 | .0449 | .0116 | .307 | .390 | .073 |
| .40 | 4.64 | .101 | -.603 | 5.42 | .017 | 2.61 | ---- | .70 | .0371 | .0094 | .284 | ----- | .076 |
| .40 | 5.28 | .099 | -.687 | 6.16 | .013 | 2.32 | 3.01 | .77 | .0288 | .0071 | .252 | .328 | .084 |
| .40 | 6.33 | .089 | -.812 | 7.39 | .008 | 1.91 | 2.39 | .84 | .0200 | .0044 | .208 | .260 | .091 |
| .40 | 7.39 | .086 | -.902 | 8.62 | .006 | 1.60 | 2.21 | .92 | .0147 | .0032 | .174 | .240 | .100 |
| .40 | 8.44 | .083 | -.961 | 9.85 | .004 | 1.41 | 1.75 | .96 | .0112 | .0023 | .153 | .191 | .104 |
| .50 | 0 | 0 | -.405 | 0 | ----- | 3.20 | 5.85 | -.07 | ------ | ------ | .375 | .685 | -.009 |
| .50 | .63 | .014 | -.407 | .71 | .111 | 3.20 | ---- | -.05 | 2.4938 | .0698 | .375 | ----- | -.006 |
| .50 | 1.06 | .054 | -.437 | 1.18 | .154 | 3.15 | 5.67 | .02 | .8985 | .0970 | .369 | .664 | .002 |
| .50 | 1.48 | .071 | -.387 | 1.66 | .103 | 3.29 | ---- | .05 | .4583 | .0651 | .386 | ----- | .006 |
| .50 | 2.11 | .108 | -.320 | 2.37 | .077 | 3.47 | 5.38 | .09 | .2246 | .0485 | .407 | .630 | .011 |
| .50 | 2.53 | .132 | -.407 | 2.84 | .065 | 3.28 | ---- | .20 | .1560 | .0412 | .384 | ----- | .023 |
| .50 | 3.17 | .143 | -.397 | 3.55 | .045 | 3.31 | 4.54 | .33 | .0999 | .0286 | .388 | .532 | .039 |
| .50 | 3.59 | .142 | -.454 | 4.03 | .035 | 3.17 | ---- | .44 | .0777 | .0221 | .371 | ----- | .052 |
| .50 | 4.22 | .136 | -.568 | 4.74 | .024 | 2.89 | 3.66 | .57 | .0562 | .0153 | .339 | .429 | .066 |
| τ = 20° | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | ------ | ------ | ------- | 0.104 | 0.171 |
| 0 | .63 | .001 | -.007 | ----- | ----- | ---- | ---- | ---- | 0 | 0.0050 | -3.740 | ----- | .167 |
| 0 | 1.06 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .005 | .179 |
| 0 | 1.48 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | .181 |
| 0 | 2.11 | 0 | 0 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | 0 | .186 |
| 0 | 2.53 | 0 | -.068 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | .183 |
| 0 | 3.17 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | 0 | .183 |
| 0 | 3.59 | .001 | -.068 | ----- | ----- | ---- | ---- | ---- | 0 | .0002 | -23.526 | ----- | .184 |
| 0 | 4.22 | 0 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .002 | .184 |
| 0 | 4.64 | 0 | -.009 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | .184 |
| 0 | 5.28 | 0 | -.009 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .002 | .184 |
| 0 | 6.33 | 0 | -.005 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | 0 | .184 |
| 0 | 7.39 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | ----- | ----- |
| 0 | 8.44 | .001 | -.004 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -1.317 | .002 | .185 |
| 0 | 9.50 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 10.55 | .002 | ----- | ----- | ----- | ---- | ---- | ---- | 0 | 0 | ------- | .011 | .184 |
| 0 | 11.61 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 12.66 | .002 | -.009 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -1.121 | .005 | .184 |
| 0 | 13.72 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 14.77 | .002 | -.040 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -6.858 | .002 | .183 |
| 0 | 15.83 | ----- | ----- | ----- | ----- | ---- | ---- | ---- | 0 | ------ | ------- | ----- | ----- |
| 0 | 16.88 | .002 | -.079 | ----- | ----- | ---- | ---- | ---- | 0 | 0 | -14.215 | .002 | .185 |

TABLE IV - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 20^{\circ}$ - Continued | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.194 | 0 | ----- | 2.84 | 5.43 | 1.23 | ------ | ------ | 0.195 | 0.373 | 0.085 |
| .10 | .63 | .009 | -.210 | .93 | 0.208 | 2.66 | ---- | 1.28 | 0.4988 | 0.0449 | .182 | ----- | .087 |
| .10 | 1.06 | .016 | -.210 | 1.55 | .134 | 2.75 | 5.18 | 1.30 | .1797 | .0288 | .189 | .355 | .089 |
| .10 | 1.48 | .025 | -.226 | 2.17 | .106 | 2.53 | ---- | 1.42 | .0917 | .0229 | .174 | ----- | .098 |
| .10 | 2.11 | .027 | -.229 | 3.10 | .055 | 2.50 | 4.12 | 1.60 | .0449 | .0121 | .172 | .283 | .110 |
| .10 | 2.53 | .024 | -.230 | 3.72 | .035 | 2.44 | ---- | 1.72 | .0312 | .0075 | .167 | ----- | .118 |
| .10 | 3.17 | .024 | -.255 | 4.65 | .022 | 1.92 | 2.81 | 1.87 | .0200 | .0048 | .131 | .192 | .128 |
| .10 | 3.59 | .026 | -.276 | 5.26 | .019 | 1.51 | ---- | 1.95 | .0155 | .0040 | .104 | ----- | .134 |
| .10 | 4.22 | .026 | -.280 | 6.19 | .013 | 1.42 | 1.98 | 2.05 | .0112 | .0029 | .098 | .136 | .140 |
| .10 | 4.64 | .024 | -.291 | 6.81 | .010 | 1.14 | ---- | 2.10 | .0093 | .0022 | .078 | ----- | .144 |
| .10 | 5.28 | .024 | -.310 | 7.74 | .008 | .74 | 1.44 | 2.14 | .0072 | .0017 | .051 | .099 | .147 |
| .10 | 6.33 | .027 | -.330 | 9.29 | .006 | .40 | 1.13 | 2.23 | .0050 | .0013 | .028 | .078 | .153 |
| .10 | 7.39 | .026 | -.330 | 10.84 | .005 | .36 | .93 | 2.29 | .0037 | .0010 | .025 | .064 | .157 |
| .10 | 8.44 | .027 | -.330 | 12.39 | .004 | .40 | .75 | 2.33 | .0028 | .0008 | .028 | .051 | .160 |
| .10 | 9.50 | .027 | -.355 | 13.94 | .003 | -.12 | .41 | 2.36 | .0022 | .0006 | -.008 | .028 | .162 |
| .10 | 10.55 | .028 | -.340 | 15.49 | .002 | .18 | .41 | 2.37 | .0018 | .0005 | .013 | .030 | .163 |
| .10 | 11.61 | .028 | -.360 | 17.04 | .002 | -.22 | .93 | 2.37 | .0015 | .0004 | -.015 | .064 | .163 |
| .10 | 12.66 | .031 | -.371 | 18.59 | .002 | -.34 | .67 | 2.37 | .0013 | .0004 | -.023 | .046 | .163 |
| .10 | 13.72 | .032 | -.371 | 20.13 | .001 | -.34 | .16 | 2.37 | .0011 | .0003 | -.023 | .011 | .163 |
| .10 | 14.77 | .031 | -.411 | 21.68 | .001 | -1.16 | .16 | 2.38 | .0009 | .0003 | -.081 | .011 | .164 |
| .10 | 15.83 | .033 | ---- | 23.23 | .001 | ----- | .16 | 2.38 | .0008 | .0003 | ----- | .011 | .164 |
| .20 | 0 | 0 | -.320 | 0 | ----- | 2.87 | 5.44 | .64 | ------ | ------ | .248 | .470 | .055 |
| .20 | .63 | .015 | -.342 | .83 | .219 | 2.78 | ---- | .68 | .9975 | .0748 | .240 | ----- | .058 |
| .20 | 1.06 | .032 | -.348 | 1.38 | .168 | 2.80 | 5.21 | .74 | .3594 | .0575 | .242 | .450 | .064 |
| .20 | 1.48 | .042 | -.335 | 1.93 | .113 | 2.98 | ---- | .78 | .1833 | .0385 | .257 | ----- | .067 |
| .20 | 2.11 | .056 | -.371 | 2.76 | .074 | 2.72 | 4.42 | .96 | .0898 | .0252 | .235 | .381 | .083 |
| .20 | 2.53 | .056 | -.363 | 3.31 | .051 | 2.83 | ---- | 1.09 | .0624 | .0175 | .242 | ----- | .094 |
| .20 | 3.17 | .054 | -.409 | 4.11 | .032 | 2.41 | 3.35 | 1.24 | .0399 | .0108 | .208 | .290 | .107 |
| .20 | 3.59 | .054 | -.442 | 4.69 | .025 | 2.11 | ---- | 1.34 | .0311 | .0084 | .182 | ----- | .115 |
| .20 | 4.22 | .052 | -.478 | 5.52 | .017 | 1.82 | 2.45 | 1.45 | .0225 | .0058 | .157 | .212 | .125 |
| .20 | 4.64 | .051 | -.498 | 6.07 | .014 | 1.64 | ---- | 1.50 | .0186 | .0047 | .142 | ----- | .130 |
| .20 | 5.28 | .051 | -.523 | 6.90 | .011 | 1.42 | 1.92 | 1.57 | .0144 | .0037 | .123 | .166 | .136 |
| .20 | 6.33 | .051 | -.561 | 8.28 | .007 | 1.10 | 1.44 | 1.67 | .0100 | .0025 | .095 | .124 | .145 |
| .20 | 7.39 | .049 | -.595 | 9.66 | .005 | .81 | 1.19 | 1.73 | .0073 | .0018 | .070 | .102 | .149 |
| .20 | 8.44 | .051 | -.605 | 11.04 | .004 | .74 | 1.06 | 1.77 | .0056 | .0014 | .064 | .092 | .153 |
| .20 | 9.50 | .052 | -.645 | 12.42 | .004 | .42 | .90 | 1.80 | .0044 | .0012 | .036 | .078 | .155 |
| .20 | 10.55 | .053 | -.663 | 13.80 | .003 | .27 | .74 | 1.82 | .0036 | .0010 | .023 | .064 | .157 |
| .20 | 11.61 | .053 | -.674 | 15.18 | .002 | .17 | .53 | 1.83 | .0030 | .0008 | .015 | .046 | .158 |
| .20 | 12.66 | .054 | -.674 | 16.56 | .002 | .20 | .53 | 1.84 | .0025 | .0007 | .017 | .046 | .159 |
| .20 | 13.72 | .056 | -.704 | 17.94 | .002 | ----- | .12 | 1.85 | .0021 | .0006 | ----- | .011 | .160 |
| .30 | 0 | 0 | -.407 | 0 | ----- | 2.89 | 5.50 | .31 | ------ | ------ | .286 | .544 | .031 |
| .30 | .63 | .018 | -.411 | .77 | .200 | 2.91 | ---- | .34 | 1.4963 | .0898 | .288 | ----- | .034 |
| .30 | 1.06 | .046 | -.436 | 1.29 | .185 | 2.87 | 5.25 | .43 | .5391 | .0827 | .284 | .519 | .042 |
| .30 | 1.48 | .059 | -.402 | 1.80 | .121 | 3.07 | ---- | .46 | .2750 | .0541 | .303 | ----- | .046 |
| .30 | 2.11 | .089 | -.472 | 2.58 | .089 | 2.81 | 4.59 | .63 | .1348 | .0400 | .278 | .454 | .063 |
| .30 | 2.53 | .089 | -.453 | 3.09 | .062 | 2.89 | ---- | .74 | .0936 | .0278 | .286 | ----- | .074 |
| .30 | 3.17 | .089 | -.509 | 3.87 | .040 | 2.64 | 3.55 | .82 | .0599 | .0178 | .261 | .351 | .081 |
| .30 | 3.59 | .085 | -.587 | 4.38 | .029 | 2.23 | ---- | 1.02 | .0466 | .0132 | .220 | ----- | .101 |
| .30 | 4.22 | .080 | -.620 | 5.16 | .020 | 2.06 | 2.68 | 1.14 | .0337 | .0090 | .204 | .265 | .113 |
| .30 | 4.64 | .078 | -.658 | 5.67 | .016 | 1.86 | ---- | 1.20 | .0278 | .0072 | .184 | ----- | .119 |
| .30 | 5.28 | .076 | -.709 | 6.45 | .012 | 1.61 | 2.03 | 1.26 | .0216 | .0055 | .159 | .201 | .124 |
| .30 | 6.33 | .078 | -.787 | 7.74 | .009 | 1.24 | 1.66 | 1.37 | .0150 | .0039 | .123 | .164 | .136 |
| .30 | 7.39 | .078 | -.862 | 9.02 | .006 | .92 | 1.50 | 1.42 | .0110 | .0029 | .091 | .148 | .140 |
| .30 | 8.44 | .074 | -.851 | 10.31 | .005 | .92 | 1.54 | 1.47 | .0084 | .0021 | .091 | .152 | .146 |
| .30 | 9.50 | .074 | -.888 | 11.60 | .004 | .73 | .89 | 1.51 | .0067 | .0016 | .072 | .088 | .149 |
| .30 | 10.55 | .075 | -.918 | 12.89 | .003 | .60 | .88 | 1.53 | .0054 | .0013 | .059 | .087 | .151 |
| .30 | 11.61 | .078 | -.938 | 14.18 | .003 | .52 | .82 | 1.54 | .0044 | .0012 | .051 | .081 | .153 |

TABLE IV - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 20° - Concluded | | | | | | | | | | | | | |
| 0.40 | 0 | 0 | -0.436 | 0 | ------ | 3.02 | 5.51 | 0.09 | ------- | ------ | 0.329 | 0.599 | 0.010 |
| .40 | .63 | .022 | -.454 | .74 | 0.202 | 2.98 | ---- | .13 | 1.9950 | 0.1097 | .324 | ----- | .014 |
| .40 | 1.06 | .060 | -.474 | 1.23 | .199 | 2.98 | 5.27 | .23 | .7188 | .1078 | .324 | .574 | .025 |
| .40 | 1.48 | .073 | -.436 | 1.72 | .123 | 3.12 | ---- | .26 | .3666 | .0669 | .339 | ----- | .028 |
| .40 | 2.11 | .118 | -.528 | 2.46 | .098 | 2.87 | 4.69 | .42 | .1797 | .0530 | .312 | .510 | .045 |
| .40 | 2.53 | .125 | -.503 | 2.96 | .072 | 2.98 | ---- | .52 | .1248 | .0390 | .324 | ----- | .056 |
| .40 | 3.17 | .125 | -.573 | 3.70 | .046 | 2.73 | 3.78 | .69 | .0799 | .0250 | .297 | .411 | .075 |
| .40 | 3.59 | .122 | -.637 | 4.19 | .035 | 2.54 | ---- | .80 | .0622 | .0190 | .276 | ----- | .087 |
| .40 | 4.22 | .115 | -.737 | 4.93 | .024 | 2.18 | 2.89 | .92 | .0449 | .0129 | .237 | .314 | .101 |
| .40 | 4.64 | .109 | -.791 | 5.42 | .019 | 2.00 | ---- | .91 | .0371 | .0101 | .218 | ----- | .108 |
| .40 | 5.28 | .106 | -.864 | 6.16 | .014 | 1.76 | 2.30 | 1.07 | .0288 | .0076 | .191 | .251 | .117 |
| .40 | 6.33 | .102 | -.972 | 7.39 | .009 | 1.39 | 1.83 | 1.18 | .0200 | .0051 | .151 | .200 | .128 |
| .40 | 7.39 | .101 | -1.031 | 8.62 | .007 | 1.19 | 1.56 | 1.24 | .0147 | .0037 | .129 | .170 | .135 |
| .40 | 8.44 | .103 | -1.100 | 9.85 | .005 | .97 | 1.30 | 1.29 | .0112 | .0029 | .106 | .141 | .141 |
| .50 | 0 | 0 | -.431 | 0 | ------ | 3.11 | 5.59 | -.10 | ------- | ------ | .365 | .655 | -.012 |
| .50 | .63 | .024 | -.448 | .71 | .190 | 3.10 | ---- | -.04 | 2.4938 | .1197 | .363 | ----- | -.005 |
| .50 | 1.06 | .072 | -.494 | 1.18 | .205 | 3.00 | 5.35 | .05 | .8985 | .1294 | .352 | .627 | .005 |
| .50 | 1.48 | .089 | -.543 | 1.66 | .129 | 2.89 | ---- | .07 | .4583 | .0816 | .339 | ----- | .009 |
| .50 | 2.11 | .150 | -.574 | 2.37 | .107 | 2.88 | 4.79 | .23 | .2246 | .0674 | .337 | .562 | .027 |
| .50 | 2.53 | .159 | -.543 | 2.84 | .079 | 2.97 | ---- | .35 | .1560 | .0496 | .348 | ----- | .042 |
| .50 | 3.17 | .161 | -.595 | 3.55 | .051 | 2.84 | 3.86 | .51 | .0999 | .0321 | .333 | .452 | .060 |
| .50 | 3.59 | .155 | -.678 | 4.03 | .036 | 2.64 | ---- | .63 | .0777 | .0241 | .310 | ----- | .074 |
| .50 | 4.22 | .150 | -.806 | 4.74 | .027 | 2.31 | 2.99 | .76 | .0562 | .0168 | .271 | .351 | .090 |

TABLE V

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ----- | ------ | ------ | ----- | 0.413 | 0.082 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ----- | 0 | 0 | ----- | ----- | .082 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ---- | ---- | ----- | 0 | .0018 | ----- | .561 | .081 |
| 0 | 1.48 | .004 | 0 | ---- | ----- | ---- | ---- | ----- | 0 | .0037 | ----- | ----- | .078 |
| 0 | 2.11 | .013 | .020 | ---- | ----- | ---- | ---- | ----- | 0 | .0058 | ----- | .758 | .071 |
| 0 | 2.53 | .028 | .031 | ---- | ----- | ---- | ---- | ----- | 0 | .0087 | ----- | ----- | .064 |
| 0 | 3.17 | .089 | .117 | ---- | ----- | ---- | ---- | ----- | 0 | .0178 | ----- | 1.000 | .041 |
| 0 | 3.59 | .153 | .157 | ---- | ----- | ---- | ---- | ----- | 0 | .0238 | ----- | ----- | .030 |
| 0 | 4.22 | .518 | .082 | ---- | ----- | ---- | ---- | ----- | 0 | .0582 | ----- | ----- | -.054 |
| .10 | 0 | 0 | .011 | 0 | ----- | 4.79 | 6.82 | 0.45 | ------ | ------ | 0.522 | .744 | .049 |
| .10 | .63 | .002 | .018 | .93 | 0.046 | 4.98 | ---- | .41 | .4988 | .0100 | .542 | ----- | .048 |
| .10 | 1.06 | .009 | .052 | 1.55 | .075 | 5.69 | 7.73 | .42 | .1797 | .0161 | .520 | .842 | .045 |
| .10 | 1.48 | .016 | .062 | 2.17 | .068 | 5.90 | ---- | .43 | .0917 | .0147 | .643 | ----- | .047 |
| .10 | 2.11 | .033 | .072 | 3.10 | .069 | 6.12 | 8.81 | .40 | .0449 | .0148 | .667 | .960 | .044 |
| .10 | 2.53 | .051 | .103 | 3.72 | .074 | 6.77 | ---- | .31 | .0312 | .0159 | .737 | ----- | .034 |
| .10 | 3.17 | .113 | .138 | 4.65 | .104 | 7.63 | 9.19 | .20 | .0200 | .0225 | .832 | 1.000 | .021 |
| .10 | 3.59 | .212 | .174 | 5.26 | .153 | 8.31 | ---- | .03 | .0155 | .0329 | .906 | ----- | .003 |
| .20 | 0 | 0 | .034 | 0 | ----- | 3.93 | 6.34 | .25 | ------ | ------ | .539 | .870 | .035 |
| .20 | .63 | .002 | .042 | .83 | .029 | 3.97 | ---- | .23 | .9975 | .0100 | .545 | ----- | .032 |
| .20 | 1.06 | .016 | .097 | 1.38 | .084 | 4.47 | 7.30 | .19 | .3594 | .0287 | .613 | 1.000 | .026 |
| .20 | 1.48 | .026 | .128 | 1.93 | .070 | 4.74 | ---- | .19 | .1833 | .0238 | .650 | ----- | .026 |
| .20 | 2.11 | .042 | .117 | 2.76 | .055 | 4.63 | 7.30 | .19 | .0898 | .0188 | .636 | 1.000 | .025 |
| .20 | 2.53 | .075 | .127 | 3.31 | .068 | 4.71 | ---- | .14 | .0624 | .0234 | .616 | ----- | .019 |
| .20 | 3.17 | .183 | .139 | 4.14 | .107 | 4.81 | ---- | -.03 | .0399 | .0365 | .660 | ----- | -.004 |
| .20 | 3.59 | .318 | .117 | 4.69 | .144 | 4.63 | ---- | -.31 | .0311 | .0494 | .636 | ----- | -.043 |
| .30 | 0 | 0 | .050 | 0 | ----- | 3.43 | 5.89 | .14 | ------ | ------ | .539 | .926 | .022 |
| .30 | .63 | .005 | .054 | .77 | .056 | 3.43 | ---- | .12 | 1.4963 | .0249 | .539 | ----- | .019 |
| .30 | 1.06 | .028 | .127 | 1.29 | .112 | 3.81 | 6.38 | .08 | .5391 | .0502 | .599 | 1.000 | .012 |
| .30 | 1.48 | .045 | .174 | 1.80 | .092 | 4.03 | ---- | .09 | .2750 | .0412 | .633 | ----- | .013 |
| .30 | 2.11 | .068 | .154 | 2.58 | .068 | 3.95 | 6.38 | .08 | .1348 | .0305 | .620 | 1.000 | .012 |
| .30 | 2.53 | .113 | .139 | 3.09 | .079 | 3.86 | ---- | .02 | .0936 | .0352 | .606 | ----- | .003 |
| .30 | 3.17 | .223 | .117 | 3.87 | .099 | 3.75 | ---- | -.17 | .0599 | .0445 | .589 | ----- | -.026 |
| .40 | 0 | 0 | .064 | 0 | ----- | 3.09 | 5.60 | .07 | ------ | ------ | .535 | .968 | .012 |
| .40 | .63 | .005 | .062 | .74 | .046 | 3.09 | ---- | .04 | 1.9950 | .0249 | .535 | ----- | .007 |
| .40 | 1.06 | .040 | .154 | 1.23 | .132 | 3.41 | 5.79 | -.01 | .7158 | .0717 | .589 | 1.000 | -.002 |
| .40 | 1.48 | .061 | .195 | 1.72 | .103 | 3.54 | ---- | -.01 | .3666 | .0559 | .613 | ----- | -.002 |
| .40 | 2.11 | .082 | .149 | 2.46 | .068 | 3.39 | 5.79 | -.01 | .1797 | .0368 | .586 | 1.000 | -.001 |
| .40 | 2.53 | .122 | .123 | 2.96 | .070 | 3.29 | ---- | -.07 | .1248 | .0380 | .569 | ----- | -.012 |
| .40 | 3.17 | .285 | .057 | 3.70 | .105 | 3.08 | ---- | -.35 | .0799 | .0568 | .532 | ----- | -.060 |
| .50 | 0 | 0 | .077 | 0 | ----- | 2.87 | 5.38 | 0 | ------ | ------ | .535 | 1.000 | 0 |
| .50 | .63 | .007 | .067 | .71 | .055 | 2.84 | 5.38 | -.04 | 2.4938 | .0349 | .529 | 1.000 | -.007 |
| .50 | 1.06 | .052 | .169 | 1.18 | .148 | 3.11 | 5.38 | -.11 | .8985 | .0933 | .579 | 1.000 | -.020 |
| .50 | 1.48 | .073 | .201 | 1.66 | .106 | 3.18 | 5.38 | -.10 | .4583 | .0669 | .593 | 1.000 | -.019 |
| .50 | 2.11 | .099 | .134 | 2.37 | .071 | 3.02 | 5.38 | -.11 | .2246 | .0444 | .562 | 1.000 | -.020 |
| .50 | 2.53 | .157 | .097 | 2.84 | .078 | 2.93 | 5.38 | -.20 | .1560 | .0489 | .545 | 1.000 | -.038 |
| .50 | 3.17 | .356 | .007 | 3.55 | .113 | 2.70 | 5.38 | -.44 | .0999 | .0710 | .502 | 1.000 | -.082 |
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.323 | 0.087 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .082 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | 0.500 | .421 | .082 |
| 0 | 1.48 | .004 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0037 | .500 | ----- | .079 |
| 0 | 2.11 | .012 | .011 | ---- | ----- | ---- | ---- | ---- | 0 | .0054 | 3.360 | .645 | .070 |
| 0 | 2.53 | .026 | .031 | ---- | ----- | ---- | ---- | ---- | 0 | .0081 | 4.458 | ----- | .064 |
| 0 | 3.17 | .068 | .087 | ---- | ----- | ---- | ---- | ---- | 0 | .0136 | 4.875 | .814 | .050 |
| 0 | 3.59 | .122 | .179 | ---- | ----- | ---- | ---- | ---- | 0 | .0190 | 5.495 | ----- | .037 |
| 0 | 4.22 | .216 | .476 | ---- | ----- | ---- | ---- | ---- | 0 | .0243 | 7.973 | ----- | .013 |
| 0 | 4.64 | .349 | .738 | ---- | ----- | ---- | ---- | ---- | 0 | .0324 | 7.636 | ----- | -.011 |

TABLE V - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.029 | 0 | ----- | 3.96 | 6.85 | 0.45 | ------ | ------ | 0.431 | 0.746 | 0.049 |
| .10 | .63 | .002 | -.020 | .93 | 0.046 | 4.14 | ---- | .43 | 0.4988 | 0.0100 | .451 | ----- | .047 |
| .10 | 1.06 | .009 | .007 | 1.55 | .075 | 4.73 | 7.70 | .41 | .1797 | .0161 | .515 | .839 | .044 |
| .10 | 1.48 | .014 | .017 | 2.17 | .059 | 4.94 | ---- | .43 | .0917 | .0128 | .539 | ----- | .047 |
| .10 | 2.11 | .028 | .034 | 3.10 | .059 | 5.28 | 8.06 | .40 | .0449 | .0126 | .576 | .878 | .044 |
| .10 | 2.53 | .047 | .057 | 3.72 | .068 | 5.78 | ---- | .35 | .0312 | .0146 | .630 | ----- | .038 |
| .10 | 3.17 | .101 | .141 | 4.65 | .093 | 7.42 | 8.42 | .25 | .0200 | .0201 | .808 | .918 | .027 |
| .10 | 3.59 | .146 | .283 | 5.26 | .105 | 10.14 | ---- | .13 | .0155 | .0227 | 1.104 | ----- | .014 |
| .10 | 4.22 | .262 | .556 | 6.19 | .137 | 14.77 | ---- | -.11 | .0112 | .0294 | 1.609 | ----- | -.012 |
| .20 | 0 | 0 | -.046 | 0 | ----- | 3.23 | 6.44 | .25 | ------ | ------ | .444 | .884 | .035 |
| .20 | .63 | .002 | -.040 | .83 | .029 | 3.29 | ---- | .22 | .9975 | .0100 | .451 | ----- | .030 |
| .20 | 1.06 | .015 | .021 | 1.38 | .084 | 3.80 | 6.69 | .19 | .3594 | .0287 | .522 | .918 | .026 |
| .20 | 1.48 | .028 | .047 | 1.93 | .075 | 4.02 | ---- | .21 | .1833 | .0256 | .552 | ----- | .029 |
| .20 | 2.11 | .045 | .064 | 2.76 | .059 | 4.17 | 6.69 | .21 | .0898 | .0202 | .572 | .918 | .029 |
| .20 | 2.53 | .066 | .009 | 3.31 | .060 | 4.36 | ---- | .17 | .0624 | .0206 | .599 | ----- | .023 |
| .20 | 3.17 | .110 | .209 | 4.14 | .064 | 5.35 | 6.97 | .08 | .0399 | .0219 | .734 | .957 | .011 |
| .20 | 3.59 | .163 | .335 | 4.69 | .074 | 6.35 | ---- | -.02 | .0311 | .0253 | .872 | ----- | -.002 |
| .20 | 4.22 | .350 | .637 | 5.52 | .115 | 8.49 | ---- | -.25 | .0225 | .0390 | 1.165 | ----- | -.035 |
| .30 | 0 | 0 | -.058 | 0 | ----- | 2.90 | 5.88 | .14 | ------ | ------ | .455 | .923 | .022 |
| .30 | .63 | .004 | -.045 | .77 | .045 | 2.96 | ---- | .12 | 1.4963 | .0200 | .465 | ----- | .019 |
| .30 | 1.06 | .024 | .037 | 1.29 | .096 | 3.37 | 6.16 | .08 | .5391 | .0430 | .529 | .968 | .013 |
| .30 | 1.48 | .038 | .071 | 1.80 | .078 | 3.51 | ---- | .10 | .2750 | .0348 | .552 | ----- | .015 |
| .30 | 2.11 | .059 | .098 | 2.58 | .059 | 3.64 | 6.25 | .09 | .1348 | .0265 | .572 | .982 | .014 |
| .30 | 2.53 | .078 | .119 | 3.09 | .054 | 3.75 | ---- | .07 | .0936 | .0243 | .589 | ----- | .011 |
| .30 | 3.17 | .146 | .241 | 3.87 | .065 | 4.33 | ---- | -.01 | .0599 | .0291 | .680 | ----- | -.001 |
| .30 | 3.59 | .247 | .382 | 4.38 | .086 | 4.97 | ---- | -.12 | .0466 | .0384 | .781 | ----- | -.019 |
| .40 | 0 | 0 | -.556 | 0 | ----- | 2.69 | 5.55 | .06 | ------ | ------ | .465 | .960 | .010 |
| .40 | .63 | .005 | -.040 | .74 | .046 | 2.75 | ---- | .04 | 1.9950 | .0249 | .475 | ----- | .007 |
| .40 | 1.06 | .031 | .062 | 1.23 | .102 | 3.09 | 5.79 | 0 | .7188 | .0556 | .535 | 1.000 | 0 |
| .40 | 1.48 | .045 | .098 | 1.72 | .076 | 3.22 | ---- | .01 | .3666 | .0412 | .556 | ----- | .001 |
| .40 | 2.11 | .071 | .135 | 2.46 | .059 | 3.33 | 5.79 | 0 | .1797 | .0319 | .576 | 1.000 | 0 |
| .40 | 2.53 | .094 | .151 | 2.96 | .054 | 3.39 | ---- | -.02 | .1248 | .0293 | .586 | ----- | -.004 |
| .40 | 3.17 | .163 | .283 | 3.70 | .060 | 3.82 | 5.79 | -.12 | .0799 | .0325 | .660 | 1.000 | -.021 |
| .40 | 3.59 | .317 | .449 | 4.19 | .091 | 4.32 | ---- | -.33 | .1622 | .0492 | .747 | ----- | -.057 |
| .50 | 0 | 0 | -.046 | 0 | ----- | 2.57 | 5.38 | -.01 | ------ | ------ | .478 | 1.000 | -.001 |
| .50 | .63 | .005 | -.020 | .71 | .040 | 2.62 | ---- | -.03 | 2.4938 | .0249 | .488 | ----- | -.006 |
| .50 | 1.06 | .045 | .077 | 1.18 | .128 | 2.87 | 5.38 | -.07 | .8985 | .0807 | .535 | 1.000 | -.013 |
| .50 | 1.48 | .061 | .117 | 1.66 | .089 | 2.96 | ---- | -.05 | .4583 | .0559 | .552 | ----- | -.010 |
| .50 | 2.11 | .089 | .146 | 2.37 | .063 | 3.04 | 5.38 | -.07 | .2246 | .0399 | .566 | 1.000 | -.013 |
| .50 | 2.53 | .120 | .169 | 2.84 | .059 | 3.09 | ---- | -.10 | .1560 | .0374 | .576 | ----- | -.018 |
| .50 | 3.17 | .242 | .332 | 3.55 | .077 | 3.49 | ---- | -.25 | .0999 | .0483 | .650 | ----- | -.046 |
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.480 | 0.095 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .094 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | 0.500 | .438 | .094 |
| 0 | 1.48 | .004 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0037 | .500 | ----- | .091 |
| 0 | 2.11 | .009 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0040 | .500 | .522 | .084 |
| 0 | 2.53 | .021 | .011 | ---- | ----- | ---- | ---- | ---- | 0 | .0066 | 1.401 | ----- | .076 |
| 0 | 3.17 | .066 | .087 | ---- | ----- | ---- | ---- | ---- | 0 | .0132 | 2.801 | .727 | .570 |
| 0 | 3.59 | .118 | .235 | ---- | ----- | ---- | ---- | ---- | 0 | .0185 | 3.865 | ----- | .040 |
| 0 | 4.22 | .226 | .667 | ---- | ----- | ---- | ---- | ---- | 0 | .0254 | 5.502 | ----- | .010 |
| 0 | 4.64 | .324 | .958 | ---- | ----- | ---- | ---- | ---- | 0 | .0301 | 5.515 | ----- | -.010 |

TABLE V - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.067 | 0 | ----- | 3.12 | 6.31 | 0.52 | ------ | ------ | 0.340 | 0.687 | 0.056 |
| .10 | .63 | .002 | -.064 | .93 | 0.046 | 3.18 | ---- | .46 | 0.4986 | 0.0100 | .347 | ----- | .050 |
| .10 | 1.06 | .009 | -.034 | 1.55 | .075 | 3.86 | 6.57 | .44 | .1797 | .0161 | .421 | .716 | .048 |
| .10 | 1.48 | .014 | -.029 | 2.17 | .059 | 3.96 | ---- | .47 | .0917 | .0128 | .431 | ----- | .052 |
| .10 | 2.11 | .031 | -.007 | 3.10 | .064 | 4.42 | 6.57 | .44 | .0449 | .0139 | .481 | .716 | .048 |
| .10 | 2.53 | .049 | .027 | 3.72 | .071 | 5.13 | ---- | .37 | .0312 | .0153 | .559 | ----- | .041 |
| .10 | 3.17 | .103 | .179 | 4.65 | .095 | 7.97 | 7.34 | .24 | .0200 | .0205 | .569 | .800 | .027 |
| .10 | 3.59 | .157 | .354 | 5.26 | .113 | 10.91 | ---- | .10 | .0155 | .0244 | 1.189 | ----- | .011 |
| .10 | 4.22 | .266 | .774 | 6.19 | .138 | 16.81 | ---- | -.13 | .0112 | .0298 | 1.632 | ----- | -.015 |
| .20 | 0 | 0 | -.107 | 0 | ----- | 2.72 | 5.64 | .28 | ------ | ------ | .374 | .775 | .038 |
| .20 | .63 | .004 | -.092 | .83 | .059 | 2.85 | ---- | .27 | .9975 | .0200 | .391 | ----- | .036 |
| .20 | 1.06 | .019 | -.046 | 1.38 | .100 | 3.27 | 5.91 | .26 | .3594 | .0341 | .444 | .811 | .035 |
| .20 | 1.48 | .026 | -.030 | 1.93 | .070 | 3.39 | ---- | .28 | .1833 | .0238 | .465 | ----- | .038 |
| .20 | 2.11 | .042 | -.003 | 2.76 | .055 | 3.61 | 5.85 | .27 | .0898 | .0188 | .495 | .800 | .036 |
| .20 | 2.53 | .063 | .047 | 3.31 | .057 | 4.00 | ---- | .20 | .0624 | .0196 | .549 | ----- | .028 |
| .20 | 3.17 | .129 | .250 | 4.14 | .075 | 5.28 | 6.42 | .09 | .0399 | .0257 | .724 | .681 | .012 |
| .20 | 3.59 | .176 | .454 | 4.69 | .050 | 6.08 | ---- | .01 | .0311 | .0273 | .835 | ----- | .001 |
| .20 | 4.22 | .324 | .890 | 5.52 | .106 | 6.21 | ---- | -.19 | .0225 | .0364 | .852 | ----- | -.026 |
| .30 | 0 | 0 | -.134 | 0 | ----- | 2.51 | 5.31 | .15 | ------ | ------ | .394 | .833 | .023 |
| .30 | .63 | .005 | -.107 | .77 | .056 | 2.64 | ---- | .12 | 1.4963 | .0249 | .414 | ----- | .018 |
| .30 | 1.06 | .028 | -.047 | 1.29 | .112 | 2.93 | 5.50 | .11 | .5391 | .0502 | .461 | .864 | .017 |
| .30 | 1.48 | .035 | -.025 | 1.80 | .078 | 3.04 | ---- | .13 | .2750 | .0348 | .478 | ----- | .020 |
| .30 | 2.11 | .059 | .011 | 2.58 | .059 | 3.23 | 5.48 | .12 | .1348 | .0265 | .508 | .862 | .018 |
| .30 | 2.53 | .080 | .072 | 3.09 | .056 | 3.51 | ---- | .07 | .0936 | .0249 | .552 | ----- | .011 |
| .30 | 3.17 | .139 | .354 | 3.87 | .062 | 4.72 | 5.95 | -.05 | .0599 | .0277 | .741 | .934 | -.008 |
| .30 | 3.59 | .233 | .566 | 4.38 | .081 | 5.16 | ---- | -.14 | .0466 | .0362 | .811 | ----- | -.021 |
| .40 | 0 | 0 | -.144 | 0 | ----- | 2.39 | 5.11 | .05 | ------ | ------ | .414 | .884 | .009 |
| .40 | .63 | .005 | -.107 | .74 | .046 | 2.51 | ---- | .02 | 1.9950 | .0249 | .434 | ----- | .004 |
| .40 | 1.06 | .038 | -.029 | 1.23 | .126 | 2.78 | 5.34 | .01 | .7188 | .0682 | .481 | .923 | .001 |
| .40 | 1.48 | .052 | -.003 | 1.72 | .088 | 2.88 | ---- | .03 | .3665 | .0476 | .498 | ----- | .006 |
| .40 | 2.11 | .075 | .042 | 2.46 | .062 | 3.02 | 5.26 | .02 | .1797 | .0337 | .522 | .909 | .003 |
| .40 | 2.53 | .103 | .154 | 2.96 | .059 | 3.39 | ---- | -.04 | .1248 | .0321 | .586 | ----- | -.007 |
| .40 | 3.17 | .188 | .429 | 3.70 | .069 | 4.26 | 5.63 | -.16 | .0759 | .0375 | .737 | .974 | -.027 |
| .40 | 3.59 | .282 | .738 | 4.19 | .081 | 5.20 | ---- | -.25 | .0622 | .0438 | .899 | ----- | -.044 |
| .50 | 0 | 0 | -.131 | 0 | ----- | 2.35 | 4.93 | -.03 | ------ | ------ | .438 | .918 | -.005 |
| .50 | .63 | .005 | -.103 | .71 | .040 | 2.40 | ---- | -.05 | 2.4938 | .0249 | .448 | ----- | -.010 |
| .50 | 1.06 | .049 | -.013 | 1.18 | .140 | 2.64 | 5.14 | -.07 | .8985 | .0879 | .492 | .957 | -.013 |
| .50 | 1.48 | .063 | .007 | 1.66 | .092 | 2.70 | ---- | -.04 | .4583 | .0577 | .502 | ----- | -.008 |
| .50 | 2.11 | .087 | .072 | 2.37 | .062 | 2.86 | 5.05 | -.06 | .2246 | .0390 | .532 | .940 | -.011 |
| .50 | 2.53 | .108 | .201 | 2.84 | .054 | 3.18 | ---- | -.12 | .1560 | .0337 | .593 | ----- | -.023 |
| .50 | 3.17 | .222 | .556 | 3.55 | .070 | 4.01 | 5.38 | -.25 | .0999 | .0441 | .747 | 1.000 | -.047 |
| .50 | 3.59 | .335 | .859 | 4.03 | .084 | 4.59 | ---- | -.36 | .0777 | .0526 | .855 | ----- | -.067 |
| $\tau = 12^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.379 | 0.111 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .113 |
| 0 | 1.06 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .337 | .113 |
| 0 | 1.48 | .001 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0009 | 0.500 | ----- | .111 |
| 0 | 2.11 | .006 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0027 | .500 | .404 | .105 |
| 0 | 2.53 | .016 | .008 | ---- | ----- | ---- | ---- | ---- | 0 | .0050 | 1.077 | ----- | .094 |
| 0 | 3.17 | .078 | .127 | ---- | ----- | ---- | ---- | ---- | 0 | .0156 | 2.384 | .643 | .066 |
| 0 | 3.59 | .143 | .328 | ---- | ----- | ---- | ---- | ---- | 0 | .0222 | 3.118 | ----- | .043 |
| 0 | 4.22 | .259 | .744 | ---- | ----- | ---- | ---- | ---- | 0 | .0291 | 3.751 | ----- | .012 |

TABLE V - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^{\circ}$ - Concluded | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.091 | 0 | ----- | 2.57 | 5.49 | 0.62 | ------ | ------ | 0.279 | 0.598 | 0.067 |
| .10 | .63 | .003 | -.078 | .93 | 0.070 | 2.87 | ---- | .59 | 0.4988 | 0.0150 | .313 | ----- | .065 |
| .10 | 1.06 | .012 | -.062 | 1.55 | .100 | 3.25 | 5.77 | .59 | .1797 | .0215 | .354 | .629 | .065 |
| .10 | 1.48 | .016 | -.056 | 2.17 | .068 | 3.37 | ---- | .60 | .0917 | .0147 | .367 | ----- | .053 |
| .10 | 2.11 | .033 | -.029 | 3.10 | .069 | 3.99 | 6.90 | .55 | .0449 | .0148 | .434 | .752 | .060 |
| .10 | 2.53 | .056 | .031 | 3.72 | .081 | 5.19 | 6.82 | .46 | .0312 | .0175 | .566 | .744 | .050 |
| .10 | 3.17 | .125 | .248 | 4.65 | .116 | 9.67 | ---- | .27 | .0200 | .0249 | 1.054 | ----- | .029 |
| .10 | 3.59 | .200 | .476 | 5.26 | .144 | 11.56 | ---- | .11 | .0155 | .0311 | 1.303 | ----- | .012 |
| .10 | 4.22 | .301 | .930 | 6.19 | .157 | 17.18 | ---- | -.09 | .0112 | .0338 | 1.872 | ----- | -.010 |
| .20 | 0 | 0 | -.147 | 0 | ----- | 2.33 | 4.99 | .31 | ------ | ------ | .320 | .685 | .043 |
| .20 | .63 | .005 | -.127 | .83 | .073 | 2.53 | ---- | .28 | .9975 | .0249 | .347 | ----- | .038 |
| .20 | 1.06 | .021 | -.097 | 1.38 | .110 | 2.82 | 5.19 | .29 | .3594 | .0377 | .387 | .713 | .040 |
| .20 | 1.48 | .028 | -.085 | 1.93 | .075 | 2.92 | ---- | .31 | .1833 | .0256 | .401 | ----- | .043 |
| .20 | 2.11 | .049 | -.029 | 2.76 | .064 | 3.39 | 5.25 | .27 | .0898 | .0220 | .465 | .721 | .037 |
| .20 | 2.53 | .075 | .067 | 3.31 | .068 | 4.17 | 5.87 | .20 | .0624 | .0234 | .572 | .805 | .027 |
| .20 | 3.17 | .153 | .335 | 4.14 | .089 | 6.16 | ---- | .05 | .0399 | .0305 | .845 | ----- | .006 |
| .20 | 3.59 | .214 | .556 | 4.69 | .097 | 7.61 | ---- | -.04 | .0311 | .0332 | 1.044 | ----- | -.005 |
| .20 | 4.22 | .306 | 1.030 | 5.52 | .100 | 10.45 | ---- | -.19 | .0225 | .0343 | 1.434 | ----- | -.027 |
| .30 | 0 | 0 | -.184 | 0 | ----- | 2.23 | 4.79 | .17 | ------ | ------ | .350 | .752 | .027 |
| .30 | .63 | .005 | -.159 | .77 | .056 | 2.36 | ---- | .13 | 1.4963 | .0249 | .370 | ----- | .021 |
| .30 | 1.06 | .035 | -.107 | 1.29 | .140 | 2.64 | 5.02 | .15 | .5391 | .0628 | .414 | .789 | .024 |
| .30 | 1.48 | .042 | -.100 | 1.80 | .086 | 2.68 | ---- | .17 | .2750 | .0385 | .421 | ----- | .027 |
| .30 | 2.11 | .066 | -.025 | 2.58 | .066 | 3.04 | 5.07 | .15 | .1348 | .0296 | .478 | .797 | .024 |
| .30 | 2.53 | .101 | .123 | 3.09 | .070 | 3.75 | ---- | .06 | .0936 | .0315 | .589 | ----- | .010 |
| .30 | 3.17 | .183 | .413 | 3.87 | .081 | 5.04 | 5.48 | -.04 | .0599 | .0365 | .791 | .862 | -.006 |
| .30 | 3.59 | .247 | .651 | 4.38 | .086 | 6.00 | ---- | -.13 | .0466 | .0384 | .943 | ----- | -.020 |
| .40 | 0 | 0 | -.196 | 0 | ----- | 2.20 | 4.69 | .05 | ------ | ------ | .380 | .811 | .009 |
| .40 | .63 | .008 | -.164 | .74 | .074 | 2.32 | ---- | .02 | 1.9950 | .0399 | .401 | ----- | .004 |
| .40 | 1.06 | .047 | -.107 | 1.23 | .155 | 2.51 | 4.90 | .03 | .7188 | .0843 | .434 | .848 | .006 |
| .40 | 1.48 | .056 | -.087 | 1.72 | .095 | 2.59 | ---- | .03 | .3666 | .0513 | .448 | ----- | .006 |
| .40 | 2.11 | .080 | -.003 | 2.46 | .066 | 2.88 | 4.90 | .03 | .1797 | .0359 | .498 | .848 | .006 |
| .40 | 2.53 | .122 | .159 | 2.96 | .070 | 3.41 | ---- | -.04 | .1248 | .0380 | .589 | ----- | -.007 |
| .40 | 3.17 | .212 | .480 | 3.70 | .078 | 4.38 | 5.24 | -.14 | .0799 | .0423 | .758 | .906 | -.024 |
| .40 | 3.59 | .292 | .878 | 4.19 | .083 | 5.53 | ---- | -.23 | .0622 | .0453 | .956 | ----- | -.040 |
| .50 | 0 | 0 | -.186 | 0 | ----- | 2.21 | 4.60 | -.04 | ------ | ------ | .411 | .856 | -.007 |
| .50 | .63 | .009 | -.151 | .71 | .071 | 2.30 | ---- | -.07 | 2.4938 | .0449 | .428 | ----- | -.013 |
| .50 | 1.06 | .063 | -.092 | 1.18 | .179 | 2.44 | 4.75 | -.05 | .8985 | .1130 | .455 | .884 | -.010 |
| .50 | 1.48 | .075 | -.067 | 1.66 | .109 | 2.51 | ---- | -.04 | .4583 | .0687 | .468 | ----- | -.007 |
| .50 | 2.11 | .103 | .047 | 2.37 | .073 | 2.79 | 4.78 | -.07 | .2246 | .0462 | .519 | .890 | -.013 |
| .50 | 2.53 | .143 | .229 | 2.84 | .071 | 3.24 | ---- | -.13 | .1560 | .0446 | .603 | ----- | -.024 |
| .50 | 3.17 | .247 | .581 | 3.55 | .078 | 4.03 | ---- | -.23 | .0999 | .0493 | .751 | ----- | -.042 |
| .50 | 3.59 | .343 | .889 | 4.03 | .085 | 4.03 | ---- | -.29 | .0777 | .0533 | .872 | ----- | -.054 |
| $\tau = 16^{\circ}$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ----- | 0.275 | 0.139 |
| 0 | .63 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | ----- | .139 |
| 0 | 1.06 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ----- | .275 | .141 |
| 0 | 1.48 | .002 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | 0.500 | ----- | .140 |
| 0 | 2.11 | .006 | 0 | ---- | ----- | ---- | ---- | ---- | 0 | .0027 | .500 | .337 | .133 |
| 0 | 2.53 | .026 | .018 | ---- | ----- | ---- | ---- | ---- | 0 | .0081 | 1.104 | .581 | .113 |
| 0 | 3.17 | .103 | .188 | ---- | ----- | ---- | ---- | ---- | 0 | .0206 | 2.047 | ----- | .075 |
| 0 | 3.59 | .176 | .409 | ---- | ----- | ---- | ---- | ---- | 0 | .0274 | 2.492 | ----- | .053 |
| 0 | 4.22 | .296 | .828 | ---- | ----- | ---- | ---- | ---- | 0 | .0332 | 2.889 | ----- | .026 |
| .10 | 0 | 0 | -.097 | 0 | ----- | 2.44 | 4.84 | .72 | ------ | ------ | .266 | .528 | .078 |
| .10 | .63 | .006 | -.086 | .93 | .139 | 2.35 | ---- | .66 | .4988 | .0299 | .256 | ----- | .072 |
| .10 | 1.06 | .014 | -.080 | 1.55 | .117 | 2.84 | 5.02 | .71 | .1797 | .0251 | .310 | .547 | .077 |
| .10 | 1.48 | .019 | -.070 | 2.17 | .081 | 3.09 | ---- | .72 | .0917 | .0174 | .337 | ----- | .079 |
| .10 | 2.11 | .045 | -.013 | 3.10 | .094 | 4.30 | 5.36 | .62 | .0449 | .0202 | .468 | .584 | .067 |
| .10 | 2.53 | .075 | .058 | 3.72 | .109 | 5.62 | 6.31 | .50 | .0312 | .0234 | .613 | .687 | .055 |
| .10 | 3.17 | .150 | .286 | 4.65 | .139 | 8.31 | ---- | .28 | .0200 | .0299 | .906 | ----- | .031 |
| .10 | 3.59 | .228 | .530 | 5.26 | .164 | 11.77 | ---- | .15 | .0155 | .0354 | 1.283 | ----- | .016 |
| .10 | 4.22 | .322 | .989 | 6.19 | .168 | 16.16 | ---- | -.05 | .0112 | .0361 | 1.761 | ----- | -.006 |

TABLE V - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 16^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.159 | 0 | ----- | 2.21 | 4.52 | 0.37 | ------ | ------ | 0.303 | 0.620 | 0.051 |
| .20 | .63 | .006 | -.145 | .53 | 0.087 | 2.35 | ---- | .34 | 0.9975 | 0.0299 | .323 | ----- | .046 |
| .20 | 1.06 | .028 | -.121 | 1.36 | .147 | 2.60 | 4.70 | .37 | .3594 | .0502 | .357 | .645 | .051 |
| .20 | 1.48 | .038 | -.107 | 1.93 | .102 | 2.72 | ---- | .37 | .1833 | .0348 | .374 | ----- | .051 |
| .20 | 2.11 | .066 | -.017 | 2.76 | .087 | 3.45 | 4.93 | .29 | .0898 | .0298 | .478 | .676 | .039 |
| .20 | 2.53 | .103 | .097 | 3.31 | .094 | 4.39 | ---- | .22 | .0624 | .0321 | .603 | ----- | .030 |
| .20 | 3.17 | .188 | .373 | 4.14 | .110 | 5.72 | 5.58 | .07 | .0399 | .0375 | .785 | .766 | .010 |
| .20 | 3.59 | .268 | .655 | 4.69 | .122 | 6.30 | ---- | -.03 | .0311 | .0416 | .865 | ----- | -.004 |
| .30 | 0 | 0 | -.196 | 0 | ----- | 2.23 | 4.39 | .19 | ------ | ------ | .350 | .690 | .029 |
| .30 | .63 | .011 | -.174 | .77 | .123 | 2.32 | ---- | .15 | 1.4963 | .0549 | .364 | ----- | .024 |
| .30 | 1.06 | .044 | -.144 | 1.29 | .176 | 2.44 | 4.61 | .18 | .5391 | .0759 | .384 | .724 | .028 |
| .30 | 1.48 | .053 | -.123 | 1.80 | .108 | 2.57 | ---- | .19 | .2750 | .0485 | .404 | ----- | .030 |
| .30 | 2.11 | .082 | -.004 | 2.58 | .082 | 3.15 | 4.66 | .12 | .1348 | .0368 | .495 | .732 | .018 |
| .30 | 2.53 | .125 | .142 | 3.09 | .087 | 3.84 | ---- | .06 | .0936 | .0390 | .603 | ----- | .010 |
| .30 | 3.17 | .226 | .464 | 3.87 | .101 | 5.14 | 5.11 | -.05 | .0599 | .0451 | .808 | .802 | -.008 |
| .30 | 3.59 | .301 | .758 | 4.38 | .104 | 6.24 | ---- | -.13 | .0466 | .0467 | .980 | ----- | -.020 |
| .40 | 0 | 0 | -.211 | 0 | ----- | 2.14 | 4.35 | .05 | ------ | ------ | .370 | .752 | .008 |
| .40 | .63 | .011 | -.192 | .74 | .101 | 2.20 | ---- | .04 | 1.9950 | .0549 | .380 | ----- | .007 |
| .40 | 1.06 | .059 | -.154 | 1.23 | .195 | 2.36 | 4.49 | .06 | .7198 | .1058 | .407 | .777 | .011 |
| .40 | 1.48 | .068 | -.117 | 1.72 | .115 | 2.49 | ---- | .09 | .3666 | .0623 | .431 | ----- | .015 |
| .40 | 2.11 | .096 | .007 | 2.46 | .079 | 2.86 | 4.60 | .03 | .1797 | .0431 | .495 | .795 | .006 |
| .40 | 2.53 | .153 | .214 | 2.96 | .088 | 3.56 | ---- | -.04 | .1248 | .0477 | .616 | ----- | -.007 |
| .40 | 3.17 | .259 | .567 | 3.70 | .095 | 4.38 | 4.98 | -.15 | .0799 | .0516 | .758 | .862 | -.026 |
| .40 | 3.59 | .338 | .879 | 4.19 | .097 | 5.37 | ---- | -.23 | .0622 | .0525 | .929 | ----- | -.040 |
| .50 | 0 | 0 | -.207 | 0 | ----- | 2.13 | 4.41 | -.05 | ------ | ------ | .397 | .820 | -.010 |
| .50 | .63 | .020 | -.174 | .71 | .158 | 2.22 | ---- | -.07 | 2.4538 | .0998 | .414 | ----- | -.013 |
| .50 | 1.06 | .075 | -.143 | 1.18 | .214 | 2.31 | 4.43 | -.03 | .8585 | .1348 | .431 | .825 | -.005 |
| .50 | 1.48 | .085 | -.107 | 1.66 | .124 | 2.41 | ---- | -.01 | .4583 | .0778 | .448 | ----- | -.002 |
| .50 | 2.11 | .125 | .082 | 2.37 | .089 | 2.87 | 4.55 | -.08 | .2246 | .0561 | .535 | .848 | -.015 |
| .50 | 2.53 | .174 | .276 | 2.94 | .086 | 3.33 | ---- | -.13 | .1560 | .0542 | .620 | ----- | -.023 |
| .50 | 3.17 | .275 | .572 | 3.55 | .087 | 4.19 | ---- | -.20 | .0999 | .0548 | .781 | ----- | -.038 |
| .50 | 3.59 | .371 | 1.000 | 4.03 | .091 | 4.84 | ---- | -.27 | .0777 | .0576 | .902 | ----- | -.050 |
| $\tau = 20^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ------ | 0.255 | 0.172 |
| 0 | .63 | 0 | -.019 | ---- | ----- | ---- | ---- | ---- | 0 | 0 | ------ | ----- | .178 |
| 0 | 1.06 | .001 | -.019 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | -8.929 | .224 | .179 |
| 0 | 1.48 | .002 | -.019 | ---- | ----- | ---- | ---- | ---- | 0 | .0018 | -4.215 | ----- | .173 |
| 0 | 2.11 | .009 | -.004 | ---- | ----- | ---- | ---- | ---- | 0 | .0040 | .209 | .300 | .161 |
| 0 | 2.53 | .038 | .017 | ---- | ----- | ---- | ---- | ---- | 0 | .0119 | .815 | ----- | .134 |
| 0 | 3.17 | .115 | .159 | ---- | ----- | ---- | ---- | ---- | 0 | .0230 | 1.448 | .533 | .097 |
| 0 | 3.59 | .195 | .373 | ---- | ----- | ---- | ---- | ---- | 0 | .0303 | 1.818 | ----- | .078 |
| 0 | 4.22 | .310 | .779 | ---- | ----- | ---- | ---- | ---- | 0 | .0348 | 2.229 | ----- | .047 |
| .10 | 0 | 0 | -.112 | 0 | ----- | 2.01 | 4.43 | 0.85 | ------ | ------ | .219 | .483 | .092 |
| .10 | .63 | .006 | -.107 | .93 | 0.139 | 2.16 | ---- | .84 | .4988 | .0299 | .236 | ----- | .091 |
| .10 | 1.06 | .016 | -.103 | 1.55 | .133 | 2.35 | 4.51 | .86 | .1797 | .0267 | .256 | .491 | .094 |
| .10 | 1.48 | .021 | -.087 | 2.17 | .089 | 2.72 | ---- | .86 | .0917 | .0192 | .296 | ----- | .094 |
| .10 | 2.11 | .056 | -.013 | 3.10 | .117 | 4.33 | 4.95 | .69 | .0449 | .0251 | .471 | .539 | .076 |
| .10 | 2.53 | .094 | .057 | 3.72 | .136 | 5.56 | ---- | .58 | .0312 | .0293 | .606 | ----- | .063 |
| .10 | 3.17 | .176 | .275 | 4.65 | .163 | 8.44 | 5.90 | .39 | .0200 | .0351 | .919 | .643 | .043 |
| .10 | 3.59 | .251 | .505 | 5.26 | .181 | 10.63 | ---- | .24 | .0155 | .0390 | 1.158 | ----- | .026 |
| .10 | 4.22 | .378 | .950 | 6.19 | .197 | 13.72 | ---- | .03 | .0112 | .0424 | 1.495 | ----- | .003 |

TABLE V - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 6 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 20^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.174 | 0 | ----- | 2.03 | 4.19 | 0.43 | ------ | ------ | 0.279 | 0.575 | 0.060 |
| .20 | .63 | .009 | -.164 | .83 | 0.131 | 2.16 | ---- | .43 | 0.9975 | 0.0449 | .296 | ----- | .059 |
| .20 | 1.06 | .033 | -.154 | 1.38 | .173 | 2.30 | 4.33 | .47 | .3594 | .0592 | .316 | .595 | .065 |
| .20 | 1.48 | .040 | -.127 | 1.93 | .107 | 2.55 | ---- | .47 | .1833 | .0366 | .350 | ----- | .065 |
| .20 | 2.11 | .085 | -.004 | 2.76 | .111 | 3.62 | 4.56 | .35 | .0898 | .0381 | .495 | .626 | .047 |
| .20 | 2.53 | .127 | .097 | 3.31 | .116 | 4.34 | ---- | .25 | .0624 | .0396 | .596 | ----- | .035 |
| .20 | 3.17 | .223 | .372 | 4.14 | .130 | 6.03 | 5.23 | .12 | .0399 | .0445 | .828 | .718 | .016 |
| .20 | 3.59 | .296 | .637 | 4.69 | .135 | 7.41 | ---- | .01 | .0311 | .0460 | 1.017 | ----- | .001 |
| .30 | 0 | 0 | -.212 | 0 | ----- | 2.06 | 4.09 | .21 | ------ | ------ | .323 | .643 | .033 |
| .30 | .63 | .014 | -.201 | .77 | .156 | 2.12 | ---- | .18 | 1.4963 | .0698 | .333 | ----- | .029 |
| .30 | 1.06 | .052 | -.184 | 1.29 | .208 | 2.25 | 4.59 | .23 | .5391 | .0933 | .354 | .721 | .036 |
| .30 | 1.48 | .061 | -.147 | 1.80 | .125 | 2.44 | ---- | .23 | .2750 | .0559 | .384 | ----- | .036 |
| .30 | 2.11 | .103 | 0 | 2.58 | .103 | 3.17 | 4.48 | .13 | .1348 | .0462 | .500 | .704 | .020 |
| .30 | 2.53 | .157 | .145 | 3.09 | .109 | 3.81 | ---- | .05 | .0936 | .0489 | .599 | ----- | .008 |
| .30 | 3.17 | .270 | .494 | 3.87 | .120 | 5.14 | 4.84 | -.05 | .0599 | .0538 | .808 | .760 | -.006 |
| .30 | 3.59 | .355 | .779 | 4.38 | .123 | 6.07 | ---- | -.12 | .0466 | .0551 | .953 | ----- | -.019 |
| .40 | 0 | 0 | -.232 | 0 | ----- | 2.05 | 4.06 | .05 | ------ | ------ | .354 | .702 | .009 |
| .40 | .63 | .016 | -.217 | .74 | .147 | 2.11 | ---- | .02 | 1.9950 | .0798 | .365 | ----- | .004 |
| .40 | 1.06 | .071 | -.201 | 1.23 | .235 | 2.20 | 4.17 | .06 | .7188 | .1274 | .380 | .721 | .010 |
| .40 | 1.48 | .082 | -.139 | 1.72 | .138 | 2.42 | ---- | .06 | .3666 | .0751 | .418 | ----- | .010 |
| .40 | 2.11 | .132 | .040 | 2.46 | .109 | 3.02 | 4.35 | -.03 | .1797 | .0592 | .522 | .752 | -.004 |
| .40 | 2.53 | .190 | .219 | 2.96 | .109 | 3.56 | ---- | -.07 | .1248 | .0592 | .616 | ----- | -.013 |
| .40 | 3.17 | .306 | .556 | 3.70 | .112 | 4.46 | 4.61 | -.16 | .0799 | .0610 | .771 | .797 | -.027 |
| .40 | 3.59 | .393 | .879 | 4.19 | .112 | 5.22 | ---- | -.22 | .0622 | .0610 | .902 | ----- | -.038 |
| .50 | 0 | 0 | -.226 | 0 | ----- | 2.06 | 4.08 | -.07 | ------ | ------ | .384 | .760 | -.015 |
| .50 | .63 | .024 | -.211 | .71 | .190 | 2.12 | ---- | -.09 | 2.4938 | .1197 | .394 | ----- | -.016 |
| .50 | 1.06 | .094 | -.191 | 1.18 | .268 | 2.19 | 4.16 | -.03 | .8985 | .1686 | .407 | .775 | -.005 |
| .50 | 1.48 | .103 | -.118 | 1.66 | .150 | 2.38 | ---- | -.03 | .4583 | .0943 | .444 | ----- | -.005 |
| .50 | 2.11 | .157 | .092 | 2.37 | .112 | 2.89 | 4.32 | -.10 | .2246 | .0705 | .539 | .805 | -.019 |
| .50 | 2.53 | .219 | .275 | 2.84 | .108 | 3.31 | ---- | -.14 | .1560 | .0683 | .616 | ----- | -.026 |
| .50 | 3.17 | .334 | .667 | 3.55 | .106 | 4.12 | ---- | -.22 | .0999 | .0666 | .768 | ----- | -.042 |

TABLE VI

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $\tau = 0^\circ$ | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ----- | ---- | ------ | ------ | ----- | 0.438 | 0.058 |
| 0 | .63 | 0 | .001 | ---- | ----- | ----- | ----- | ---- | 0 | 0 | ----- | ----- | .057 |
| 0 | 1.06 | .002 | .007 | ---- | ----- | ----- | ----- | ---- | 0 | .0036 | ----- | .491 | .056 |
| 0 | 1.48 | .004 | .007 | ---- | ----- | ----- | ----- | ---- | 0 | .0037 | ----- | ----- | .057 |
| 0 | 2.11 | .009 | .013 | ---- | ----- | ----- | ----- | ---- | 0 | .0040 | ----- | .598 | .056 |
| 0 | 2.53 | .014 | .012 | ---- | ----- | ----- | ----- | ---- | 0 | .0044 | ----- | ----- | .054 |
| 0 | 3.17 | .035 | .024 | ---- | ----- | ----- | ----- | ---- | 0 | .0070 | ----- | .748 | .053 |
| 0 | 3.59 | .054 | .054 | ---- | ----- | ----- | ----- | ---- | 0 | .0084 | ----- | ----- | .046 |
| 0 | 4.22 | .105 | .108 | ---- | ----- | ----- | ----- | ---- | 0 | .0112 | ----- | ----- | .044 |
| 0 | 4.64 | .210 | .276 | ---- | ----- | ----- | ----- | ---- | 0 | .0195 | ----- | ----- | .027 |
| .10 | 0 | 0 | .024 | 0 | ----- | 6.55 | 8.96 | 0.40 | ------ | ------ | 0.544 | .744 | .033 |
| .10 | .63 | .001 | .029 | .93 | 0.023 | 6.64 | ----- | .38 | .4988 | .0050 | .551 | ----- | .031 |
| .10 | 1.06 | .007 | .066 | 1.55 | .059 | 7.45 | 9.86 | .36 | .1797 | .0126 | .618 | .818 | .030 |
| .10 | 1.48 | .011 | .070 | 2.17 | .047 | 7.54 | ----- | .36 | .0917 | .0101 | .626 | ----- | .030 |
| .10 | 2.11 | .023 | .090 | 3.10 | .048 | 7.97 | 9.48 | .37 | .0449 | .0103 | .662 | .786 | .031 |
| .10 | 2.53 | .032 | .092 | 3.72 | .046 | 8.03 | ----- | .35 | .0312 | .0100 | .667 | ----- | .029 |
| .10 | 3.17 | .077 | .129 | 4.65 | .072 | 8.81 | 11.80 | .31 | .0200 | .0154 | .731 | .979 | .026 |
| .10 | 3.59 | .111 | .135 | 5.26 | .080 | 9.36 | ----- | .27 | .0155 | .0172 | .777 | ----- | .022 |
| .10 | 4.22 | .210 | .276 | 6.19 | .110 | 11.93 | ----- | .16 | .0112 | .0236 | .990 | ----- | .013 |
| .10 | 4.64 | .259 | .249 | 6.81 | .111 | 11.43 | ----- | .02 | .0093 | .0240 | .949 | ----- | .001 |
| .20 | 0 | 0 | .050 | 0 | ----- | 5.20 | 8.12 | .23 | 0 | ------ | .544 | .848 | .024 |
| .20 | .63 | .002 | .050 | .83 | .029 | 5.20 | ----- | .21 | .9975 | .0100 | .544 | ----- | .022 |
| .20 | 1.06 | .009 | .102 | 1.38 | .047 | 5.66 | 9.06 | .19 | .3594 | .0161 | .592 | .947 | .020 |
| .20 | 1.48 | .018 | .134 | 1.93 | .048 | 5.94 | ----- | .19 | .1833 | .0165 | .621 | ----- | .020 |
| .20 | 2.11 | .037 | .170 | 2.76 | .049 | 6.23 | 9.47 | .19 | .0898 | .0166 | .651 | .989 | .020 |
| .20 | 2.53 | .053 | .176 | 3.31 | .048 | 6.28 | ----- | .18 | .0624 | .0165 | .656 | ----- | .019 |
| .20 | 3.17 | .098 | .202 | 4.14 | .057 | 6.50 | 9.57 | .14 | .0399 | .0195 | .679 | 1.000 | .015 |
| .20 | 3.59 | .180 | .255 | 4.69 | .082 | 6.97 | ----- | .08 | .0311 | .0279 | .728 | ----- | .008 |
| .20 | 4.22 | ----- | ----- | 5.52 | ----- | ----- | ----- | -.18 | .0225 | ------ | ----- | ----- | -.019 |
| .30 | 0 | 0 | .071 | 0 | ----- | 4.55 | 7.73 | .12 | ------ | ------ | .544 | .925 | .014 |
| .30 | .63 | .002 | .071 | .77 | .022 | 4.55 | ----- | .12 | 1.4963 | .0100 | .544 | ----- | .014 |
| .30 | 1.06 | .015 | .153 | 1.29 | .060 | 4.95 | 8.36 | .08 | .5391 | .0269 | .592 | 1.000 | .010 |
| .30 | 1.48 | .023 | .188 | 1.80 | .047 | 5.12 | ----- | .09 | .2750 | .0211 | .613 | ----- | .010 |
| .30 | 2.11 | .051 | .249 | 2.58 | .051 | 5.42 | 8.36 | .08 | .1348 | .0229 | .649 | 1.000 | .009 |
| .30 | 2.53 | .075 | .221 | 3.09 | .052 | 5.27 | ----- | .07 | .0936 | .0234 | .631 | ----- | .008 |
| .30 | 3.17 | .138 | .229 | 3.87 | .061 | 5.32 | ----- | .03 | .0599 | .0275 | .636 | ----- | .004 |
| .30 | 3.59 | .237 | .428 | 4.38 | .082 | 5.62 | ----- | -.09 | .0466 | .0368 | .672 | ----- | -.011 |
| .40 | 0 | 0 | .086 | 0 | ----- | 4.09 | 7.30 | .05 | ------ | ------ | .538 | .961 | .007 |
| .40 | .63 | .004 | .080 | .74 | .037 | 4.07 | ----- | .05 | 1.9950 | .0200 | .536 | ----- | .006 |
| .40 | 1.05 | .002 | .197 | 1.23 | .007 | 4.46 | 7.59 | .01 | .7188 | .0036 | .587 | 1.000 | .002 |
| .40 | 1.48 | .033 | .216 | 1.72 | .056 | 4.53 | ----- | .01 | .3666 | .0302 | .597 | ----- | .001 |
| .40 | 2.11 | .064 | .249 | 2.46 | .053 | 4.66 | 7.59 | 0 | .1797 | .0288 | .613 | 1.000 | 0 |
| .40 | 2.53 | .100 | .234 | 2.96 | .057 | 4.59 | ----- | -.02 | .1248 | .0312 | .605 | ----- | -.003 |
| .40 | 3.17 | .189 | .208 | 3.70 | .069 | 4.50 | 7.59 | -.10 | .0799 | .0377 | .592 | 1.000 | -.014 |
| .50 | 0 | 0 | .102 | 0 | ----- | 3.78 | 7.05 | 0 | ------ | ------ | .536 | 1.000 | 0 |
| .50 | .63 | .005 | .097 | .71 | .395 | 3.78 | ----- | -.01 | 2.4938 | .0249 | .536 | ----- | -.002 |
| .50 | 1.05 | .025 | .192 | 1.18 | .071 | 4.01 | 7.05 | -.05 | .8985 | .0449 | .569 | 1.000 | -.008 |
| .50 | 1.48 | .042 | .238 | 1.66 | .061 | 4.12 | ----- | -.05 | .4583 | .0385 | .585 | ----- | -.006 |
| .50 | 2.11 | .077 | .255 | 2.37 | .055 | 4.11 | ----- | -.06 | .2246 | .0346 | ----- | ----- | -.008 |
| .50 | 2.53 | .121 | .213 | 2.84 | .060 | 4.00 | ----- | -.07 | .1560 | .0377 | ----- | ----- | -.010 |
| .50 | 3.17 | .187 | .222 | 3.55 | .059 | 4.02 | 7.05 | -.06 | .0999 | .0373 | ----- | 1.000 | -.011 |

TABLE VI - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ----- | ---- | ------ | ------ | ----- | 0.370 | 0.063 |
| 0 | .63 | 0 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | 0 | ----- | ----- | .062 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0018 | 0.500 | .449 | .063 |
| 0 | 1.48 | .002 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0018 | .500 | ----- | .062 |
| 0 | 2.11 | .008 | .007 | ---- | ----- | ----- | ----- | ---- | 0 | .0036 | 3.320 | .534 | .062 |
| 0 | 2.53 | .013 | .012 | ---- | ----- | ----- | ----- | ---- | 0 | .0041 | 2.808 | ----- | .057 |
| 0 | 3.17 | .029 | .024 | ---- | ----- | ----- | ----- | ---- | 0 | .0058 | 2.808 | .664 | .055 |
| 0 | 3.59 | .048 | .040 | ---- | ----- | ----- | ----- | ---- | 0 | .0075 | 2.697 | ----- | .050 |
| 0 | 4.22 | .098 | .097 | ---- | ----- | ----- | ----- | ---- | 0 | .0110 | 2.979 | .754 | .044 |
| 0 | 4.64 | .159 | .216 | ---- | ----- | ----- | ----- | ---- | 0 | .0148 | 3.951 | ----- | .037 |
| 0 | 5.28 | .262 | .476 | ---- | ----- | ----- | ----- | ---- | 0 | .0188 | 5.169 | ----- | .025 |
| .10 | 0 | 0 | -.064 | 0 | ----- | 4.67 | 9.07 | 0.40 | ------ | ------ | .387 | .752 | .033 |
| .10 | .63 | .002 | .060 | .93 | 0.046 | 4.73 | ----- | .40 | 0.4988 | .0100 | .392 | ----- | .033 |
| .10 | 1.06 | .006 | -.031 | 1.55 | .050 | 5.38 | 9.09 | .37 | .1797 | .0108 | .446 | .754 | .031 |
| .10 | 1.48 | .011 | -.017 | 2.17 | .047 | 5.65 | ----- | .37 | .0917 | .0101 | .469 | ----- | .031 |
| .10 | 2.11 | .021 | -.003 | 3.10 | .043 | 5.96 | 8.91 | .37 | .0449 | .0094 | .495 | .739 | .031 |
| .10 | 2.53 | .033 | .007 | 3.72 | .048 | 6.18 | ----- | .36 | .0312 | .0103 | .513 | ----- | .030 |
| .10 | 3.17 | .055 | .028 | 4.65 | .051 | 6.61 | 9.40 | .31 | .0200 | .0110 | .549 | .780 | .026 |
| .10 | 3.59 | .086 | .067 | 5.26 | .062 | 7.39 | ----- | .30 | .0155 | .0134 | .613 | ----- | .025 |
| .10 | 4.22 | .154 | .196 | 6.19 | .080 | 9.86 | 10.20 | .21 | .0112 | .0173 | .818 | .846 | .018 |
| .10 | 4.64 | .212 | .328 | 6.81 | .091 | 12.21 | ----- | .16 | .0093 | .0197 | 1.013 | ----- | .013 |
| .10 | 5.28 | .321 | .618 | 7.74 | .107 | 16.93 | ----- | .03 | .0072 | .0230 | 1.405 | ----- | .002 |
| .20 | 0 | 0 | -.111 | 0 | ----- | 3.83 | 7.91 | .22 | ------ | ------ | .400 | .827 | .023 |
| .20 | .63 | .002 | -.100 | .83 | .029 | 3.92 | ----- | .22 | .9975 | .0100 | .410 | ----- | .023 |
| .20 | 1.06 | .009 | -.052 | 1.38 | .047 | 4.34 | 8.08 | .20 | .3594 | .0161 | .454 | .844 | .021 |
| .20 | 1.48 | .016 | -.020 | 1.93 | .043 | 4.61 | ----- | .20 | .1833 | .0147 | .482 | ----- | .021 |
| .20 | 2.11 | .030 | .007 | 2.76 | .040 | 4.86 | 7.89 | .20 | .0898 | .0135 | .508 | .825 | .021 |
| .20 | 2.53 | .047 | .003 | 3.31 | .043 | 4.81 | ----- | .20 | .0624 | .0147 | .503 | ----- | .021 |
| .20 | 3.17 | .079 | .066 | 4.14 | .046 | 5.35 | 8.14 | .16 | .0399 | .0158 | .559 | .850 | .017 |
| .20 | 3.59 | .121 | .122 | 4.69 | .055 | 5.79 | ----- | .14 | .0311 | .0188 | .605 | ----- | .015 |
| .20 | 4.22 | .198 | .269 | 5.52 | .065 | 6.95 | 8.75 | .09 | .0225 | .0222 | .726 | .914 | .010 |
| .20 | 4.64 | .257 | .429 | 6.07 | .070 | 8.14 | ----- | .04 | .0186 | .0238 | .851 | ----- | .004 |
| .20 | 5.28 | .343 | ----- | 6.90 | .072 | ----- | ----- | -.10 | .0144 | .0246 | ----- | ----- | -.011 |
| .30 | 0 | 0 | -.133 | 0 | ----- | 3.62 | 7.36 | .11 | ------ | ------ | .433 | .880 | .013 |
| .30 | .63 | .002 | -.111 | .77 | .022 | 3.62 | ----- | .10 | 1.4963 | .0100 | .433 | ----- | .011 |
| .30 | 1.06 | .012 | -.046 | 1.29 | .048 | 3.95 | 7.50 | .08 | .5391 | .0215 | .472 | .897 | .009 |
| .30 | 1.48 | .023 | -.008 | 1.80 | .047 | 4.14 | ----- | .09 | .2750 | .0211 | .495 | ----- | .011 |
| .30 | 2.11 | .043 | .034 | 2.58 | .043 | 4.36 | 7.43 | .09 | .1348 | .0193 | .521 | .889 | .011 |
| .30 | 2.53 | .062 | .054 | 3.09 | .043 | 4.44 | ----- | .08 | .0936 | .0193 | .531 | ----- | .009 |
| .30 | 3.17 | .102 | .102 | 3.87 | .045 | 4.67 | 7.50 | .06 | .0599 | .0203 | .559 | .897 | .007 |
| .30 | 3.59 | .147 | .159 | 4.38 | .051 | 4.95 | ----- | .05 | .0466 | .0228 | .592 | ----- | .006 |
| .30 | 4.22 | .231 | .344 | 5.16 | .058 | 5.81 | 8.11 | -.01 | .0337 | .0259 | .695 | .970 | -.001 |
| .30 | 4.64 | .326 | .629 | 5.67 | .067 | 7.10 | ----- | -.10 | .0278 | .0302 | .849 | ----- | -.012 |
| .30 | 5.28 | .473 | 1.000 | 6.45 | .076 | 8.69 | ----- | -.18 | .0216 | .0340 | 1.040 | ----- | -.021 |
| .40 | 0 | 0 | -.135 | 0 | ----- | 3.33 | 6.98 | .04 | ------ | ------ | .438 | .919 | .005 |
| .40 | .63 | .004 | -.115 | .74 | .037 | 3.41 | ----- | .03 | 1.9950 | .0200 | .449 | ----- | .004 |
| .40 | 1.06 | .019 | -.031 | 1.23 | .063 | 3.70 | 7.12 | .01 | .7188 | .0341 | .487 | .938 | .001 |
| .40 | 1.48 | .032 | .012 | 1.72 | .054 | 3.83 | ----- | .03 | .3666 | .0293 | .505 | ----- | .003 |
| .40 | 2.11 | .056 | .060 | 2.46 | .046 | 3.99 | 7.04 | .03 | .1797 | .0252 | .526 | .927 | .003 |
| .40 | 2.53 | .079 | .087 | 2.96 | .045 | 4.09 | ----- | .01 | .1248 | .0246 | .538 | ----- | .001 |
| .40 | 3.17 | .132 | .149 | 3.70 | .049 | 4.28 | 7.14 | -.01 | .0799 | .0264 | .564 | .940 | -.001 |
| .40 | 3.59 | .183 | .222 | 4.19 | .052 | 4.53 | ----- | -.02 | .0622 | .0284 | .597 | ----- | -.002 |
| .40 | 4.22 | .300 | .524 | 4.93 | .062 | 5.49 | ----- | -.11 | .0449 | .0337 | .723 | ----- | -.015 |
| .40 | 4.64 | .410 | .730 | 5.42 | .070 | 6.11 | ----- | -.15 | .0371 | .0381 | .805 | ----- | -.020 |

[redacted]

TABLE VI - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.50 | 0 | 0 | -0.115 | 0 | ----- | 3.24 | 6.75 | -0.02 | ------ | ------ | 0.459 | 0.957 | -0.003 |
| .50 | .63 | .004 | -.100 | .71 | 0.032 | 3.27 | ---- | -.03 | 2.4938 | 0.0200 | .464 | ----- | -.004 |
| .50 | 1.06 | .022 | -.013 | 1.18 | .063 | 3.49 | 6.85 | -.05 | .8965 | .0395 | .495 | .972 | -.007 |
| .50 | 1.48 | .040 | .034 | 1.56 | .058 | 3.62 | ---- | -.04 | .4583 | .0367 | .513 | ----- | -.005 |
| .50 | 2.11 | .065 | .081 | 2.37 | .046 | 3.72 | 6.75 | -.04 | .2246 | .0292 | .528 | .957 | -.005 |
| .50 | 2.53 | .092 | .113 | 2.84 | .046 | 3.81 | ---- | -.04 | .1560 | .0287 | .541 | ----- | -.005 |
| .50 | 3.17 | .142 | .197 | 3.55 | .045 | 4.01 | 6.90 | -.07 | .0999 | .0284 | .569 | .979 | -.009 |
| .50 | 3.59 | .224 | .344 | 4.03 | .055 | 4.38 | ---- | -.12 | .0777 | .0318 | .621 | ----- | -.016 |
| .50 | 4.22 | .340 | .561 | 4.74 | .061 | 4.88 | ---- | -.15 | .0562 | .0382 | .692 | ----- | -.020 |
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | 0.459 | 0.075 |
| 0 | .63 | .001 | .007 | ---- | ----- | ----- | ---- | ---- | 0 | 0.0050 | 8.559 | ----- | .075 |
| 0 | 1.06 | .001 | -.003 | ---- | ----- | ----- | ---- | ---- | 0 | .0018 | -3.164 | .419 | .076 |
| 0 | 1.48 | .002 | .003 | ---- | ----- | ----- | ---- | ---- | 0 | .0018 | 1.987 | ----- | .075 |
| 0 | 2.11 | .006 | -.003 | ---- | ----- | ----- | ---- | ---- | 0 | .0027 | -.254 | .408 | .076 |
| 0 | 2.53 | .008 | .003 | ---- | ----- | ----- | ---- | ---- | 0 | .0025 | .928 | ----- | .072 |
| 0 | 3.17 | .029 | 0 | ---- | ----- | ----- | ---- | ---- | 0 | .0058 | .500 | .466 | .066 |
| 0 | 3.59 | .049 | .040 | ---- | ----- | ----- | ---- | ---- | 0 | .0076 | 1.487 | ----- | .061 |
| 0 | 4.22 | .114 | .186 | ---- | ----- | ----- | ---- | ---- | 0 | .0125 | 2.590 | .600 | .050 |
| 0 | 4.64 | .175 | .350 | ---- | ----- | ----- | ---- | ---- | 0 | .0162 | 3.064 | ----- | .033 |
| 0 | 5.28 | .253 | .750 | ---- | ----- | ----- | ---- | ---- | 0 | .0189 | 4.143 | ----- | .026 |
| .10 | 0 | 0 | -.132 | 0 | ----- | 3.15 | 7.34 | 0.52 | ------ | ------ | .262 | .609 | .043 |
| .10 | .63 | .004 | -.115 | .93 | 0.093 | 3.52 | ---- | .51 | .4988 | .0200 | .292 | ----- | .042 |
| .10 | 1.06 | .007 | -.094 | 1.55 | .059 | 3.99 | 7.16 | .51 | .1797 | .0126 | .331 | .594 | .042 |
| .10 | 1.48 | .014 | -.094 | 2.17 | .059 | 4.02 | ---- | .52 | .0917 | .0128 | .333 | ----- | .043 |
| .10 | 2.11 | .023 | -.083 | 3.10 | .048 | 4.26 | 7.16 | .52 | .0449 | .0103 | .354 | .594 | .043 |
| .10 | 2.53 | .036 | -.062 | 3.72 | .052 | 4.73 | ---- | .51 | .0312 | .0112 | .392 | ----- | .042 |
| .10 | 3.17 | .068 | .019 | 4.65 | .063 | 6.40 | 7.76 | .42 | .0200 | .0136 | .531 | .645 | .035 |
| .10 | 3.59 | .107 | .119 | 5.26 | .077 | 8.28 | ---- | .35 | .0155 | .0166 | .687 | ----- | .029 |
| .10 | 4.22 | .168 | .344 | 6.19 | .087 | 12.08 | 8.58 | .23 | .0112 | .0188 | 1.003 | .711 | .019 |
| .10 | 4.64 | .228 | .560 | 6.81 | .098 | 15.20 | ---- | .13 | .0093 | .0211 | 1.262 | ----- | .011 |
| .10 | 5.28 | .290 | .397 | 7.74 | .097 | 12.21 | ---- | .04 | .0072 | .0208 | 1.013 | ----- | .003 |
| .20 | 0 | 0 | -.195 | 0 | ----- | 3.09 | 6.73 | .28 | ------ | ------ | .323 | .703 | .029 |
| .20 | .63 | .001 | -.175 | .83 | .015 | 3.09 | ---- | .26 | .9975 | .0050 | .323 | ----- | .027 |
| .20 | 1.06 | .012 | -.141 | 1.38 | .063 | 3.58 | 6.69 | .26 | .3594 | .0215 | .374 | .699 | .027 |
| .20 | 1.48 | .020 | -.127 | 1.93 | .054 | 3.70 | ---- | .28 | .1833 | .0183 | .387 | ----- | .029 |
| .20 | 2.11 | .035 | -.115 | 2.76 | .046 | 3.80 | 6.50 | .28 | .0898 | .0157 | .397 | .679 | .029 |
| .20 | 2.53 | .049 | -.073 | 3.31 | .045 | 4.17 | ---- | .27 | .0624 | .0153 | .436 | ----- | .028 |
| .20 | 3.17 | .089 | .034 | 4.14 | .052 | 5.05 | 6.91 | .22 | .0399 | .0177 | .528 | .722 | .023 |
| .20 | 3.59 | .124 | .139 | 4.69 | .056 | 5.88 | ---- | .16 | .0311 | .0193 | .615 | ----- | .017 |
| .20 | 4.22 | .194 | .423 | 5.52 | .064 | 8.00 | 7.61 | .08 | .0225 | .0218 | .836 | .795 | .009 |
| .20 | 4.64 | .237 | .623 | 6.07 | .064 | 9.42 | ---- | .02 | .0186 | .0220 | .985 | ----- | .002 |
| .20 | 5.25 | .322 | ----- | 6.90 | .066 | ----- | ---- | -.05 | .0144 | .0231 | ----- | ----- | -.005 |
| .30 | 0 | 0 | -.241 | 0 | ----- | 2.98 | 6.36 | .14 | ------ | ------ | .356 | .761 | .017 |
| .30 | .63 | .005 | -.216 | .77 | .056 | 3.08 | ---- | .13 | 1.4963 | .0249 | .369 | ----- | .016 |
| .30 | 1.06 | .023 | -.169 | 1.29 | .092 | 3.34 | 6.36 | .13 | .5391 | .0413 | .400 | .761 | .015 |
| .30 | 1.48 | .033 | -.147 | 1.80 | .067 | 3.45 | ---- | .15 | .2750 | .0302 | .413 | ----- | .018 |
| .30 | 2.11 | .051 | -.111 | 2.58 | .051 | 3.64 | 6.25 | .14 | .1348 | .0229 | .436 | .748 | .017 |
| .30 | 2.53 | .065 | -.082 | 3.09 | .045 | 3.77 | ---- | .14 | .0936 | .0203 | .451 | ----- | .017 |
| .30 | 3.17 | .103 | .060 | 3.87 | .046 | 4.46 | 6.57 | .08 | .0599 | .0205 | .533 | .786 | .010 |
| .30 | 3.59 | .147 | .228 | 4.38 | .051 | 5.25 | ---- | .05 | .0466 | .0226 | .628 | ----- | .005 |
| .30 | 4.22 | .222 | .544 | 5.16 | .056 | 6.66 | 6.93 | -.01 | .0337 | .0249 | .797 | .829 | -.001 |
| .30 | 4.64 | .263 | .764 | 5.67 | .054 | 7.61 | ---- | -.05 | .0278 | .0244 | .910 | ----- | -.005 |
| .30 | 5.28 | .338 | ----- | 6.45 | .054 | ---- | ---- | -.10 | .0216 | .0243 | ----- | ----- | -.012 |

TABLE VI - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.40 | 0 | 0 | -0.254 | 0 | ----- | 2.92 | 6.17 | 0.04 | ------ | ------ | 0.385 | 0.812 | 0.006 |
| .40 | .63 | .006 | -.234 | .74 | 0.055 | 3.00 | ---- | .04 | 1.9950 | 0.0299 | .395 | ----- | .005 |
| .40 | 1.06 | .028 | -.180 | 1.23 | .093 | 3.20 | 6.26 | .04 | .7188 | .0503 | .421 | .825 | .005 |
| .40 | 1.48 | .042 | -.149 | 1.72 | .071 | 3.29 | ---- | .05 | .3666 | .0385 | .433 | ----- | .007 |
| .40 | 2.11 | .063 | -.106 | 2.46 | .052 | 3.45 | 6.10 | .06 | .1797 | .0283 | .454 | .803 | .008 |
| .40 | 2.53 | .082 | -.052 | 2.96 | .047 | 3.62 | ---- | .05 | .1248 | .0256 | .477 | ----- | .006 |
| .40 | 3.17 | .126 | .129 | 3.70 | .046 | 4.22 | 6.34 | 0 | .0799 | .0252 | .556 | .835 | .001 |
| .40 | 3.59 | .181 | .328 | 4.19 | .052 | 4.84 | ---- | -.04 | .0622 | .0281 | .638 | ----- | -.005 |
| .40 | 4.22 | .255 | .628 | 4.93 | .053 | 5.79 | ---- | -.09 | .0449 | .0286 | .762 | ----- | -.012 |
| .40 | 4.64 | .327 | ----- | 5.42 | .056 | ----- | ---- | -.14 | .0371 | .0304 | ----- | ----- | -.018 |
| .50 | 0 | 0 | -.244 | 0 | ----- | 2.91 | 6.04 | -.04 | ------ | ------ | .413 | .857 | -.005 |
| .50 | .63 | .006 | -.228 | .71 | .048 | 2.95 | ---- | -.04 | 2.4938 | .0299 | .418 | ----- | -.006 |
| .50 | 1.06 | .037 | -.159 | 1.18 | .106 | 3.13 | 6.15 | -.04 | .8985 | .0665 | .444 | .872 | -.005 |
| .50 | 1.48 | .051 | -.133 | 1.66 | .074 | 3.18 | ---- | -.03 | .4583 | .0467 | .451 | ----- | -.004 |
| .50 | 2.11 | .079 | -.067 | 2.37 | .056 | 3.36 | 6.04 | -.02 | .2246 | .0355 | .477 | .857 | -.003 |
| .50 | 2.53 | .105 | 0 | 2.84 | .052 | 3.52 | ---- | -.04 | .1560 | .0328 | .500 | ----- | -.006 |
| .50 | 3.17 | .149 | .201 | 3.55 | .047 | 4.01 | 6.27 | -.06 | .0999 | .0297 | .569 | .889 | -.008 |
| .50 | 3.59 | .218 | .436 | 4.03 | .054 | 4.55 | ---- | -.13 | .0777 | .0339 | .646 | ----- | -.018 |
| .50 | 4.22 | .313 | .624 | 4.74 | .056 | 5.03 | ---- | -.13 | .0562 | .0351 | .713 | ----- | -.019 |
| $\tau = 12^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | 0.273 | 0.105 |
| 0 | .63 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | 0 | 0 | ----- | ----- | .103 |
| 0 | 1.06 | .001 | -.008 | ---- | ----- | ----- | ---- | ---- | 0 | .0018 | -2.577 | .220 | .104 |
| 0 | 1.48 | .001 | -.003 | ---- | ----- | ----- | ---- | ---- | 0 | .0009 | -.782 | ----- | .104 |
| 0 | 2.11 | .004 | -.008 | ---- | ----- | ----- | ---- | ---- | 0 | .0018 | -1.038 | .246 | .100 |
| 0 | 2.53 | .008 | -.002 | ---- | ----- | ----- | ---- | ---- | 0 | .0025 | .308 | ----- | .098 |
| 0 | 3.17 | .021 | .012 | ---- | ----- | ----- | ---- | ---- | 0 | .0042 | 1.013 | .380 | .093 |
| 0 | 3.59 | .089 | .114 | ---- | ----- | ----- | ---- | ---- | 0 | .0138 | 1.590 | ----- | .071 |
| 0 | 4.22 | .134 | .259 | ---- | ----- | ----- | ---- | ---- | 0 | .0150 | 2.154 | .547 | .061 |
| 0 | 4.64 | .176 | .407 | ---- | ----- | ----- | ---- | ---- | 0 | .0163 | 2.497 | ----- | .054 |
| 0 | 5.28 | .234 | .698 | ---- | ----- | ----- | ---- | ---- | 0 | .0168 | 3.069 | ----- | .060 |
| .10 | 0 | 0 | -.147 | 0 | ----- | 0.28 | 6.21 | 0.68 | ------ | ------ | .231 | .515 | .056 |
| .10 | .63 | .004 | -.140 | .93 | 0.093 | 2.97 | ---- | .64 | .4988 | .0200 | .245 | ----- | .053 |
| .10 | 1.06 | .011 | -.132 | 1.55 | .091 | 3.18 | 6.33 | .66 | .1797 | .0197 | .264 | .526 | .055 |
| .10 | 1.48 | .015 | -.121 | 2.17 | .064 | 3.46 | ---- | .70 | .0917 | .0137 | .287 | ----- | .058 |
| .10 | 2.11 | .027 | -.100 | 3.10 | .056 | 3.96 | 6.23 | .68 | .0449 | .0121 | .328 | .517 | .056 |
| .10 | 2.53 | .043 | -.054 | 3.72 | .062 | 4.94 | ---- | .62 | .0312 | .0134 | .410 | ----- | .052 |
| .10 | 3.17 | .078 | .039 | 4.65 | .072 | 6.77 | 7.00 | .53 | .0200 | .0156 | .562 | .581 | .044 |
| .10 | 3.59 | .117 | .139 | 5.26 | .085 | 8.47 | ---- | .44 | .0155 | .0182 | .703 | ----- | .037 |
| .10 | 4.22 | .166 | .349 | 6.19 | .086 | 11.74 | 7.93 | .36 | .0112 | .0186 | .974 | .658 | .030 |
| .10 | 4.65 | .205 | .549 | 6.81 | .088 | 14.43 | ---- | .29 | .0093 | .0190 | 1.197 | ----- | .024 |
| .10 | 5.28 | .281 | .971 | 7.74 | .094 | 19.31 | ---- | .15 | .0072 | .0202 | 1.603 | ----- | .012 |
| .20 | 0 | 0 | -.233 | 0 | ----- | 2.75 | 5.77 | .35 | ------ | ------ | .287 | .603 | .037 |
| .20 | .63 | .006 | -.217 | .83 | .087 | 2.90 | ---- | .33 | .9975 | .0299 | .303 | ----- | .035 |
| .20 | 1.06 | .020 | -.196 | 1.38 | .105 | 3.12 | 5.91 | .35 | .3594 | .0359 | .326 | .617 | .037 |
| .20 | 1.48 | .027 | -.191 | 1.93 | .072 | 3.17 | ---- | .37 | .1833 | .0247 | .331 | ----- | .039 |
| .20 | 2.11 | .042 | -.147 | 2.76 | .055 | 3.56 | 5.79 | .35 | .0898 | .0189 | .372 | .605 | .037 |
| .20 | 2.53 | .063 | -.079 | 3.31 | .057 | 4.14 | ---- | .31 | .0624 | .0196 | .433 | ----- | .033 |
| .20 | 3.17 | .107 | .063 | 4.14 | .062 | 5.27 | 6.54 | .24 | .0399 | .0213 | .551 | .684 | .026 |
| .20 | 3.59 | .144 | .213 | 4.69 | .066 | 6.40 | ---- | .20 | .0311 | .0224 | .669 | ----- | .021 |
| .20 | 4.22 | .203 | .508 | 5.52 | .067 | 8.44 | 6.77 | .13 | .0225 | .0228 | .882 | .707 | .013 |
| .20 | 4.64 | .246 | .719 | 6.07 | .067 | 9.77 | ---- | .08 | .0186 | .0228 | 1.021 | ----- | .008 |
| .20 | 5.28 | .319 | 1.119 | 6.90 | .067 | 12.07 | ---- | 0 | .0144 | .0229 | 1.262 | ----- | 0 |

TABLE VI - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 12^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.30 | 0 | 0 | -0.283 | 0 | ----- | 2.74 | 5.64 | 0.17 | ------ | ------ | 0.328 | 0.675 | 0.020 |
| .30 | .63 | .005 | -.267 | .77 | 0.056 | 2.83 | ---- | .15 | 1.4963 | 0.0249 | .338 | ----- | .018 |
| .30 | 1.06 | .028 | -.239 | 1.29 | .112 | 2.98 | 5.73 | .17 | .5391 | .0502 | .356 | .686 | .020 |
| .30 | 1.48 | .037 | -.222 | 1.80 | .076 | 3.08 | ---- | .21 | .2750 | .0339 | .369 | ----- | .025 |
| .30 | 2.11 | .056 | -.164 | 2.58 | .056 | 3.37 | 5.61 | .20 | .1348 | .0251 | .403 | .671 | .024 |
| .30 | 2.53 | .079 | -.073 | 3.09 | .055 | 3.94 | ---- | .14 | .0936 | .0246 | .459 | ----- | .017 |
| .30 | 3.17 | .132 | .113 | 3.87 | .059 | 4.70 | 6.07 | .10 | .0599 | .0253 | .562 | .726 | .012 |
| .30 | 3.59 | .183 | .318 | 4.38 | .063 | 5.62 | ---- | .05 | .0466 | .0284 | .672 | ----- | .006 |
| .30 | 4.22 | .248 | .647 | 5.16 | .062 | 6.99 | 6.52 | -.02 | .0337 | .0278 | .836 | .780 | -.002 |
| .30 | 4.64 | .288 | .847 | 5.67 | .060 | 7.76 | ---- | -.05 | .0278 | .0267 | .928 | ----- | -.006 |
| .40 | 0 | 0 | -.302 | 0 | ----- | 2.75 | 5.57 | .04 | ------ | ------ | .362 | .733 | .006 |
| .40 | .63 | .008 | -.281 | .74 | .074 | 2.82 | ---- | .03 | 1.9950 | .0399 | .372 | ----- | .004 |
| .40 | 1.06 | .037 | .255 | 1.23 | .123 | 2.94 | 5.68 | .05 | .7188 | .0665 | .387 | .748 | .007 |
| .40 | 1.48 | .051 | -.235 | 1.72 | .086 | 3.00 | ---- | .08 | .3666 | .0467 | .395 | ----- | .010 |
| .40 | 2.11 | .075 | -.154 | 2.46 | .062 | 3.29 | 5.58 | .06 | .1797 | .0337 | .433 | .735 | .008 |
| .40 | 2.53 | .097 | -.052 | 2.96 | .056 | 3.62 | ---- | .04 | .1248 | .0303 | .477 | ----- | .005 |
| .40 | 3.17 | .162 | .179 | 3.70 | .060 | 4.36 | 5.94 | -.02 | .0799 | .0323 | .574 | .782 | -.002 |
| .40 | 3.59 | .210 | .370 | 4.19 | .060 | 4.94 | ---- | -.05 | .0622 | .0326 | .651 | ----- | -.007 |
| .40 | 4.22 | .290 | .730 | 4.93 | .060 | 6.00 | ---- | -.09 | .0449 | .0326 | .790 | ----- | -.012 |
| .40 | 4.64 | .360 | 1.032 | 5.42 | .062 | 6.88 | ---- | -.14 | .0371 | .0334 | .895 | ----- | -.019 |
| .50 | 0 | 0 | -.297 | 0 | ----- | 2.76 | 5.54 | -.06 | ------ | ------ | .392 | .786 | -.008 |
| .50 | .63 | .009 | -.275 | .71 | .071 | 2.82 | ---- | -.07 | 2.4938 | .0449 | .400 | ----- | -.009 |
| .50 | 1.06 | .049 | -.249 | 1.18 | .140 | 2.89 | 5.60 | -.04 | .8955 | .0881 | .410 | .795 | -.006 |
| .50 | 1.48 | .063 | -.228 | 1.66 | .092 | 2.95 | ---- | -.01 | .4583 | .0577 | .418 | ----- | -.002 |
| .50 | 2.11 | .092 | -.133 | 2.37 | .066 | 3.20 | 5.54 | -.02 | .2246 | .0413 | .454 | .786 | -.003 |
| .50 | 2.53 | .121 | -.004 | 2.84 | .060 | 3.50 | ---- | -.04 | .1560 | .0377 | .497 | ----- | -.006 |
| .50 | 3.17 | .191 | .249 | 3.55 | .061 | 4.12 | 5.81 | -.11 | .0999 | .0381 | .585 | .825 | -.014 |
| .50 | 3.59 | .255 | .486 | 4.03 | .063 | 4.65 | ---- | -.05 | .0777 | .0396 | .659 | ----- | -.007 |
| .50 | 4.22 | .333 | .843 | 4.74 | .059 | 5.42 | ---- | -.15 | .0562 | .0374 | .769 | ----- | -.019 |
| $\tau = 15^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | 0.252 | 0.129 |
| 0 | .63 | .002 | -.013 | ---- | ----- | ----- | ---- | ---- | 0 | 0.0100 | -3.164 | ----- | .124 |
| 0 | 1.06 | .005 | -.035 | ---- | ----- | ----- | ---- | ---- | 0 | .0090 | -3.943 | .179 | .129 |
| 0 | 1.48 | .008 | -.008 | ---- | ----- | ----- | ---- | ---- | 0 | .0037 | -.964 | ----- | .125 |
| 0 | 2.11 | .011 | -.020 | ---- | ----- | ----- | ---- | ---- | 0 | .0063 | -.462 | .239 | .125 |
| 0 | 2.53 | .025 | -.009 | ---- | ----- | ----- | ---- | ---- | 0 | .0078 | .262 | .365 | .116 |
| 0 | 3.17 | .057 | .039 | ---- | ----- | ----- | ---- | ---- | 0 | .0114 | .938 | ----- | .108 |
| 0 | 3.59 | .092 | .117 | ---- | ----- | ----- | ---- | ---- | 0 | .0143 | 1.331 | ----- | .098 |
| 0 | 4.22 | .160 | .296 | ---- | ----- | ----- | ---- | ---- | 0 | .0180 | 1.705 | .504 | .085 |
| 0 | 4.64 | .212 | .444 | ---- | ----- | ----- | ---- | ---- | 0 | .0197 | 1.859 | ----- | .075 |
| 0 | 5.28 | .286 | .771 | ---- | ----- | ----- | ---- | ---- | 0 | .0206 | 2.244 | ----- | .066 |
| .10 | 0 | 0 | -.161 | 0 | ----- | 2.41 | 5.46 | 0.83 | ------ | ------ | .200 | .453 | .069 |
| .10 | .63 | .005 | -.153 | .93 | 0.116 | 2.63 | ---- | .78 | .4988 | .0249 | .218 | ----- | .065 |
| .10 | 1.06 | .016 | -.158 | 1.55 | .133 | 2.66 | 5.56 | .84 | .1797 | .0287 | .221 | .461 | .070 |
| .10 | 1.46 | .017 | -.133 | 2.17 | .072 | 3.18 | ---- | .86 | .0917 | .0156 | .264 | ----- | .071 |
| .10 | 2.11 | .036 | -.088 | 3.10 | .075 | 4.23 | 5.69 | .81 | .0449 | .0162 | .351 | .472 | .067 |
| .10 | 2.53 | .060 | -.040 | 3.72 | .087 | 5.25 | ---- | .71 | .0312 | .0187 | .436 | ----- | .059 |
| .10 | 3.17 | .106 | .070 | 4.65 | .098 | 7.23 | 6.44 | .63 | .0200 | .0211 | .600 | .534 | .052 |
| .10 | 3.59 | .148 | .191 | 5.26 | .107 | 9.02 | ---- | .54 | .0155 | .0230 | .749 | ----- | .045 |
| .10 | 4.22 | .222 | .455 | 6.19 | .116 | 12.17 | 7.24 | .42 | .0112 | .0249 | 1.010 | .600 | .035 |
| .10 | 4.64 | .269 | .638 | 6.81 | .116 | 14.12 | ---- | .36 | .0093 | .0249 | 1.172 | ----- | .030 |
| .10 | 5.28 | .323 | .965 | 7.74 | .108 | 17.24 | ---- | .27 | .0072 | .0232 | 1.431 | ----- | .022 |

TABLE VI - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 16° - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.251 | 0 | ----- | 2.55 | 5.23 | 0.44 | ------ | ------ | 0.267 | 0.547 | 0.046 |
| .20 | .63 | .006 | -.233 | .63 | 0.087 | 2.73 | ---- | .41 | 0.9975 | 0.0299 | .285 | ----- | .043 |
| .20 | 1.06 | .027 | -.238 | 1.38 | .142 | 2.75 | 5.28 | .47 | .3594 | .0484 | .287 | .551 | .049 |
| .20 | 1.48 | .032 | -.207 | 1.93 | .086 | 3.01 | ---- | .49 | .1833 | .0293 | .315 | ----- | .051 |
| .20 | 2.11 | .057 | -.137 | 2.76 | .075 | 3.65 | 5.34 | .46 | .0898 | .0256 | .382 | .558 | .048 |
| .20 | 2.53 | .083 | -.040 | 3.31 | .076 | 4.47 | ---- | .39 | .0624 | .0259 | .467 | ----- | .041 |
| .20 | 3.17 | .144 | .117 | 4.14 | .084 | 5.65 | 5.77 | .32 | .0399 | .0287 | .590 | .603 | .033 |
| .20 | 3.59 | .190 | .271 | 4.69 | .086 | 6.67 | ---- | .27 | .0311 | .0295 | .697 | ----- | .028 |
| .20 | 4.22 | .257 | .536 | 5.52 | .084 | 8.27 | ---- | .20 | .0225 | .0288 | .864 | ----- | .021 |
| .20 | 4.64 | .307 | .785 | 6.07 | .083 | 9.64 | ---- | .17 | .0186 | .0285 | 1.008 | ----- | .018 |
| .30 | 0 | 0 | -.302 | 0 | ----- | 2.62 | 5.16 | .23 | ------ | ------ | .313 | .617 | .027 |
| .30 | .63 | .009 | -.281 | .77 | .100 | 2.72 | ---- | .23 | 1.4963 | .0449 | .326 | ----- | .027 |
| .30 | 1.06 | .041 | -.282 | 1.29 | .164 | 2.77 | 5.22 | .27 | .5391 | .0735 | .331 | .624 | .033 |
| .30 | 1.48 | .062 | -.255 | 1.80 | .127 | 2.93 | ---- | .29 | .2750 | .0568 | .351 | ----- | .035 |
| .30 | 2.11 | .075 | -.141 | 2.58 | .075 | 3.49 | 5.32 | .24 | .1348 | .0337 | .418 | .637 | .029 |
| .30 | 2.53 | .106 | -.040 | 3.09 | .074 | 3.99 | ---- | .18 | .0936 | .0330 | .477 | ----- | .022 |
| .30 | 3.17 | .169 | .144 | 3.87 | .075 | 4.82 | 5.64 | .15 | .0599 | .0337 | .577 | .675 | .017 |
| .30 | 3.59 | .222 | .323 | 4.38 | .077 | 5.55 | ---- | .11 | .0466 | .0345 | .664 | ----- | .013 |
| .30 | 4.22 | .300 | .771 | 5.16 | .075 | 7.29 | ---- | .05 | .0337 | .0337 | .872 | ----- | .006 |
| .40 | 0 | 0 | -.329 | 0 | ----- | 2.63 | 5.16 | .07 | ------ | ------ | .346 | .679 | .009 |
| .40 | .63 | .011 | -.302 | .74 | .101 | 2.75 | ---- | .07 | 1.9950 | .0549 | .362 | ----- | .009 |
| .40 | 1.06 | .053 | -.310 | 1.23 | .175 | 2.75 | 5.16 | .11 | .7188 | .0952 | .362 | .679 | .014 |
| .40 | 1.48 | .062 | -.269 | 1.72 | .105 | 2.88 | ---- | .11 | .3666 | .0568 | .379 | ----- | .015 |
| .40 | 2.11 | .089 | -.158 | 2.46 | .074 | 3.27 | 5.19 | .10 | .1797 | .0400 | .431 | .684 | .013 |
| .40 | 2.53 | .131 | .020 | 2.96 | .075 | 3.86 | ---- | .06 | .1248 | .0409 | .508 | ----- | .008 |
| .40 | 3.17 | .209 | .201 | 3.70 | .077 | 4.42 | 5.40 | .01 | .0799 | .0417 | .582 | .711 | .001 |
| .40 | 3.59 | .260 | .397 | 4.19 | .074 | 4.98 | ---- | -.02 | .0621 | .0404 | .656 | ----- | -.003 |
| .50 | 0 | 0 | -.314 | 0 | ----- | 2.69 | 5.17 | -.06 | ------ | ------ | .382 | .733 | -.009 |
| .50 | .63 | .014 | -.302 | .71 | .111 | 2.75 | ---- | -.05 | 2.4938 | .0698 | .390 | ----- | -.007 |
| .50 | 1.06 | .065 | -.299 | 1.18 | .185 | 2.76 | 5.15 | 0 | .8985 | .1168 | .392 | .731 | 0 |
| .50 | 1.48 | .078 | -.261 | 1.66 | .114 | 2.88 | ---- | .03 | .4583 | .0715 | .408 | ----- | .004 |
| .50 | 2.11 | .108 | -.101 | 2.37 | .077 | 3.27 | 5.21 | -.03 | .2246 | .0485 | .464 | .739 | -.004 |
| .50 | 2.53 | .155 | .054 | 2.84 | .077 | 3.65 | ---- | -.05 | .1560 | .0484 | .518 | ----- | -.007 |
| .50 | 3.17 | .243 | .288 | 3.55 | .077 | 4.19 | 5.24 | -.09 | .0999 | .0485 | .595 | .744 | -.013 |
| .50 | 3.59 | .304 | .539 | 4.03 | .075 | 4.74 | ---- | -.12 | .0777 | .0473 | .672 | ----- | -.017 |
| .50 | 4.22 | .374 | .905 | 4.74 | .067 | 5.49 | ---- | -.13 | .0562 | .0420 | .779 | ----- | -.019 |
| $\tau$ = 20° | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ----- | 0.239 | 0.172 |
| 0 | .63 | .001 | -.010 | ---- | ----- | ----- | ---- | ---- | 0 | .0050 | -3.346 | ----- | .172 |
| 0 | 1.06 | .002 | -.010 | ---- | ----- | ----- | ---- | ---- | 0 | .0036 | -1.423 | .229 | .172 |
| 0 | 1.48 | .004 | -.010 | ---- | ----- | ----- | ---- | ---- | 0 | .0037 | -.782 | ----- | .172 |
| 0 | 2.11 | .007 | -.007 | ---- | ----- | ----- | ---- | ---- | 0 | .0031 | -.013 | .226 | .170 |
| 0 | 2.53 | .014 | -.002 | ---- | ----- | ----- | ---- | ---- | 0 | .0044 | .423 | ----- | .167 |
| 0 | 3.16 | .027 | .007 | ---- | ----- | ----- | ---- | ---- | 0 | .0054 | .641 | .316 | .160 |
| 0 | 3.59 | .062 | .050 | ---- | ----- | ----- | ---- | ---- | 0 | .0096 | .928 | ----- | .155 |
| 0 | 4.22 | .050 | .007 | ---- | ----- | ----- | ---- | ---- | 0 | .0056 | .577 | ----- | .157 |
| 0 | 4.64 | .160 | .208 | ---- | ----- | ----- | ---- | ---- | 0 | .0149 | 1.179 | ----- | .123 |
| 0 | 5.28 | .226 | .370 | ---- | ----- | ----- | ---- | ---- | 0 | .0162 | 1.354 | ----- | .112 |
| .10 | 0 | 0 | -.157 | 0 | ----- | 2.38 | 4.74 | 0.97 | ------ | ------ | .191 | .393 | .081 |
| .10 | .63 | .007 | -.153 | .93 | 0.162 | 2.60 | ---- | .99 | .4988 | .0349 | .215 | ----- | .082 |
| .10 | 1.06 | .018 | -.162 | 1.55 | .150 | 2.53 | 5.07 | .99 | .1797 | .0323 | .210 | .421 | .082 |
| .10 | 1.48 | .023 | -.147 | 2.17 | .098 | 2.90 | ---- | .99 | .0917 | .0211 | .241 | ----- | .082 |
| .10 | 2.11 | .044 | -.086 | 3.10 | .091 | 4.33 | 5.36 | .93 | .0449 | .0197 | .359 | .444 | .077 |
| .10 | 2.53 | .067 | -.048 | 3.72 | .097 | 5.16 | ---- | .90 | .0512 | .0209 | .428 | ----- | .075 |

TABLE VI - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 9 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 20^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.10 | 3.17 | 0.117 | 0.049 | 4.65 | 0.108 | 6.83 | 5.77 | 0.78 | 0.0200 | 0.0233 | 0.567 | 0.479 | 0.065 |
| .10 | 3.59 | .153 | .131 | 5.26 | .111 | 7.94 | ---- | .73 | .0155 | .0238 | .659 | ----- | .060 |
| .10 | 4.22 | .215 | .313 | 6.19 | .112 | 10.04 | ---- | .65 | .0112 | .0241 | .833 | ----- | .054 |
| .10 | 4.64 | .256 | .450 | 6.81 | .110 | 11.37 | ---- | .59 | .0093 | .0237 | .944 | ----- | .049 |
| .10 | 5.28 | .321 | .633 | 7.74 | .107 | 12.73 | ---- | .57 | .0072 | .0230 | 1.056 | ----- | .048 |
| .20 | 0 | 0 | -.243 | 0 | ----- | 2.55 | 4.78 | .50 | ------ | ------ | .267 | .500 | .052 |
| .20 | .63 | .014 | -.255 | .63 | .204 | 2.53 | ---- | .49 | .9975 | .0698 | .264 | ----- | .051 |
| .20 | 1.06 | .034 | -.255 | 1.38 | .178 | 2.60 | 4.91 | .54 | .3594 | .0610 | .272 | .513 | .056 |
| .20 | 1.45 | .042 | -.232 | 1.93 | .113 | 2.82 | ---- | .54 | .1833 | .0385 | .295 | ----- | .056 |
| .20 | 2.11 | .070 | -.136 | 2.76 | .092 | 3.68 | 5.03 | .49 | .0898 | .0314 | .385 | .526 | .051 |
| .20 | 2.53 | .099 | -.073 | 3.31 | .090 | 4.22 | ---- | .46 | .0624 | .0309 | .441 | ----- | .048 |
| .20 | 3.17 | .165 | .070 | 4.14 | .096 | 5.27 | 5.36 | .38 | .0399 | .0329 | .551 | .560 | .039 |
| .20 | 3.59 | .204 | .196 | 4.69 | .093 | 6.09 | ---- | .36 | .0311 | .0317 | .636 | ----- | .038 |
| .20 | 4.22 | .273 | .423 | 5.52 | .090 | 7.36 | ---- | .32 | .0225 | .0306 | .769 | ----- | .033 |
| .20 | 4.64 | .311 | .540 | 6.07 | .085 | 7.90 | ---- | .33 | .0186 | .0291 | .826 | ----- | .034 |
| .20 | 5.28 | .379 | .750 | 6.90 | .080 | 8.83 | ---- | .33 | .0144 | .0272 | .923 | ----- | .034 |
| .30 | 0 | 0 | -.309 | 0 | ----- | 2.53 | 4.75 | .25 | ------ | ------ | .303 | .568 | .030 |
| .30 | .63 | .018 | -.309 | .77 | .200 | 2.57 | ---- | .25 | 1.4963 | .0898 | .308 | ----- | .030 |
| .30 | 1.06 | .050 | -.314 | 1.29 | .200 | 2.62 | 4.80 | .30 | .5391 | .0897 | .313 | .575 | .036 |
| .30 | 1.48 | .058 | -.276 | 1.80 | .119 | 2.81 | ---- | .32 | .2750 | .0531 | .336 | ----- | .038 |
| .30 | 2.11 | .092 | -.156 | 2.58 | .096 | 3.43 | 4.93 | .26 | .1348 | .0431 | .410 | .590 | .031 |
| .30 | 2.53 | .134 | -.057 | 3.09 | .093 | 3.92 | ---- | .22 | .0936 | .0418 | .469 | ----- | .026 |
| .30 | 3.17 | .209 | .118 | 3.87 | .093 | 4.67 | 5.13 | .19 | .0599 | .0417 | .559 | .613 | .022 |
| .30 | 3.59 | .259 | .276 | 4.38 | .090 | 5.29 | ---- | .17 | .0466 | .0402 | .633 | ----- | .020 |
| .30 | 4.22 | .330 | .529 | 5.16 | .083 | 6.17 | ---- | .15 | .0337 | .0370 | .738 | ----- | .018 |
| .30 | 4.64 | .375 | .699 | 5.67 | .078 | 6.73 | ---- | .15 | .0273 | .0348 | .805 | ----- | .018 |
| .30 | 5.28 | .452 | .961 | 6.45 | .073 | 7.18 | ---- | .15 | .0215 | .0325 | .895 | ----- | .018 |
| .40 | 0 | 0 | -.335 | 0 | ----- | 2.57 | 4.92 | .07 | ------ | ------ | .338 | .647 | .010 |
| .40 | .63 | .018 | -.341 | .74 | .165 | 2.59 | ---- | .09 | 1.9951 | .0898 | .341 | ----- | .012 |
| .40 | 1.06 | .065 | -.350 | 1.23 | .215 | 2.61 | 4.70 | .14 | .7188 | .1168 | .344 | .620 | .018 |
| .40 | 1.48 | .074 | -.294 | 1.72 | .125 | 2.80 | ---- | .15 | .3666 | .0678 | .369 | ----- | .020 |
| .40 | 2.11 | .113 | -.148 | 2.46 | .094 | 3.31 | 4.95 | .11 | .1797 | .0508 | .436 | .652 | .014 |
| .40 | 2.53 | .160 | .041 | 2.96 | .092 | 3.93 | ---- | .09 | .1248 | .0499 | .518 | ----- | .012 |
| .40 | 3.17 | .245 | .165 | 3.70 | .090 | 4.28 | 5.05 | .07 | .0799 | .0489 | .564 | .664 | .009 |
| .40 | 3.59 | .295 | .349 | 4.19 | .085 | 4.79 | ---- | .06 | .0622 | .0459 | .631 | ----- | .008 |
| .40 | 4.22 | .368 | .654 | 4.93 | .076 | 5.57 | ---- | .05 | .0449 | .0413 | .733 | ----- | .007 |
| .40 | 4.64 | .414 | .843 | 5.42 | .071 | 6.01 | ---- | .04 | .0371 | .0384 | .792 | ----- | .005 |
| .50 | 0 | 0 | -.319 | 0 | ----- | 2.66 | 4.78 | -.09 | ------ | ------ | .377 | .677 | -.013 |
| .50 | .63 | .025 | -.330 | .71 | .198 | 2.66 | ---- | -.09 | 2.4938 | .1247 | .377 | ----- | -.012 |
| .50 | 1.06 | .061 | -.346 | 1.18 | .231 | 2.66 | 4.90 | -.09 | .8985 | .1456 | .377 | .694 | -.012 |
| .50 | 1.48 | .092 | -.276 | 1.66 | .134 | 2.84 | ---- | 0 | .4583 | .0843 | .403 | ----- | -.001 |
| .50 | 2.11 | .137 | -.112 | 2.37 | .098 | 3.26 | 4.87 | -.04 | .2246 | .0615 | .462 | .690 | -.005 |
| .50 | 2.53 | .186 | -.014 | 2.84 | .092 | 3.49 | ---- | -.04 | .1560 | .0580 | .495 | ----- | -.005 |
| .50 | 3.17 | .279 | .213 | 3.55 | .088 | 4.00 | 4.99 | -.06 | .0999 | .0557 | .567 | .707 | -.008 |
| .50 | 3.59 | .337 | .417 | 4.03 | .083 | 4.43 | ---- | -.08 | .0777 | .0524 | .628 | ----- | -.011 |
| .50 | 4.22 | .419 | .775 | 4.74 | .075 | 5.12 | ---- | ---- | .0562 | .0471 | .726 | ----- | ----- |

TABLE VII

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 0^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ------ | ----- | ----- | ---- | ------ | ------ | ----- | 0.415 | 0.042 |
| 0 | .63 | 0 | 0 | ---- | ------ | ----- | ----- | ---- | 0 | 0 | ----- | ----- | .042 |
| 0 | 1.06 | 0 | 0 | ---- | ------ | ----- | ----- | ---- | 0 | 0 | ----- | .410 | .042 |
| 0 | 1.48 | .002 | 0 | ---- | ------ | ----- | ----- | ---- | 0 | .0018 | ----- | ----- | .042 |
| 0 | 2.11 | .006 | .003 | ---- | ------ | ----- | ----- | ---- | 0 | .0027 | ----- | .578 | .040 |
| 0 | 2.53 | .010 | .007 | ---- | ------ | ----- | ----- | ---- | 0 | .0031 | ----- | ----- | .037 |
| 0 | 3.17 | .024 | .016 | ---- | ------ | ----- | ----- | ---- | 0 | .0048 | ----- | .689 | .036 |
| 0 | 3.59 | .040 | .027 | ---- | ------ | ----- | ----- | ---- | 0 | .0062 | ----- | ----- | .036 |
| 0 | 4.22 | .066 | .058 | ---- | ------ | ----- | ----- | ---- | 0 | .0074 | ----- | .825 | .033 |
| 0 | 4.64 | .092 | .087 | ---- | ------ | ----- | ----- | ---- | 0 | .0085 | ----- | ----- | .031 |
| 0 | 5.28 | .193 | .180 | ---- | ------ | ----- | ----- | ---- | 0 | .0139 | ----- | ----- | .026 |
| .10 | 0 | 0 | .015 | 0 | ------ | 7.64 | 10.92 | 0.38 | ------ | ------ | 0.523 | .749 | .026 |
| .10 | .63 | .002 | .021 | .93 | 0.046 | 7.76 | ----- | .36 | .4988 | .0100 | .532 | ----- | .024 |
| .10 | 1.06 | .006 | .052 | 1.55 | .050 | 8.40 | 12.59 | .34 | .1797 | .0108 | .576 | .863 | .023 |
| .10 | 1.48 | .009 | .067 | 2.17 | .038 | 8.74 | ----- | .34 | .0927 | .0082 | .600 | ----- | .023 |
| .10 | 2.11 | .021 | .087 | 3.10 | .044 | 9.18 | 12.59 | .33 | .0449 | .0094 | .629 | .863 | .022 |
| .10 | 2.53 | .031 | .096 | 3.72 | .045 | 9.42 | ----- | .33 | .0312 | .0097 | .646 | ----- | .022 |
| .10 | 3.17 | .047 | .103 | 4.65 | .044 | 9.52 | 13.26 | .33 | .0200 | .0094 | .653 | .909 | .022 |
| .10 | 3.59 | .068 | .129 | 5.26 | .049 | 10.07 | ----- | .31 | .0155 | .0106 | .691 | ----- | .022 |
| .10 | 4.22 | .127 | .180 | 6.19 | .066 | 11.21 | 13.75 | .27 | .0112 | .0143 | .769 | .943 | .019 |
| .10 | 4.64 | .165 | .220 | 6.81 | .071 | 12.14 | ----- | .24 | .0093 | .0153 | .833 | ----- | .016 |
| .10 | 5.28 | .306 | .342 | 7.74 | .102 | 14.67 | ----- | .19 | .0072 | .0220 | 1.006 | ----- | .013 |
| .20 | 0 | 0 | .038 | 0 | ------ | 6.11 | 9.98 | .23 | ------ | ------ | .528 | .862 | .020 |
| .20 | .63 | .002 | .042 | .83 | .029 | 6.14 | ----- | .23 | .9975 | .0100 | .530 | ----- | .020 |
| .20 | 1.06 | .008 | .087 | 1.38 | .042 | 6.53 | 11.24 | .22 | .3594 | .0144 | .564 | .971 | .019 |
| .20 | 1.48 | .015 | .129 | 1.93 | .040 | 6.89 | ----- | .21 | .1833 | .0137 | .595 | ----- | .018 |
| .20 | 2.11 | .031 | .168 | 2.76 | .041 | 7.21 | 11.12 | .21 | .0898 | .0139 | .623 | .961 | .018 |
| .20 | 2.53 | .043 | .194 | 3.31 | .039 | 7.46 | ----- | .20 | .0625 | .0134 | .644 | ----- | .017 |
| .20 | 3.17 | .075 | .210 | 4.14 | .044 | 7.58 | 11.16 | .20 | .0399 | .0150 | .655 | .964 | .017 |
| .20 | 3.59 | .106 | .228 | 4.69 | .048 | 7.72 | ----- | .19 | .0311 | .0165 | .667 | ----- | .017 |
| .20 | 4.22 | .157 | .261 | 5.52 | .0515 | 8.02 | 11.45 | .16 | .0225 | .0176 | .693 | .989 | .014 |
| .30 | 0 | 0 | .054 | 0 | ------ | 5.31 | 9.47 | .12 | ------ | ------ | .525 | .936 | .012 |
| .30 | .63 | .003 | .058 | .77 | .034 | 5.36 | ----- | .11 | 1.4963 | .0150 | .530 | ----- | .011 |
| .30 | 1.06 | .012 | .102 | 1.29 | .048 | 5.57 | 10.11 | .09 | .5391 | .0216 | .551 | 1.000 | .008 |
| .30 | 1.48 | .024 | .170 | 1.80 | .049 | 5.92 | ----- | .09 | .2750 | .0220 | .585 | ----- | .008 |
| .30 | 2.11 | .041 | .211 | 2.58 | .041 | 6.11 | 10.11 | .09 | .1348 | .0184 | .604 | 1.000 | .008 |
| .30 | 2.53 | .059 | .250 | 3.09 | .041 | 6.30 | ----- | .08 | .0936 | .0184 | .623 | ----- | .008 |
| .30 | 3.17 | .101 | .261 | 3.87 | .045 | 6.36 | 10.11 | .08 | .0599 | .0202 | .629 | 1.000 | .008 |
| .30 | 3.59 | .139 | .250 | 4.38 | .048 | 6.30 | ----- | .07 | .0466 | .0216 | .623 | ----- | .007 |
| .30 | 4.22 | .207 | .250 | 5.16 | .052 | 6.30 | ----- | .03 | .0337 | .0232 | .623 | ----- | .003 |
| .30 | 4.64 | .306 | .261 | 5.67 | .063 | 6.36 | ----- | 0 | .0278 | .0284 | .629 | ----- | 0 |
| .40 | 0 | 0 | .072 | 0 | ------ | 4.83 | 9.18 | .05 | ------ | ------ | .525 | 1.000 | .006 |
| .40 | .63 | .004 | .072 | .74 | .037 | 4.83 | ----- | .04 | 1.9950 | .0201 | .525 | ----- | .005 |
| .40 | 1.06 | .014 | .133 | 1.23 | .046 | 5.05 | 9.18 | .03 | .7188 | .0252 | .549 | 1.000 | .003 |
| .40 | 1.48 | .028 | .210 | 1.72 | .047 | 5.31 | ----- | .02 | .3666 | .0257 | .578 | ----- | .002 |
| .40 | 2.11 | .047 | .255 | 2.46 | .039 | 5.45 | 9.18 | .01 | .1797 | .0211 | .593 | 1.000 | .001 |
| .40 | 2.53 | .066 | .291 | 2.96 | .038 | 5.59 | ----- | 0 | .1248 | .0206 | .608 | ----- | 0 |
| .40 | 3.17 | .125 | .291 | 3.70 | .046 | 5.59 | 9.18 | -.01 | .0799 | .0250 | .608 | 1.000 | -.001 |
| .40 | 3.59 | .179 | .281 | 4.19 | .051 | 5.59 | ----- | -.03 | .0622 | .0278 | .608 | ----- | -.003 |
| .40 | 4.22 | .327 | .261 | 4.93 | .068 | 5.40 | ----- | -.08 | .0449 | .0367 | .587 | ----- | -.008 |
| .50 | 0 | 0 | .087 | 0 | ------ | 4.48 | 8.53 | 0 | ------ | ------ | .525 | 1.000 | 0 |
| .50 | .63 | .005 | .087 | .71 | .040 | 4.48 | ----- | -.01 | 2.4938 | .0249 | .525 | ----- | -.001 |
| .50 | 1.06 | .014 | .139 | 1.18 | .040 | 4.61 | 8.53 | -.03 | .8985 | .0252 | .540 | 1.000 | -.004 |
| .50 | 1.48 | .033 | .236 | 1.66 | .048 | 4.86 | ----- | -.04 | .4583 | .0302 | .570 | ----- | -.005 |
| .50 | 2.11 | .061 | .281 | 2.37 | .044 | 4.97 | 8.53 | -.04 | .2246 | .0274 | .583 | 1.000 | -.005 |
| .50 | 2.53 | .089 | .307 | 2.84 | .044 | 5.01 | ----- | -.06 | .1560 | .0278 | .587 | ----- | -.007 |
| .50 | 3.17 | .155 | .271 | 3.55 | .049 | 4.96 | 8.53 | -.07 | .0999 | .0309 | .581 | 1.000 | -.008 |
| .50 | 3.59 | .240 | .250 | 4.03 | .059 | 4.90 | ----- | -.11 | .0777 | .0373 | .574 | ----- | -.013 |

TABLE VII.- Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ----- | ---- | ------ | ------ | ----- | 0.364 | 0.049 |
| 0 | .63 | .001 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | 0.0050 | 0.500 | ----- | .049 |
| 0 | 1.06 | .002 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0036 | .500 | .332 | .049 |
| 0 | 1.48 | .002 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0018 | .500 | ----- | .049 |
| 0 | 2.11 | .007 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0031 | .500 | .445 | .048 |
| 0 | 2.53 | .011 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0034 | .500 | ----- | .045 |
| 0 | 3.17 | .020 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0040 | .500 | .493 | .044 |
| 0 | 3.59 | .029 | 0 | ---- | ----- | ----- | ----- | ---- | 0 | .0045 | .500 | ----- | .043 |
| 0 | 4.22 | .047 | .012 | ---- | ----- | ----- | ----- | ---- | 0 | .0053 | 1.045 | .549 | .040 |
| 0 | 4.64 | .078 | .027 | ---- | ----- | ----- | ----- | ---- | 0 | .0072 | 1.206 | ----- | .038 |
| 0 | 5.28 | .157 | .154 | ---- | ----- | ----- | ----- | ---- | 0 | .0113 | 2.584 | ----- | .031 |
| .10 | 0 | 0 | -.117 | 0 | ----- | 4.76 | 9.81 | 0.43 | ------ | ------ | .326 | .673 | .030 |
| .10 | .63 | .001 | -.113 | .93 | 0.023 | 4.85 | ----- | .44 | .4988 | .0050 | .333 | ----- | .030 |
| .10 | 1.06 | .005 | -.091 | 1.55 | .042 | 5.32 | 10.10 | .43 | .1797 | .0090 | .364 | .692 | .030 |
| .10 | 1.48 | .009 | -.080 | 2.17 | .038 | 5.59 | ----- | .43 | .0917 | .0082 | .383 | ----- | .030 |
| .10 | 2.11 | .020 | -.066 | 3.10 | .042 | 5.90 | 9.76 | .43 | .0449 | .0090 | .405 | .669 | .030 |
| .10 | 2.53 | .029 | -.060 | 3.72 | .042 | 6.03 | ----- | .42 | .0312 | .0090 | .413 | ----- | .029 |
| .10 | 3.17 | .047 | -.048 | 4.65 | .044 | 6.27 | 9.89 | .39 | .0200 | .0094 | .430 | .678 | .027 |
| .10 | 3.59 | .066 | -.035 | 5.26 | .048 | 6.58 | ----- | .38 | .0155 | .0103 | .451 | ----- | .026 |
| .10 | 4.22 | .110 | .021 | 6.19 | .058 | 7.73 | 10.43 | .35 | .0112 | .0124 | .530 | .715 | .024 |
| .10 | 4.64 | .139 | .119 | 6.81 | .060 | 9.64 | ----- | .31 | .0093 | .0129 | .661 | ----- | .021 |
| .10 | 5.28 | .216 | .251 | 7.74 | .072 | 12.55 | ----- | .24 | .0072 | .0155 | .860 | ----- | .016 |
| .20 | 0 | 0 | -.189 | 0 | ----- | 4.17 | 8.96 | .24 | ------ | ------ | .350 | .774 | .021 |
| .20 | .63 | .002 | -.175 | .83 | .029 | 4.27 | ----- | .23 | .9975 | .0100 | .359 | ----- | .019 |
| .20 | 1.06 | .009 | -.133 | 1.38 | .047 | 4.67 | 9.02 | .20 | .3594 | .0162 | .403 | .779 | .018 |
| .20 | 1.48 | .015 | -.113 | 1.93 | .040 | 4.83 | ----- | .22 | .1833 | .0137 | .417 | ----- | .019 |
| .20 | 2.11 | .032 | -.086 | 2.76 | .042 | 5.05 | 8.87 | .23 | .0898 | .0144 | .436 | .766 | .019 |
| .20 | 2.53 | .041 | -.069 | 3.31 | .037 | 5.20 | ----- | .22 | .0624 | .0128 | .449 | ----- | .019 |
| .20 | 3.17 | .066 | -.046 | 4.14 | .039 | 5.42 | 9.04 | .19 | .0399 | .0132 | .468 | .781 | .017 |
| .20 | 3.59 | .087 | -.005 | 4.69 | .040 | 5.42 | ----- | .18 | .0311 | .0135 | .496 | ----- | .016 |
| .20 | 4.22 | .132 | .076 | 5.52 | .043 | 5.74 | 9.12 | .16 | .0225 | .0148 | .555 | .788 | .014 |
| .20 | 4.64 | .176 | .200 | 6.07 | .048 | 7.41 | ----- | .11 | .0186 | .0163 | .640 | ----- | .010 |
| .20 | 5.28 | .243 | .389 | 6.90 | .051 | 8.71 | ----- | .07 | .0144 | .0175 | .752 | ----- | .006 |
| .30 | 0 | 0 | -.233 | 0 | ----- | 3.90 | 8.38 | .13 | ------ | ------ | .386 | .828 | .012 |
| .30 | .63 | .002 | -.221 | .77 | .022 | 3.95 | ----- | .12 | 1.4963 | .0100 | .390 | ----- | .012 |
| .30 | 1.06 | .012 | -.159 | 1.29 | .048 | 4.27 | 8.48 | .11 | .5391 | .0216 | .422 | .839 | .011 |
| .30 | 1.48 | .021 | -.122 | 1.80 | .043 | 4.46 | ----- | .12 | .2750 | .0192 | .441 | ----- | .012 |
| .30 | 2.11 | .041 | -.092 | 2.58 | .041 | 4.61 | 8.45 | .13 | .1348 | .0184 | .456 | .835 | .013 |
| .30 | 2.53 | .053 | -.060 | 3.09 | .037 | 4.75 | ----- | .12 | .0936 | .0165 | .470 | ----- | .012 |
| .30 | 3.17 | .082 | -.013 | 3.87 | .037 | 5.00 | 8.31 | .12 | .0599 | .0164 | .494 | .821 | .012 |
| .30 | 3.59 | .110 | .037 | 4.38 | .038 | 5.23 | ----- | .10 | .0466 | .0171 | .517 | ----- | .010 |
| .30 | 4.22 | .165 | .171 | 5.16 | .041 | 5.90 | 8.66 | .07 | .0337 | .0185 | .583 | .857 | .007 |
| .30 | 4.64 | .207 | .287 | 5.67 | .043 | 6.43 | ----- | .05 | .0278 | .0192 | .636 | ----- | .005 |
| .30 | 5.28 | .285 | .543 | 6.45 | .046 | 7.59 | ----- | 0 | .0216 | .0205 | .750 | ----- | 0 |
| .40 | 0 | 0 | -.247 | 0 | ----- | 3.76 | 8.06 | .05 | ------ | ------ | .409 | .878 | .005 |
| .40 | .63 | .003 | -.226 | .74 | .028 | 3.81 | ----- | .04 | 1.9950 | .0150 | .415 | ----- | .004 |
| .40 | 1.06 | .016 | -.153 | 1.23 | .053 | 4.07 | 8.19 | .02 | .7188 | .0288 | .443 | .892 | .003 |
| .40 | 1.48 | .028 | -.113 | 1.72 | .047 | 4.21 | ----- | .04 | .3666 | .0257 | .458 | ----- | .004 |
| .40 | 2.11 | .047 | -.071 | 2.45 | .039 | 4.37 | 8.05 | .05 | .1797 | .0211 | .475 | .876 | .005 |
| .40 | 2.53 | .065 | -.040 | 2.96 | .037 | 4.46 | ----- | .04 | .1248 | .0203 | .485 | ----- | .005 |
| .40 | 3.17 | .106 | .019 | 3.70 | .039 | 4.65 | 8.05 | .04 | .0799 | .0212 | .506 | .876 | .004 |
| .40 | 3.59 | .141 | .097 | 4.19 | .040 | 4.93 | ----- | .01 | .0622 | .0219 | .536 | ----- | .001 |
| .40 | 4.22 | .200 | .248 | 4.93 | .041 | 5.41 | 8.05 | -.01 | .0449 | .0225 | .589 | .876 | -.001 |
| .40 | 4.64 | .268 | .423 | 5.42 | .046 | 5.97 | ----- | -.05 | .0371 | .0249 | .650 | ----- | -.005 |
| .40 | 5.28 | .364 | .697 | 6.16 | .048 | 6.84 | ----- | -.07 | .0288 | .0262 | .744 | ----- | -.008 |

TABLE VII.- Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 4^\circ$ - Concluded | | | | | | | | | | | | | |
| 0.50 | 0 | 0 | -0.231 | 0 | ----- | 3.69 | 7.80 | -0.02 | ------ | ------ | 0.432 | 0.915 | -0.002 |
| .50 | .63 | .004 | -.206 | .71 | 0.032 | 3.75 | ---- | -.03 | 2.4938 | 0.0200 | .439 | ----- | -.003 |
| .50 | 1.06 | .019 | -.134 | 1.18 | .054 | 3.92 | 7.92 | -.04 | .8986 | .0341 | .460 | .929 | -.005 |
| .50 | 1.48 | .033 | -.066 | 1.66 | .048 | 4.05 | ---- | -.03 | .4583 | .0302 | .475 | ----- | -.003 |
| .50 | 2.11 | .055 | -.048 | 2.37 | .039 | 4.14 | 7.74 | -.02 | .2246 | .0247 | .485 | .908 | -.003 |
| .50 | 2.53 | .078 | -.009 | 2.84 | .039 | 4.25 | ---- | -.03 | .1560 | .0243 | .498 | ----- | -.003 |
| .50 | 3.17 | .127 | .077 | 3.55 | .040 | 4.46 | 7.80 | -.05 | .0999 | .0254 | .523 | .915 | -.005 |
| .50 | 3.59 | .172 | .169 | 4.03 | .042 | 4.68 | ---- | -.06 | .0777 | .0267 | .549 | ----- | -.007 |
| .50 | 4.22 | .254 | .362 | 4.74 | .045 | 5.15 | ---- | -.09 | .0562 | .0285 | .604 | ----- | -.011 |
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ----- | ------ | 0 | ------ | .233 | .073 |
| 0 | .63 | 0 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | 0 | ------ | ----- | .075 |
| 0 | 1.06 | 0 | -.004 | ---- | ----- | ----- | ---- | ----- | 0 | 0 | ------ | .134 | .075 |
| 0 | 1.48 | 0 | -.004 | ---- | ----- | ----- | ---- | ----- | 0 | 0 | ------ | ----- | .075 |
| 0 | 2.11 | .002 | -.004 | ---- | ----- | ----- | ---- | ----- | 0 | .0009 | -1.327 | .148 | .074 |
| 0 | 2.53 | .003 | -.004 | ---- | ----- | ----- | ---- | ----- | 0 | .0009 | -1.090 | ----- | .072 |
| 0 | 3.17 | .009 | -.003 | ---- | ----- | ----- | ---- | ----- | 0 | .0018 | .197 | .222 | .070 |
| 0 | 3.59 | .014 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0022 | .500 | ----- | .069 |
| 0 | 4.22 | .047 | .021 | ---- | ----- | ----- | ---- | ----- | 0 | .0053 | .988 | .399 | .069 |
| 0 | 4.64 | .092 | .099 | ---- | ----- | ----- | ---- | ----- | 0 | .0085 | 1.658 | ----- | .052 |
| 0 | 5.28 | .183 | .303 | ---- | ----- | ----- | ---- | ----- | 0 | .0132 | 2.265 | .558 | .041 |
| .10 | 0 | 0 | -.176 | 0 | ----- | 3.46 | 7.57 | .61 | ------ | ------ | .237 | .519 | .042 |
| .10 | .63 | .002 | -.164 | .93 | .046 | 3.74 | ---- | .59 | .4988 | .0100 | .256 | ----- | .041 |
| .10 | 1.06 | .008 | -.153 | 1.55 | .067 | 3.99 | 7.57 | .60 | .1797 | .0144 | .273 | .519 | .041 |
| .10 | 1.48 | .012 | -.146 | 2.17 | .051 | 4.17 | ---- | .60 | .0917 | .0110 | .286 | ----- | .041 |
| .10 | 2.11 | .021 | -.145 | 3.10 | .044 | 4.23 | 7.29 | .61 | .0449 | .0094 | .290 | .500 | .041 |
| .10 | 2.53 | .032 | -.129 | 3.72 | .046 | 4.60 | ---- | .61 | .0312 | .0100 | .316 | ----- | .041 |
| .10 | 3.17 | .059 | -.070 | 4.65 | .055 | 5.87 | 7.86 | .54 | .0200 | .0118 | .403 | .539 | .037 |
| .10 | 3.59 | .085 | -.013 | 5.26 | .061 | 7.05 | ---- | .50 | .0155 | .0132 | .483 | ----- | .034 |
| .10 | 4.22 | .134 | .098 | 6.19 | .070 | 9.12 | 8.50 | .44 | .0112 | .0150 | .625 | .585 | .030 |
| .10 | 4.64 | .174 | .230 | 6.81 | .075 | 11.34 | ---- | .36 | .0093 | .0162 | .778 | ----- | .025 |
| .10 | 5.28 | .250 | .464 | 7.74 | .084 | 14.80 | 8.91 | .26 | .0072 | .0180 | 1.02 | .611 | .018 |
| .20 | 0 | 0 | -.278 | 0 | ----- | 3.38 | 7.07 | .31 | ------ | ------ | .292 | .611 | .027 |
| .20 | .63 | .005 | -.263 | .83 | .073 | 3.53 | ---- | .29 | .9975 | .0249 | .305 | ----- | .025 |
| .20 | 1.06 | .014 | -.237 | 1.38 | .074 | 3.78 | 7.07 | .30 | .3594 | .0252 | .326 | .611 | .026 |
| .20 | 1.48 | .021 | -.226 | 1.93 | .056 | 3.86 | ---- | .32 | .1833 | .0192 | .333 | ----- | .028 |
| .20 | 2.11 | .033 | -.212 | 2.76 | .043 | 4.00 | 6.87 | .33 | .0898 | .0148 | .345 | .593 | .029 |
| .20 | 2.53 | .049 | -.194 | 3.31 | .045 | 4.17 | ---- | .29 | .0624 | .0153 | .360 | ----- | .025 |
| .20 | 3.17 | .080 | -.092 | 4.14 | .047 | 5.03 | 7.12 | .26 | .0399 | .0160 | .434 | .615 | .022 |
| .20 | 3.59 | .115 | 0 | 4.69 | .052 | 5.79 | ---- | .24 | .0311 | .0179 | .500 | ----- | .021 |
| .20 | 4.22 | .174 | .200 | 5.52 | .057 | 7.33 | 7.52 | .17 | .0225 | .0195 | .633 | .650 | .014 |
| .20 | 4.64 | .219 | .251 | 6.07 | .059 | 7.68 | ---- | .12 | .0186 | .0203 | .663 | ----- | .011 |
| .20 | 5.28 | .290 | .622 | 6.90 | .061 | 10.26 | ---- | .05 | .0144 | .0208 | .886 | ----- | .005 |
| .30 | 0 | 0 | -.336 | 0 | ----- | 3.37 | 6.89 | .16 | ------ | ------ | .333 | .682 | .016 |
| .30 | .63 | .005 | -.321 | .77 | .056 | 3.45 | ---- | .12 | 1.4963 | .0249 | .341 | ----- | .012 |
| .30 | 1.06 | .021 | -.288 | 1.29 | .084 | 3.62 | 6.98 | .15 | .5391 | .0377 | .358 | .690 | .015 |
| .30 | 1.48 | .028 | -.271 | 1.80 | .057 | 3.71 | ---- | .18 | .2750 | .0257 | .367 | ----- | .018 |
| .30 | 2.11 | .047 | -.259 | 2.58 | .047 | 3.79 | 6.79 | .15 | .1348 | .0211 | .375 | .671 | .015 |
| .30 | 2.53 | .061 | -.216 | 3.09 | .042 | 4.01 | ---- | .16 | .0936 | .0190 | .396 | ----- | .016 |
| .30 | 3.17 | .106 | -.080 | 3.87 | .047 | 4.67 | 6.89 | .13 | .0599 | .0212 | .462 | .682 | .012 |
| .30 | 3.59 | .139 | .032 | 4.38 | .048 | 5.21 | ---- | .10 | .0466 | .0216 | .515 | ----- | .010 |
| .30 | 4.22 | .204 | .267 | 5.16 | .051 | 6.28 | 7.25 | .05 | .0337 | .0229 | .621 | .717 | .005 |
| .30 | 4.64 | .254 | .434 | 5.67 | .053 | 7.01 | ---- | .03 | .0278 | .0236 | .693 | ----- | .003 |
| .30 | 5.28 | .306 | .698 | 6.45 | .049 | 8.12 | ---- | -.01 | .0216 | .0220 | .803 | ----- | -.001 |

TABLE VII.- Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $\tau$ = 8° - Concluded | | | | | | | |
| 0.40 | 0 | 0 | -0.362 | 0 | ------ | 3.35 | 6.81 | 0.05 | ------ | ------ | 0.364 | 0.742 | 0.005 |
| .40 | .63 | .007 | -.350 | .74 | 0.064 | 3.41 | ---- | .05 | 1.9950 | 0.0349 | .371 | ----- | .006 |
| .40 | 1.06 | .026 | -.311 | 1.23 | .086 | 3.55 | 6.81 | .05 | .7188 | .0467 | .386 | .742 | .006 |
| .40 | 1.48 | .035 | -.289 | 1.72 | .064 | 3.62 | ---- | .09 | .3666 | .0348 | .394 | ----- | .009 |
| .40 | 2.11 | .061 | -.224 | 2.46 | .051 | 3.83 | 6.57 | .09 | .1797 | .0274 | .417 | .715 | .010 |
| .40 | 2.53 | .078 | -.211 | 2.96 | .045 | 3.90 | ---- | .07 | .1248 | .0243 | .424 | ----- | .008 |
| .40 | 3.17 | .122 | -.055 | 3.70 | .045 | 4.42 | 6.78 | .04 | .0799 | .0244 | .481 | .738 | .005 |
| .40 | 3.59 | .160 | .053 | 4.19 | .046 | 4.77 | ---- | .03 | .0622 | .0249 | .519 | ----- | .003 |
| .40 | 4.22 | .221 | .302 | 4.93 | .046 | 5.55 | 7.07 | 0 | .0449 | .0248 | .604 | .770 | -0 |
| .40 | 4.64 | .266 | .462 | 5.42 | .046 | 6.04 | ---- | -.04 | .0371 | .0247 | .657 | ----- | -.005 |
| .40 | 5.28 | .341 | .789 | 6.16 | .045 | 7.01 | ---- | -.04 | .0288 | .0245 | .763 | ----- | -.005 |
| .50 | 0 | 0 | -.352 | 0 | ------ | 3.36 | 6.79 | -.04 | ------ | ------ | .394 | .796 | -.004 |
| .50 | .63 | .006 | -.342 | .72 | .048 | 3.40 | ---- | -.03 | 2.4938 | .0299 | .398 | ----- | -.004 |
| .50 | 1.06 | .032 | -.301 | 1.18 | .091 | 3.51 | 6.85 | -.02 | .8985 | .0575 | .421 | .803 | -.003 |
| .50 | 1.48 | .047 | -.287 | 1.66 | .068 | 3.54 | ---- | 0 | .4583 | .0431 | .415 | ----- | 0 |
| .50 | 2.11 | .071 | -.243 | 2.37 | .051 | 3.65 | 6.61 | 0 | .2246 | .0319 | .428 | .775 | 0 |
| .50 | 2.53 | .094 | -.184 | 2.84 | .047 | 3.81 | ---- | -.01 | .1560 | .0293 | .447 | ----- | -.001 |
| .50 | 3.17 | .143 | -.006 | 3.55 | .045 | 4.25 | 6.72 | -.03 | .0999 | .0286 | .496 | .788 | -.004 |
| .50 | 3.59 | .188 | .139 | 4.03 | .046 | 4.61 | ---- | -.05 | .0777 | .0292 | .540 | ----- | -.006 |
| .50 | 4.22 | .259 | .414 | 4.74 | .046 | 5.21 | 6.93 | -.08 | .0562 | .0291 | .611 | .812 | -.009 |
| | | | | | | $\tau$ = 12° | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ----- | ------ | ------ | ----- | .164 | .105 |
| 0 | .63 | .001 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0050 | .500 | ----- | .108 |
| 0 | 1.06 | .001 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0018 | .500 | .095 | .108 |
| 0 | 1.48 | .002 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0018 | .500 | ----- | .108 |
| 0 | 2.11 | .004 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0018 | .500 | .134 | .104 |
| 0 | 2.53 | .005 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0016 | .500 | ----- | .102 |
| 0 | 3.17 | .014 | 0 | ---- | ----- | ----- | ---- | ----- | 0 | .0028 | .500 | .152 | .094 |
| 0 | 3.59 | .024 | .007 | ---- | ----- | ----- | ---- | ----- | 0 | .0037 | .704 | ----- | .091 |
| 0 | 4.22 | .059 | .037 | ---- | ----- | ----- | ---- | ----- | 0 | .0065 | .949 | .343 | .081 |
| 0 | 4.64 | .106 | .118 | ---- | ----- | ----- | ---- | ----- | 0 | .0098 | 1.298 | ----- | .072 |
| 0 | 5.28 | .183 | .312 | ---- | ----- | ----- | ---- | ----- | 0 | .0132 | 1.716 | .653 | .059 |
| .10 | 0 | 0 | -.185 | 0 | ----- | 3.21 | 6.54 | .79 | ------ | ------ | .220 | .449 | .054 |
| .10 | .63 | .005 | -.184 | .93 | .116 | 3.28 | ---- | .79 | .4988 | .0249 | .223 | ----- | .054 |
| .10 | 1.06 | .011 | -.180 | 1.55 | .092 | 3.40 | 6.39 | .83 | .1797 | .0198 | .233 | .438 | .057 |
| .10 | 1.48 | .015 | -.174 | 2.17 | .064 | 3.62 | ---- | .86 | .0917 | .0137 | .248 | ----- | .059 |
| .10 | 2.11 | .027 | -.153 | 3.10 | .056 | 4.11 | 6.41 | .82 | .0449 | .0121 | .252 | .440 | .056 |
| .10 | 2.53 | .042 | -.113 | 3.72 | .061 | 5.01 | ---- | .77 | .0312 | .0131 | .243 | ----- | .053 |
| .10 | 3.17 | .073 | -.050 | 4.65 | .068 | 6.33 | 6.44 | .69 | .0200 | .0146 | .434 | .441 | .047 |
| .10 | 3.59 | .103 | 0 | 5.26 | .074 | 7.29 | ---- | .65 | .0155 | .0160 | .500 | ----- | .045 |
| .10 | 4.22 | .150 | .133 | 6.19 | .078 | 9.52 | 7.73 | .56 | .0112 | .0168 | .653 | .530 | .038 |
| .10 | 4.64 | .190 | .257 | 6.81 | .082 | 10.66 | ---- | .51 | .0093 | .0176 | .731 | ----- | .035 |
| .10 | 5.28 | .271 | .474 | 7.74 | .091 | 11.50 | ---- | .40 | .0072 | .0195 | .788 | ----- | .028 |
| .20 | 0 | 0 | -.300 | 0 | ----- | 3.16 | 6.26 | .41 | ------ | ------ | .273 | .540 | .036 |
| .20 | .63 | .006 | -.294 | .83 | .087 | 3.24 | ---- | .41 | .9975 | .0299 | .280 | ----- | .036 |
| .20 | 1.06 | .021 | -.283 | 1.38 | .110 | 3.36 | 6.42 | .45 | .3594 | .0377 | .290 | .554 | .039 |
| .20 | 1.48 | .028 | -.279 | 1.93 | .075 | 3.40 | ---- | .48 | .1833 | .0257 | .294 | ----- | .041 |
| .20 | 2.11 | .046 | -.243 | 2.76 | .061 | 3.78 | 6.34 | .45 | .0898 | .0207 | .326 | .547 | .039 |
| .20 | 2.53 | .063 | -.180 | 3.31 | .058 | 4.32 | ---- | .41 | .0624 | .0197 | .373 | ----- | .036 |
| .20 | 3.17 | .105 | -.055 | 4.14 | .061 | 5.35 | 6.34 | .35 | .0399 | .0210 | .462 | .547 | .030 |
| .20 | 3.59 | .137 | .025 | 4.69 | .062 | 5.99 | ---- | .31 | .0311 | .0213 | .517 | ----- | .027 |
| .20 | 4.22 | .200 | .216 | 5.52 | .066 | 7.36 | 6.97 | .28 | .0225 | .0225 | .636 | .602 | .024 |
| .20 | 4.64 | .242 | .357 | 6.07 | .066 | 8.27 | ---- | .24 | .0186 | .0225 | .714 | ----- | .020 |
| .20 | 5.28 | .306 | .638 | 6.90 | .064 | 10.01 | ---- | .19 | .0144 | .0220 | .864 | ----- | .016 |

TABLE VII - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION

OF FINENESS RATIO 12 WITH CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| τ = 12° - Concluded | | | | | | | | | | | | | |
| 0.30 | 0 | 0 | -0.373 | 0 | ----- | 3.15 | 6.22 | 0.21 | ------ | ------ | 0.311 | 0.615 | 0.021 |
| .30 | .63 | .008 | -.362 | .77 | 0.089 | 3.22 | ---- | .21 | 1.4963 | 0.0399 | .318 | ----- | .021 |
| .30 | 1.06 | .028 | -.356 | 1.29 | .112 | 3.28 | 6.18 | .23 | .5392 | .0503 | .324 | .611 | .022 |
| .30 | 1.48 | .040 | -.342 | 1.80 | .082 | 3.35 | ---- | .26 | .2750 | .0367 | .331 | ----- | .026 |
| .30 | 2.11 | .059 | -.289 | 2.58 | .059 | 3.64 | 6.18 | .25 | .1348 | .0265 | .360 | .611 | .024 |
| .30 | 2.53 | .078 | -.207 | 3.09 | .054 | 4.05 | ---- | .21 | .0936 | .0243 | .400 | ----- | .021 |
| .30 | 3.17 | .127 | -.040 | 3.87 | .057 | 4.87 | 6.11 | .17 | .0599 | .0254 | .481 | .604 | .016 |
| .30 | 3.59 | .169 | .067 | 4.38 | .059 | 5.36 | ---- | .14 | .0466 | .0263 | .530 | ----- | .014 |
| .30 | 4.22 | .233 | .293 | 5.16 | .059 | 6.34 | 6.57 | .11 | .0337 | .0262 | .627 | .650 | .011 |
| .30 | 4.64 | .280 | .464 | 5.67 | .058 | 7.03 | ---- | .09 | .0278 | .0260 | .695 | ----- | .009 |
| .30 | 5.28 | .350 | .779 | 6.45 | .056 | 8.25 | ---- | .05 | .0216 | .0252 | .816 | ----- | .005 |
| .40 | 0 | 0 | -.403 | 0 | ----- | 3.19 | 6.20 | .06 | ------ | ------ | .347 | .675 | .007 |
| .40 | .63 | .007 | -.395 | .74 | .064 | 3.24 | ---- | .07 | 1.9950 | .0349 | .352 | ----- | .008 |
| .40 | 1.06 | .038 | -.384 | 1.23 | .126 | 3.29 | 6.18 | .11 | .7188 | .0683 | .358 | .673 | .012 |
| .40 | 1.48 | .052 | -.371 | 1.72 | .088 | 3.35 | ---- | .13 | .3666 | .0477 | .364 | ----- | .014 |
| .40 | 2.11 | .075 | -.294 | 2.46 | .062 | 3.62 | 6.13 | .10 | .1797 | .0337 | .394 | .667 | .011 |
| .40 | 2.53 | .099 | -.180 | 2.96 | .057 | 4.01 | ---- | .07 | .1248 | .0309 | .436 | ----- | .008 |
| .40 | 3.17 | .148 | .007 | 3.70 | .054 | 4.61 | 6.16 | .05 | .0799 | .0295 | .502 | .671 | .005 |
| .40 | 3.59 | .193 | .119 | 4.19 | .055 | 4.96 | ---- | .02 | .0622 | .0300 | .540 | ----- | .002 |
| .40 | 4.22 | .251 | .337 | 4.93 | .052 | 5.62 | 6.31 | .02 | .0449 | .0282 | .612 | .687 | .002 |
| .40 | 4.64 | .289 | .516 | 5.42 | .049 | 6.15 | ---- | .01 | .0371 | .0268 | .669 | ----- | .001 |
| .40 | 5.28 | .348 | .814 | 6.16 | .046 | 6.97 | ---- | -.01 | .0268 | .0250 | .758 | ----- | -.001 |
| .50 | 0 | 0 | -.398 | 0 | ----- | 3.23 | 6.24 | -.06 | ------ | ------ | .379 | .731 | -.007 |
| .50 | .63 | .009 | -.394 | .71 | .071 | 3.25 | ---- | -.07 | 2.4938 | .0449 | .381 | ----- | -.008 |
| .50 | 1.06 | .046 | -.386 | 1.18 | .131 | 3.29 | 6.18 | -.03 | .8585 | .0827 | .386 | .724 | -.004 |
| .50 | 1.48 | .061 | -.368 | 1.66 | .089 | 3.34 | ---- | 0 | .4583 | .0559 | .392 | ----- | 0 |
| .50 | 2.11 | .092 | -.267 | 2.37 | .066 | 3.60 | 6.18 | 0 | .2246 | .0413 | .422 | .724 | -.001 |
| .50 | 2.53 | .113 | -.170 | 2.84 | .056 | 3.85 | ---- | -.03 | .1560 | .0353 | .451 | ---- | -.004 |
| .50 | 3.17 | .169 | -.004 | 3.55 | .054 | 4.25 | 6.06 | -.03 | .0999 | .0337 | .498 | .710 | -.005 |
| .50 | 3.59 | .216 | .130 | 4.03 | .053 | 4.57 | ---- | -.06 | .0777 | .0336 | .536 | ----- | -.006 |
| .50 | 4.22 | .280 | .389 | 4.74 | .050 | 5.17 | 6.18 | -.08 | .0562 | .0314 | .606 | .724 | -.007 |
| τ = 16° | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ----- | ---- | ---- | ------ | ------ | ------ | .124 | .139 |
| 0 | .63 | .001 | -.004 | ---- | ----- | ----- | ---- | ---- | 0 | .0050 | -2.622 | ----- | .142 |
| 0 | 1.06 | .001 | -.004 | ---- | ----- | ----- | ---- | ---- | 0 | .0018 | -2.622 | .111 | .143 |
| 0 | 1.48 | .001 | -.007 | ---- | ----- | ----- | ---- | ---- | 0 | .0009 | -2.090 | ----- | .143 |
| 0 | 2.11 | .002 | -.004 | ---- | ----- | ----- | ---- | ---- | 0 | .0009 | -.422 | .124 | .145 |
| 0 | 2.53 | .002 | -.004 | ---- | ----- | ----- | ---- | ---- | 0 | .0006 | -.422 | ----- | .146 |
| 0 | 3.17 | .007 | -.013 | ---- | ----- | ----- | ---- | ---- | 0 | .0016 | -.534 | .155 | .134 |
| 0 | 3.59 | .021 | .012 | ---- | ----- | ----- | ---- | ---- | 0 | .0033 | .816 | ----- | .123 |
| 0 | 4.22 | .056 | .027 | ---- | ----- | ----- | ---- | ---- | 0 | .0063 | .763 | ----- | .105 |
| 0 | 4.64 | .094 | .006 | ---- | ----- | ----- | ---- | ---- | 0 | .0067 | .535 | ----- | .094 |
| 0 | 5.28 | .174 | .241 | ---- | ----- | ----- | ---- | ---- | 0 | .0125 | 1.249 | ----- | .079 |
| .10 | 0 | 0 | -.196 | 0 | ----- | 2.91 | 5.87 | 1.01 | ------ | ------ | .199 | .403 | .069 |
| .10 | .63 | .007 | -.206 | .93 | .162 | 2.75 | ---- | 1.01 | .4988 | .0349 | .189 | ----- | .069 |
| .10 | 1.06 | .014 | -.197 | 1.55 | .117 | 3.03 | 5.66 | 1.03 | .1797 | .0252 | .208 | .388 | .071 |
| .10 | 1.43 | .019 | -.197 | 2.17 | .081 | 3.12 | ---- | 1.07 | .0917 | .0174 | .214 | ----- | .073 |
| .10 | 2.11 | .035 | -.194 | 3.10 | .073 | 3.34 | 5.98 | 1.07 | .0449 | .0157 | .229 | .410 | .073 |
| .10 | 2.53 | .052 | -.154 | 3.72 | .075 | 4.30 | ---- | 1.00 | .0312 | .0162 | .294 | ----- | .068 |
| .10 | 3.17 | .075 | -.129 | 4.65 | .070 | 4.91 | 6.23 | .95 | .0200 | .0150 | .337 | .427 | .065 |
| .10 | 3.59 | .107 | 0 | 5.26 | .077 | 7.29 | ---- | .84 | .0155 | .0166 | .500 | ----- | .058 |
| .10 | 4.22 | .153 | .129 | 6.19 | .080 | 9.30 | ---- | .75 | .0112 | .0172 | .638 | ----- | .051 |
| .10 | 4.64 | .193 | .216 | 6.81 | .083 | 10.26 | ---- | .71 | .0093 | .0179 | .703 | ----- | .049 |
| .10 | 5.28 | .254 | .414 | 7.74 | .085 | 11.46 | ---- | .63 | .0072 | .0183 | .786 | ----- | .045 |

TABLE VII - Continued

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| τ = 16° - Concluded | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.320 | 0 | ----- | 2.94 | 5.73 | 0.53 | ------ | ------ | 0.254 | 0.494 | 0.046 |
| .20 | .63 | .009 | -.326 | .83 | 0.131 | 2.92 | ---- | .53 | 0.9975 | 0.0449 | .252 | ----- | .046 |
| .20 | 1.06 | .025 | -.321 | 1.38 | .131 | 3.02 | 5.60 | .60 | .3594 | .0449 | .261 | .484 | .052 |
| .20 | 1.48 | .033 | -.306 | 1.93 | .088 | 3.18 | ---- | .62 | .1833 | .0302 | .275 | ----- | .053 |
| .20 | 2.11 | .054 | -.237 | 2.76 | .071 | 3.83 | 5.73 | .56 | .0898 | .0243 | .331 | .494 | .049 |
| .20 | 2.53 | .076 | -.186 | 3.31 | .069 | 4.30 | ---- | .54 | .0624 | .0237 | .371 | ----- | .047 |
| .20 | 3.17 | .120 | -.086 | 4.14 | .070 | 5.13 | 5.97 | .49 | .0399 | .0240 | .443 | .516 | .042 |
| .20 | 3.59 | .155 | 0 | 4.69 | .071 | 5.79 | ---- | .47 | .0311 | .0241 | .500 | ----- | .041 |
| .20 | 4.22 | .207 | .150 | 5.52 | .068 | 7.02 | ---- | .42 | .0225 | .0232 | .606 | ----- | .036 |
| .20 | 4.64 | .247 | .302 | 6.07 | .067 | 7.78 | ---- | .39 | .0186 | .0229 | .672 | ----- | .033 |
| .20 | 5.28 | .306 | .547 | 6.90 | .064 | 9.17 | ---- | .38 | .0144 | .0220 | .792 | ----- | .033 |
| .30 | 0 | 0 | -.387 | 0 | ----- | 3.04 | 5.82 | .26 | ------ | ------ | .301 | .575 | .026 |
| .30 | .63 | .012 | -.394 | .77 | .134 | 3.04 | ---- | .28 | 1.4963 | .0599 | .301 | ----- | .027 |
| .30 | 1.06 | .036 | -.403 | 1.29 | .144 | 3.04 | 5.64 | .34 | .5391 | .0647 | .301 | .558 | .033 |
| .30 | 1.48 | .048 | -.373 | 1.80 | .098 | 3.22 | ---- | .35 | .2750 | .0440 | .318 | ----- | .035 |
| .30 | 2.11 | .071 | -.265 | 2.58 | .071 | 3.65 | 5.79 | .31 | .1348 | .0329 | .362 | .572 | .031 |
| .30 | 2.53 | .098 | -.210 | 3.09 | .068 | 4.05 | ---- | .27 | .0936 | .0306 | .400 | ----- | .027 |
| .30 | 3.17 | .197 | -.076 | 3.87 | .088 | 4.71 | 5.97 | .26 | .0599 | .0393 | .466 | .590 | .026 |
| .30 | 3.59 | .193 | .104 | 4.38 | .067 | 5.50 | ---- | .26 | .0466 | .0300 | .544 | ----- | .025 |
| .30 | 4.22 | .243 | .222 | 5.16 | .061 | 5.98 | ---- | .24 | .0337 | .0273 | .591 | ----- | .023 |
| .30 | 4.64 | .284 | .322 | 5.67 | .059 | 6.36 | ---- | .22 | .0278 | .0264 | .629 | ----- | .022 |
| .30 | 5.28 | .343 | .587 | 6.45 | .055 | 7.35 | ---- | .21 | .0216 | .0247 | .727 | ----- | .021 |
| .40 | 0 | 0 | -.414 | 0 | ----- | 3.13 | 5.76 | .07 | ------ | ------ | .341 | .627 | .008 |
| .40 | .63 | .014 | -.425 | .74 | .129 | 3.12 | ---- | .09 | 1.9950 | .0698 | .339 | ----- | .010 |
| .40 | 1.06 | .047 | -.436 | 1.23 | .156 | 3.12 | 5.58 | .15 | .7188 | .0845 | .339 | .607 | .017 |
| .40 | 1.48 | .060 | -.403 | 1.72 | .101 | 3.24 | ---- | .17 | .3666 | .0550 | .352 | ----- | .019 |
| .40 | 2.11 | .087 | -.281 | 2.46 | .072 | 3.66 | 5.65 | .13 | .1797 | .0391 | .398 | .615 | .014 |
| .40 | 2.53 | .128 | -.196 | 2.96 | .068 | 3.95 | ---- | .11 | .1248 | .0368 | .430 | ----- | .012 |
| .40 | 3.17 | .179 | -.046 | 3.70 | .066 | 4.46 | 5.74 | .11 | .0799 | .0357 | .485 | .625 | .012 |
| .40 | 3.59 | .223 | .077 | 4.19 | .064 | 4.83 | ---- | .10 | .0622 | .0347 | .525 | ----- | .011 |
| .40 | 4.22 | .289 | .322 | 4.93 | .060 | 5.53 | ---- | .09 | .0449 | .0325 | .602 | ----- | .010 |
| .40 | 4.64 | .329 | .496 | 5.42 | .056 | 6.02 | ---- | .07 | .0371 | .0305 | .655 | ----- | .008 |
| .40 | 5.28 | .394 | .749 | 6.16 | .052 | 6.66 | ---- | .09 | .0288 | .0283 | .725 | ----- | .010 |
| .50 | 0 | 0 | -.411 | 0 | ----- | 3.18 | 5.72 | -.07 | ------ | ------ | .373 | .671 | -.009 |
| .50 | .63 | .018 | -.425 | .71 | .143 | 3.17 | ---- | -.04 | 2.4938 | .0898 | .371 | ----- | -.005 |
| .50 | 1.06 | .061 | -.441 | 1.18 | .174 | 3.15 | 5.69 | .02 | .8985 | .1096 | .369 | .667 | .002 |
| .50 | 1.48 | .076 | -.399 | 1.66 | .111 | 3.25 | ---- | .03 | .4583 | .0697 | .381 | ----- | .004 |
| .50 | 2.11 | .109 | -.357 | 2.37 | .078 | 3.38 | 5.77 | 0 | .2246 | .0490 | .396 | .676 | 0 |
| .50 | 2.53 | .143 | -.163 | 2.84 | .071 | 3.86 | ---- | 0 | .1560 | .0446 | .453 | ----- | 0 |
| .50 | 3.17 | .210 | .007 | 3.55 | .067 | 4.28 | 5.72 | -.01 | .0999 | .0419 | .502 | .671 | -.001 |
| .50 | 3.59 | .264 | .149 | 4.03 | .065 | 4.61 | ---- | -.01 | .0777 | .0410 | .540 | ----- | -.001 |
| .50 | 4.22 | .345 | .434 | 4.74 | .061 | 5.22 | ---- | -.02 | .0562 | .0387 | .612 | ----- | -.002 |
| τ = 20° | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | ---- | ----- | ---- | ---- | ---- | ------ | ------ | ------ | .122 | .166 |
| 0 | .63 | .001 | -.009 | ---- | ----- | ---- | ---- | ---- | 0 | .0050 | -2.562 | ----- | .168 |
| 0 | 1.06 | .002 | -.009 | ---- | ----- | ---- | ---- | ---- | 0 | .0036 | -1.468 | .099 | .168 |
| 0 | 1.48 | .003 | -.010 | ---- | ----- | ---- | ---- | ---- | 0 | .0027 | -1.014 | ----- | .169 |
| 0 | 2.11 | .005 | -.010 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | -.336 | .088 | .170 |
| 0 | 2.53 | .007 | -.010 | ---- | ----- | ---- | ---- | ---- | 0 | .0022 | -.123 | ----- | .170 |
| 0 | 3.17 | .008 | -.010 | ---- | ----- | ---- | ---- | ---- | 0 | .0016 | -.030 | .072 | .170 |
| 0 | 3.59 | .009 | -.013 | ---- | ----- | ---- | ---- | ---- | 0 | .0014 | -.123 | ----- | .172 |
| 0 | 4.22 | .006 | -.012 | ---- | ----- | ---- | ---- | ---- | 0 | .0007 | -.387 | ----- | .178 |
| 0 | 4.64 | .054 | -.010 | ---- | ----- | ---- | ---- | ---- | 0 | .0050 | .419 | ----- | .119 |
| 0 | 5.28 | .099 | .021 | ---- | ----- | ---- | ---- | ---- | 0 | .0071 | .595 | ----- | .106 |

TABLE VII - Concluded

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF

FINENESS RATIO 12 WITHOUT CHINE STRIPS

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 20° - Concluded | | | | | | | | | | | | | |
| 0.10 | 0 | 0 | -0.190 | 0 | ------ | 2.91 | 5.49 | 1.23 | ------ | ------ | 0.199 | 0.376 | 0.085 |
| .10 | .63 | .012 | -.206 | .93 | 0.278 | 2.75 | ---- | 1.27 | 0.4988 | 0.0599 | .189 | ----- | .087 |
| .10 | 1.06 | .024 | -.201 | 1.55 | .200 | 3.06 | 5.25 | 1.34 | .1797 | .0431 | .210 | .360 | .092 |
| .10 | 1.48 | .026 | -.185 | 2.17 | .111 | 3.43 | ---- | 1.31 | .0917 | .0238 | .235 | ----- | .090 |
| .10 | 2.11 | .049 | -.165 | 3.10 | .102 | 4.05 | 5.56 | 1.25 | .0449 | .0220 | .278 | .381 | .086 |
| .10 | 2.53 | .066 | -.147 | 3.72 | .096 | 4.57 | ---- | 1.21 | .0312 | .0206 | .314 | ----- | .083 |
| .10 | 3.17 | .101 | -.090 | 4.65 | .094 | 5.79 | 5.67 | 1.18 | .0200 | .0202 | .396 | .388 | .081 |
| .10 | 3.59 | .129 | -.050 | 5.26 | .093 | 6.52 | ---- | 1.14 | .0155 | .0201 | .447 | ----- | .078 |
| .10 | 4.22 | .179 | .032 | 6.19 | .093 | 7.76 | ---- | 1.07 | .0112 | .0201 | .532 | ----- | .074 |
| .10 | 4.64 | .200 | .088 | 6.81 | .086 | 8.47 | ---- | 1.05 | .0093 | .0186 | .581 | ----- | .072 |
| .10 | 5.28 | .249 | .209 | 7.74 | .083 | 9.55 | ---- | 1.04 | .0072 | .0179 | .655 | ----- | .071 |
| .20 | 0 | 0 | -.303 | 0 | ------ | 3.05 | 5.42 | .64 | ------ | ------ | .263 | .468 | .055 |
| .20 | .63 | .015 | -.326 | .83 | .219 | 2.90 | ---- | .68 | .9975 | .0748 | .250 | ----- | .059 |
| .20 | 1.06 | .033 | -.330 | 1.38 | .173 | 2.96 | 5.28 | .74 | .3594 | .0593 | .256 | .456 | .064 |
| .20 | 1.48 | .042 | -.300 | 1.93 | .113 | 3.24 | ---- | .73 | .1833 | .0385 | .280 | ----- | .062 |
| .20 | 2.11 | .071 | -.241 | 2.76 | .093 | 3.80 | 5.38 | .68 | .0898 | .0319 | .328 | .464 | .059 |
| .20 | 2.53 | .099 | -.210 | 3.31 | .090 | 4.17 | ---- | .67 | .0624 | .0309 | .360 | ----- | .058 |
| .20 | 3.17 | .150 | -.113 | 4.14 | .087 | 4.98 | 5.52 | .63 | .0399 | .0299 | .430 | .477 | .054 |
| .20 | 3.59 | .183 | -.040 | 4.69 | .083 | 5.52 | ---- | .63 | .0311 | .0284 | .477 | ----- | .054 |
| .20 | 4.22 | .226 | .068 | 5.52 | .074 | 6.23 | ---- | .61 | .0225 | .0254 | .538 | ----- | .052 |
| .20 | 4.64 | .268 | .180 | 6.07 | .073 | 6.89 | ---- | .61 | .0186 | .0249 | .595 | ----- | .052 |
| .20 | 5.28 | .322 | .322 | 6.90 | .068 | 7.65 | ---- | .62 | .0144 | .0231 | .661 | ----- | .053 |
| .30 | 0 | 0 | -.383 | 0 | ------ | 3.02 | 5.43 | .31 | ------ | ------ | .299 | .537 | .031 |
| .30 | .63 | .021 | -.403 | .77 | .234 | 2.97 | ---- | .36 | 1.4963 | .1047 | .294 | ----- | .035 |
| .30 | 1.06 | .049 | -.414 | 1.29 | .197 | 2.97 | 5.32 | .41 | .5391 | .0881 | .294 | .526 | .041 |
| .30 | 1.48 | .059 | -.377 | 1.80 | .121 | 3.20 | ---- | .40 | .2750 | .0541 | .316 | ----- | .040 |
| .30 | 2.11 | .094 | -.300 | 2.58 | .094 | 3.62 | 5.36 | .37 | .1348 | .0422 | .358 | .530 | .037 |
| .30 | 2.53 | .132 | -.243 | 3.09 | .092 | 3.95 | ---- | .37 | .0936 | .0412 | .390 | ----- | .036 |
| .30 | 3.17 | .188 | -.143 | 3.87 | .084 | 4.44 | 5.47 | .37 | .0599 | .0375 | .439 | .540 | .037 |
| .30 | 3.59 | .220 | -.040 | 4.38 | .076 | 4.89 | ---- | .37 | .0466 | .0342 | .483 | ----- | .037 |
| .30 | 4.22 | .254 | .082 | 5.16 | .064 | 5.38 | ---- | .41 | .0337 | .0285 | .532 | ----- | .041 |
| .30 | 4.64 | .291 | .189 | 5.67 | .060 | 5.81 | ---- | .41 | .0278 | .0270 | .574 | ----- | .041 |
| .30 | 5.28 | .338 | .348 | 6.45 | .054 | 6.36 | ---- | .45 | .0216 | .0243 | .629 | ----- | .044 |
| .40 | 0 | 0 | -.436 | 0 | ------ | 3.01 | 5.27 | .09 | ------ | ------ | .328 | .574 | .010 |
| .40 | .63 | .028 | -.445 | .74 | .257 | 3.01 | ---- | .15 | 1.9950 | .1397 | .328 | ----- | .016 |
| .40 | 1.06 | .065 | -.455 | 1.23 | .215 | 3.04 | 5.34 | .21 | .7188 | .1168 | .331 | .581 | .022 |
| .40 | 1.48 | .075 | -.403 | 1.72 | .127 | 3.22 | ---- | .21 | .3666 | .0687 | .350 | ----- | .022 |
| .40 | 2.11 | .113 | -.310 | 2.46 | .094 | 3.58 | 5.39 | .21 | .1797 | .0508 | .390 | .586 | .022 |
| .40 | 2.53 | .157 | -.253 | 2.96 | .090 | 3.80 | ---- | .21 | .1248 | .0490 | .413 | ----- | .022 |
| .40 | 3.17 | .226 | -.138 | 3.70 | .083 | 4.19 | 5.35 | .21 | .0799 | .0451 | .456 | .583 | .022 |
| .40 | 3.59 | .263 | -.028 | 4.19 | .076 | 4.52 | ---- | .21 | .0622 | .0409 | .492 | ----- | .023 |
| .40 | 4.22 | .315 | .149 | 4.93 | .065 | 4.03 | ---- | .23 | .0449 | .0354 | .547 | ----- | .025 |
| .40 | 4.64 | .343 | .261 | 5.42 | .059 | 5.31 | ---- | .25 | .0371 | .0318 | .578 | ----- | .027 |
| .40 | 5.28 | .395 | .454 | 6.16 | .052 | 5.80 | ---- | .31 | .0288 | .0284 | .631 | ----- | .034 |
| .50 | 0 | 0 | -.403 | 0 | ------ | 3.18 | 5.36 | -.10 | ------ | ------ | .373 | .629 | -.012 |
| .50 | .63 | .028 | -.430 | .71 | .222 | 3.13 | ---- | -.03 | 2.4935 | .1397 | .367 | ----- | -.003 |
| .50 | 1.06 | .078 | -.450 | 1.18 | .223 | 3.13 | 5.39 | .04 | .8985 | .1402 | .367 | .632 | .005 |
| .50 | 1.48 | .089 | -.394 | 1.66 | .130 | 3.27 | ---- | .03 | .4583 | .0816 | .383 | ----- | .004 |
| .50 | 2.11 | .134 | -.284 | 2.37 | .096 | 3.57 | 5.39 | .03 | .2246 | .0602 | .419 | .632 | .004 |
| .50 | 2.53 | .179 | -.216 | 2.84 | .089 | 3.76 | ---- | .04 | .1560 | .0558 | .441 | ----- | .005 |
| .50 | 3.17 | .266 | -.070 | 3.55 | .084 | 4.10 | 5.27 | .05 | .0999 | .0531 | .481 | .618 | .006 |
| .50 | 3.59 | .320 | .027 | 4.03 | .077 | 4.32 | ---- | .05 | .0777 | .0482 | .506 | ----- | .006 |
| .50 | 4.22 | .367 | .241 | 4.74 | .065 | 4.77 | ---- | .10 | .0562 | .0412 | .559 | ----- | .012 |

TABLE VIII

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF FINENESS

RATIO 6 WITH CHINE STRIPS BUT WITHOUT TAIL CONE

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau$ = 8° | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.105 | 0 | ----- | 2.04 | 4.96 | 0.28 | ------ | ------ | 0.313 | 0.748 | 0.042 |
| .20 | .63 | .004 | -.089 | .83 | 0.058 | 2.22 | ---- | .23 | 0.9975 | 0.0200 | .335 | ----- | .035 |
| .20 | 1.06 | .019 | -.036 | 1.38 | .099 | 2.69 | 5.18 | .23 | .3594 | .0341 | .406 | .781 | .035 |
| .20 | 1.48 | .025 | -.015 | 1.93 | .067 | 2.86 | ---- | .26 | .1833 | .0229 | .432 | ----- | .039 |
| .20 | 2.11 | .045 | .055 | 2.76 | .058 | 3.44 | 5.13 | .23 | .0898 | .0202 | .520 | .774 | .035 |
| .20 | 2.53 | .063 | .147 | 3.31 | .058 | 4.21 | ---- | .20 | .0624 | .0197 | .635 | ----- | .031 |
| .20 | 3.17 | .071 | .209 | 4.14 | .041 | 4.70 | 4.96 | .27 | .0399 | .0142 | .709 | .748 | .040 |
| .20 | 3.59 | .075 | .200 | 4.69 | .035 | 4.62 | ---- | .34 | .0311 | .0116 | .698 | ----- | .051 |
| .20 | 4.22 | .081 | .200 | 5.52 | .026 | 4.62 | 4.32 | .40 | .0225 | .0091 | .698 | .651 | .060 |
| .20 | 4.64 | .086 | .200 | 6.07 | .023 | 4.60 | ---- | .43 | .0186 | .0080 | .695 | ----- | .065 |
| .20 | 5.28 | .094 | .200 | 6.90 | .020 | 4.60 | 3.90 | .46 | .0144 | .0068 | .695 | .589 | .070 |
| .20 | 6.33 | .113 | .214 | 8.28 | .018 | 4.70 | 3.66 | .49 | .0100 | .0057 | .709 | .552 | .074 |
| .20 | 7.39 | .139 | .243 | 9.66 | .015 | 4.90 | 3.51 | .52 | .0073 | .0051 | .739 | .529 | .079 |
| .20 | 8.44 | .167 | .279 | 11.04 | .015 | 5.14 | 3.44 | .53 | .0056 | .0047 | .776 | .518 | .080 |
| .20 | 9.50 | .199 | .339 | 12.42 | .012 | 5.56 | 3.41 | .53 | .0044 | .0044 | .839 | .515 | .080 |
| .20 | 10.55 | .233 | .474 | 13.80 | .012 | 6.51 | 3.41 | .54 | .0036 | .0042 | .983 | .515 | .082 |
| .20 | 11.61 | .275 | .454 | 15.18 | .012 | 6.27 | 3.36 | .55 | .0030 | .0041 | .946 | .507 | .083 |
| .20 | 12.66 | .320 | .504 | 16.56 | .012 | 6.54 | 3.26 | .54 | .0025 | .0038 | .987 | .493 | .082 |
| .20 | 13.72 | .367 | .590 | 17.94 | .012 | 7.03 | 3.36 | .56 | .0021 | .0040 | 1.061 | .507 | .085 |
| .40 | 0 | 0 | -.132 | 0 | ----- | 1.92 | 4.55 | .05 | ------ | ------ | .365 | .866 | .010 |
| .40 | .63 | .005 | -.105 | .74 | .046 | 2.01 | ---- | .02 | 1.9950 | .0249 | .383 | ----- | .004 |
| .40 | 1.06 | .039 | -.015 | 1.23 | .129 | 2.31 | 4.75 | .01 | .7188 | .0701 | .439 | .903 | .002 |
| .40 | 1.48 | .052 | .011 | 1.72 | .088 | 2.40 | ---- | .04 | .3666 | .0477 | .457 | ----- | .007 |
| .40 | 2.11 | .077 | .095 | 2.46 | .064 | 2.68 | 4.71 | .02 | .1797 | .0346 | .509 | .896 | .004 |
| .40 | 2.53 | .110 | .244 | 2.96 | .063 | 3.16 | ---- | -.03 | .1248 | .0343 | .602 | ----- | .006 |
| .40 | 3.17 | .181 | .521 | 3.70 | .052 | 4.04 | 4.93 | -.09 | .0799 | .0362 | .769 | .937 | .017 |
| .40 | 3.59 | .183 | .564 | 4.19 | .052 | 4.18 | ---- | -.02 | .0622 | .0284 | .795 | ----- | .004 |
| .40 | 4.22 | .162 | .515 | 4.93 | .033 | 4.04 | 4.17 | .15 | .0449 | .0181 | .769 | .792 | .028 |
| .40 | 4.64 | .154 | .479 | 5.42 | .026 | 3.92 | ---- | .20 | .0371 | .0143 | .746 | ----- | .038 |
| .40 | 5.28 | .156 | .424 | 6.16 | .020 | 3.75 | 3.58 | .28 | .0288 | .0112 | .713 | .681 | .053 |
| .40 | 6.33 | .168 | .394 | 7.39 | .015 | 3.63 | 3.29 | .34 | .0200 | .0084 | .691 | .626 | .064 |
| .40 | 7.39 | .183 | .379 | 8.62 | .012 | 3.59 | 3.12 | .37 | .0147 | .0068 | .683 | .592 | .070 |
| .40 | 8.44 | .212 | .389 | 9.85 | .011 | 3.61 | 2.94 | .40 | .0112 | .0059 | .687 | .559 | .075 |

TABLE IX

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF FINENESS

RATIO 9 WITH CHINE STRIPS BUT WITHOUT TAIL CONE

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.196 | 0 | ----- | 2.11 | 5.54 | 0.28 | ------ | ------ | 0.248 | 0.650 | 0.032 |
| .20 | .63 | .004 | -.174 | .83 | 0.058 | 2.23 | ---- | .24 | 0.9975 | 0.0200 | .262 | ----- | .029 |
| .20 | 1.06 | .017 | -.134 | 1.38 | .089 | 2.58 | 5.67 | .24 | .3594 | .0305 | .303 | .666 | .029 |
| .20 | 1.48 | .023 | -.107 | 1.93 | .062 | 2.82 | ---- | .27 | .1833 | .0211 | .331 | ----- | .031 |
| .20 | 2.11 | .034 | -.063 | 2.76 | .045 | 3.19 | 5.47 | .27 | .0898 | .0153 | .375 | .643 | .031 |
| .20 | 2.53 | .042 | 0 | 3.31 | .038 | 3.73 | ---- | .24 | .0624 | .0131 | .438 | ----- | .029 |
| .20 | 3.17 | .050 | .055 | 4.14 | .029 | 4.20 | 5.18 | .29 | .0399 | .0100 | .493 | .608 | .034 |
| .20 | 3.59 | .056 | .067 | 4.69 | .025 | 4.29 | ---- | .34 | .0311 | .0087 | .504 | ----- | .040 |
| .20 | 4.22 | .064 | .056 | 5.52 | .021 | 4.20 | 4.51 | .40 | .0225 | .0072 | .493 | .531 | .047 |
| .20 | 4.64 | .067 | .047 | 6.07 | .018 | 4.21 | ---- | .43 | .0186 | .0062 | .494 | ----- | .050 |
| .20 | 5.28 | .072 | .037 | 6.90 | .015 | 4.03 | 4.07 | .46 | .0144 | .0052 | .473 | .479 | .054 |
| .20 | 6.33 | .084 | .007 | 8.28 | .012 | 3.73 | 3.73 | .51 | .0100 | .0042 | .438 | .438 | .060 |
| .20 | 7.39 | .095 | 0 | 9.66 | .010 | 3.73 | 3.51 | .53 | .0073 | .0035 | .438 | .412 | .062 |
| .20 | 8.44 | .112 | -.013 | 11.04 | .009 | 3.64 | 3.36 | .55 | .0056 | .0031 | .427 | .395 | .065 |
| .20 | 9.50 | .134 | -.012 | 12.42 | .009 | 3.64 | 3.23 | .56 | .0044 | .0029 | .427 | .380 | .066 |
| .20 | 10.55 | .155 | -.017 | 13.80 | .008 | 3.61 | 3.19 | .57 | .0036 | .0028 | .424 | .375 | .067 |
| .20 | 11.61 | .179 | -.007 | 15.18 | .008 | 3.68 | 3.07 | .58 | .0030 | .0026 | .432 | .360 | .068 |
| .20 | 12.66 | .203 | -.007 | 16.56 | .007 | 3.68 | 3.02 | .58 | .0025 | .0025 | .432 | .355 | .068 |
| .20 | 13.72 | .224 | -.007 | 17.94 | .007 | 3.68 | 2.97 | .58 | .0021 | .0024 | .432 | .349 | .068 |
| .40 | 0 | 0 | -.253 | 0 | ----- | 2.10 | 5.31 | .04 | ------ | ------ | .311 | .786 | .007 |
| .40 | .63 | .009 | -.231 | .74 | .083 | 2.11 | ---- | .03 | 1.9950 | .0449 | .323 | ----- | .004 |
| .40 | 1.06 | .034 | -.170 | 1.23 | .113 | 2.39 | 5.37 | .03 | .7188 | .0611 | .354 | .796 | .004 |
| .40 | 1.48 | .043 | -.139 | 1.72 | .073 | 2.49 | ---- | .06 | .3666 | .0394 | .369 | ----- | .009 |
| .40 | 2.11 | .060 | -.064 | 2.46 | .050 | 2.74 | 5.24 | .06 | .1797 | .0270 | .406 | .776 | .009 |
| .40 | 2.53 | .079 | .050 | 2.96 | .045 | 3.14 | ---- | .04 | .1248 | .0246 | .464 | ----- | .005 |
| .40 | 3.17 | .103 | .251 | 3.70 | .038 | 3.80 | 5.24 | .03 | .0799 | .0206 | .562 | .776 | .004 |
| .40 | 3.59 | .111 | .311 | 4.19 | .032 | 3.99 | ---- | .08 | .0622 | .0172 | .591 | ----- | .011 |
| .40 | 4.22 | .122 | .311 | 4.93 | .025 | 3.97 | 4.56 | .17 | .0449 | .0137 | .588 | .675 | .025 |
| .40 | 4.64 | .118 | .275 | 5.42 | .020 | 3.86 | ---- | .22 | .0371 | .0110 | .571 | ----- | .032 |
| .40 | 5.28 | .122 | .228 | 6.16 | .016 | 3.70 | 3.95 | .27 | .0258 | .0088 | .548 | .585 | .040 |
| .40 | 6.33 | .135 | .153 | 7.39 | .012 | 3.47 | 3.53 | .34 | .0200 | .0067 | .513 | .523 | .051 |
| .40 | 7.39 | .144 | .097 | 8.62 | .010 | 3.27 | 3.26 | .39 | .0147 | .0053 | .484 | .482 | .057 |
| .40 | 8.44 | .164 | .060 | 9.85 | .009 | 3.16 | 3.08 | .42 | .0112 | .0046 | .467 | .456 | .062 |

TABLE X

EXPERIMENTAL HYDRODYNAMIC DATA FOR A BODY OF REVOLUTION OF FINENESS RATIO 12 WITH CHINE STRIPS BUT WITHOUT TAIL CONE

| $C_{\Delta_Q}$ | $C_{V_Q}$ | $C_{R_Q}$ | $C_{M_Q}$ | $C_{V_\Delta}$ | $C_{D_\Delta}$ | $\frac{x}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{l}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $\frac{h}{\left(\frac{\Delta}{w}\right)^{1/3}}$ | $C_{L_Q}$ | $C_{D_Q}$ | $\frac{x}{L}$ | $\frac{l}{L}$ | $\frac{h}{L}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\tau = 8^\circ$ | | | | | | | | | | | | | |
| 0.20 | 0 | 0 | -0.253 | 0 | ----- | 2.24 | 6.03 | 0.31 | ------ | ------ | 0.219 | 0.589 | 0.030 |
| .20 | .63 | .005 | -.242 | .83 | 0.073 | 2.31 | ---- | .30 | 0.9975 | 0.0249 | .226 | ----- | .029 |
| .20 | 1.06 | .014 | -.205 | 1.38 | .074 | 2.66 | 6.03 | .30 | .3594 | .0252 | .250 | .589 | .029 |
| .20 | 1.48 | .022 | -.189 | 1.93 | .059 | 2.80 | ---- | .29 | .1833 | .0202 | .274 | ----- | .029 |
| .20 | 2.11 | .032 | -.155 | 2.76 | .042 | 3.12 | 5.84 | .29 | .0898 | .0144 | .305 | .571 | .029 |
| .20 | 2.53 | .039 | -.111 | 3.31 | .036 | 3.49 | ---- | .30 | .0624 | .0122 | .341 | ----- | .029 |
| .20 | 3.17 | .049 | -.032 | 4.14 | .029 | 4.15 | 5.81 | .31 | .0399 | .0096 | .406 | .568 | .030 |
| .20 | 3.59 | .054 | -.014 | 4.69 | .025 | 4.31 | ---- | .35 | .0311 | .0084 | .421 | ----- | .035 |
| .20 | 4.22 | .060 | -.019 | 5.52 | .020 | 4.28 | 5.08 | .42 | .0225 | .0067 | .418 | .496 | .041 |
| .20 | 4.64 | .063 | -.031 | 6.07 | .017 | 4.15 | ---- | .46 | .0186 | .0058 | .406 | ----- | .045 |
| .20 | 5.28 | .070 | -.049 | 6.90 | .015 | 4.03 | 4.42 | .51 | .0144 | .0050 | .394 | .431 | .050 |
| .20 | 6.33 | .074 | -.088 | 8.28 | .011 | 3.69 | 3.97 | .56 | .0100 | .0037 | .361 | .385 | .055 |
| .20 | 7.39 | .081 | -.126 | 9.66 | .009 | 3.40 | 3.66 | .59 | .0073 | .0030 | .332 | .357 | .057 |
| .20 | 8.44 | .089 | -.154 | 11.04 | .007 | 3.17 | 3.41 | .62 | .0056 | .0025 | .310 | .333 | .061 |
| .20 | 9.50 | .105 | -.180 | 12.42 | .007 | 2.98 | 3.19 | .63 | .0044 | .0023 | .291 | .311 | .062 |
| .20 | 10.55 | .119 | -.204 | 13.80 | .006 | 2.80 | 3.04 | .65 | .0036 | .0021 | .274 | .297 | .064 |
| .20 | 11.61 | .134 | -.228 | 15.18 | .006 | 2.63 | 2.90 | .66 | .0030 | .0020 | .257 | .283 | .065 |
| .20 | 12.66 | .147 | -.258 | 16.56 | .005 | 2.31 | 2.72 | .66 | .0025 | .0018 | .226 | .266 | .065 |
| .20 | 13.72 | .143 | -.280 | 17.94 | .004 | 2.21 | ---- | .67 | .0021 | .0015 | .216 | ----- | .066 |
| .40 | 0 | 0 | -.322 | 0 | ----- | 2.40 | 5.93 | .05 | ------ | ------ | .296 | .731 | .006 |
| .40 | .63 | .007 | -.311 | .74 | .064 | 2.44 | ---- | .05 | 1.9950 | .0353 | .300 | ----- | .006 |
| .40 | 1.06 | .027 | -.269 | 1.23 | .090 | 2.60 | 5.92 | .05 | .7188 | .0481 | .320 | .728 | .006 |
| .40 | 1.48 | .041 | -.252 | 1.72 | .070 | 2.66 | ---- | .08 | .3666 | .0374 | .327 | ----- | .010 |
| .40 | 2.11 | .056 | -.201 | 2.46 | .046 | 2.83 | 5.68 | .08 | .1797 | .0252 | .349 | .700 | .010 |
| .40 | 2.53 | .069 | -.134 | 2.96 | .041 | 3.07 | ---- | .06 | .1248 | .0226 | .378 | ----- | .008 |
| .40 | 3.17 | .094 | .025 | 3.70 | .035 | 3.59 | 5.72 | .05 | .0799 | .0187 | .442 | .704 | .006 |
| .40 | 3.59 | .102 | .140 | 4.19 | .029 | 3.98 | ---- | .05 | .0622 | .0158 | .490 | ----- | .006 |
| .40 | 4.22 | .109 | .184 | 4.93 | .022 | 4.12 | 5.32 | .07 | .0449 | .0122 | .507 | .654 | .009 |
| .40 | 4.64 | .116 | .170 | 5.42 | .020 | 4.08 | ---- | .16 | .0371 | .0108 | .502 | ----- | .020 |
| .40 | 5.28 | .122 | .123 | 6.16 | .016 | 3.92 | 4.54 | .25 | .0288 | .0088 | .483 | .559 | .031 |
| .40 | 6.33 | .129 | .028 | 7.39 | .012 | 3.61 | 4.00 | .33 | .0200 | .0064 | .445 | .493 | .041 |
| .40 | 7.39 | .139 | -.046 | 8.62 | .009 | 3.35 | 3.60 | .38 | .0147 | .0051 | .413 | .443 | .047 |
| .40 | 8.44 | .150 | -.095 | 9.85 | .007 | 3.20 | 3.36 | .41 | .0112 | .0042 | .394 | .413 | .051 |

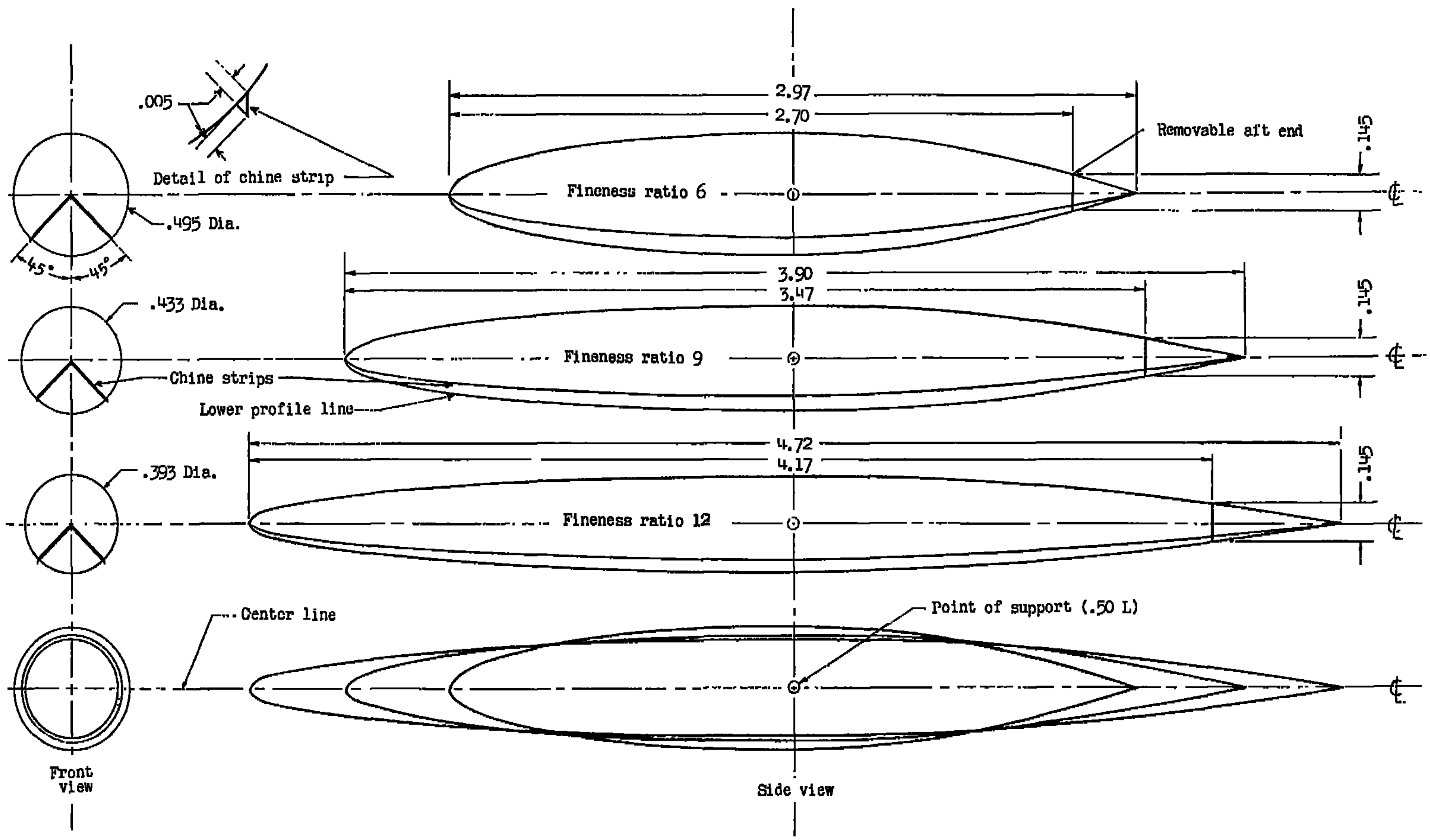
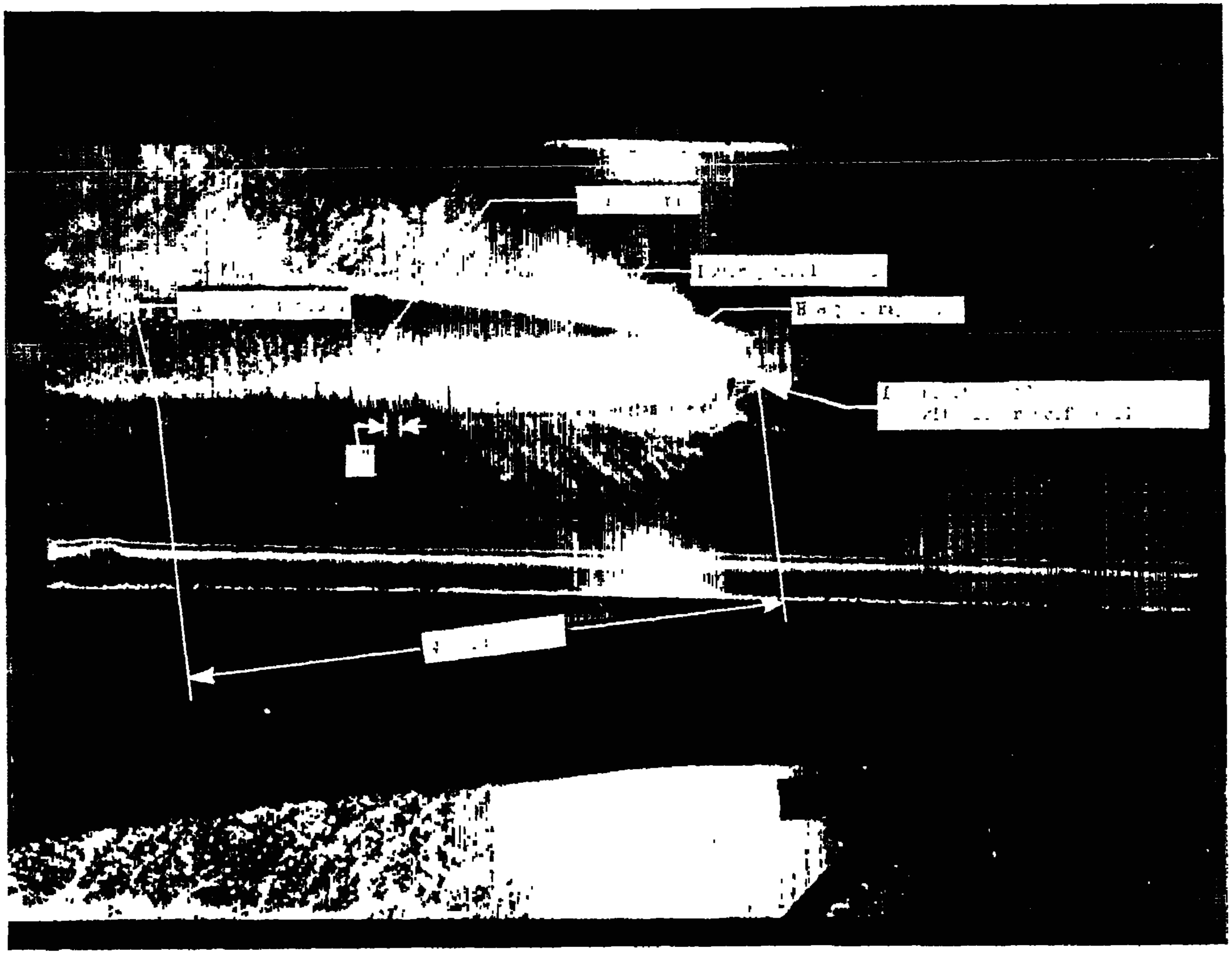



Figure 1.- Principal dimensions of models given in feet.



L-86474

Figure 2.- Underwater picture illustrating method of measuring wetted length.

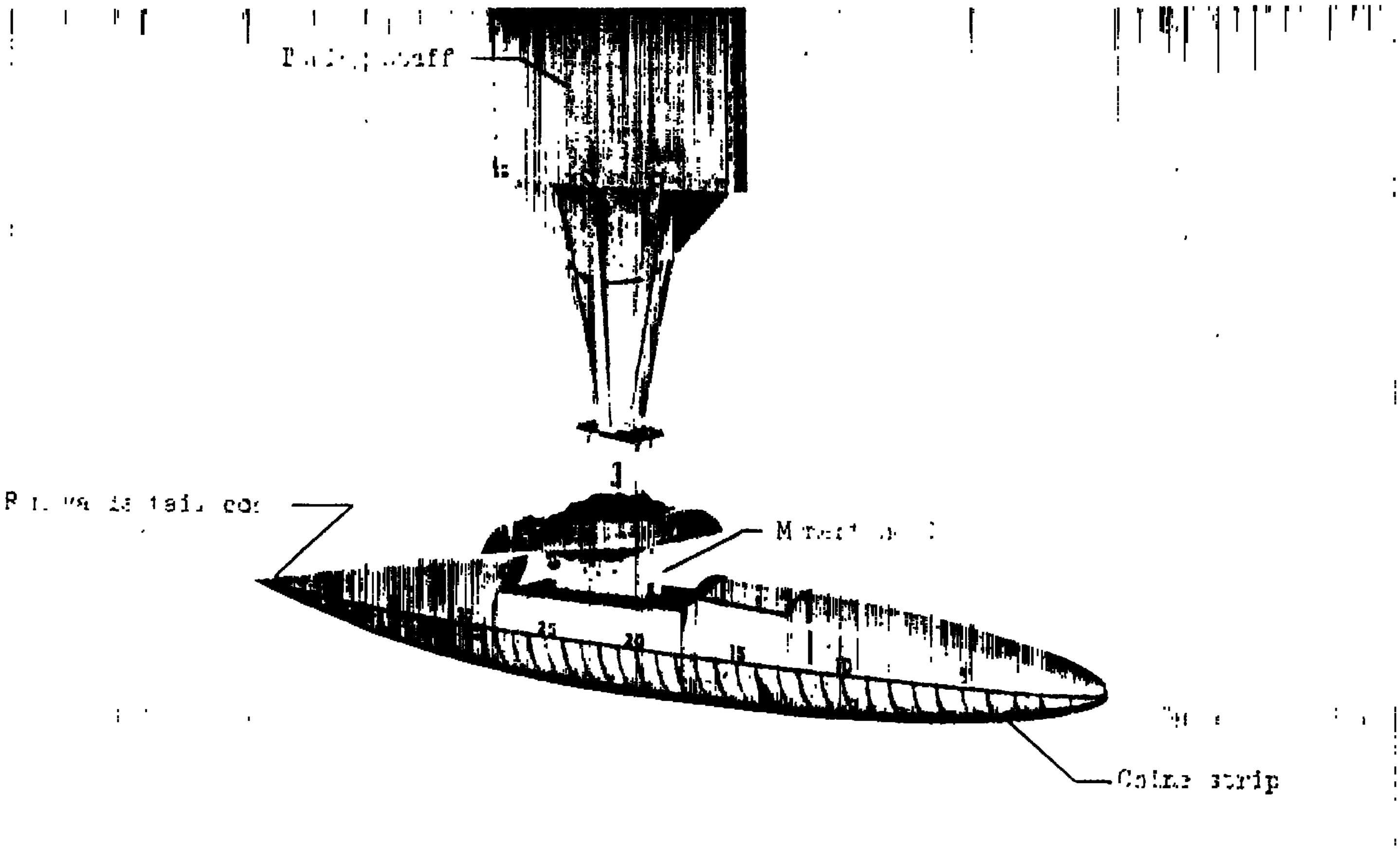


Figure 3.- Model mounted on towing staff. L-73051.1

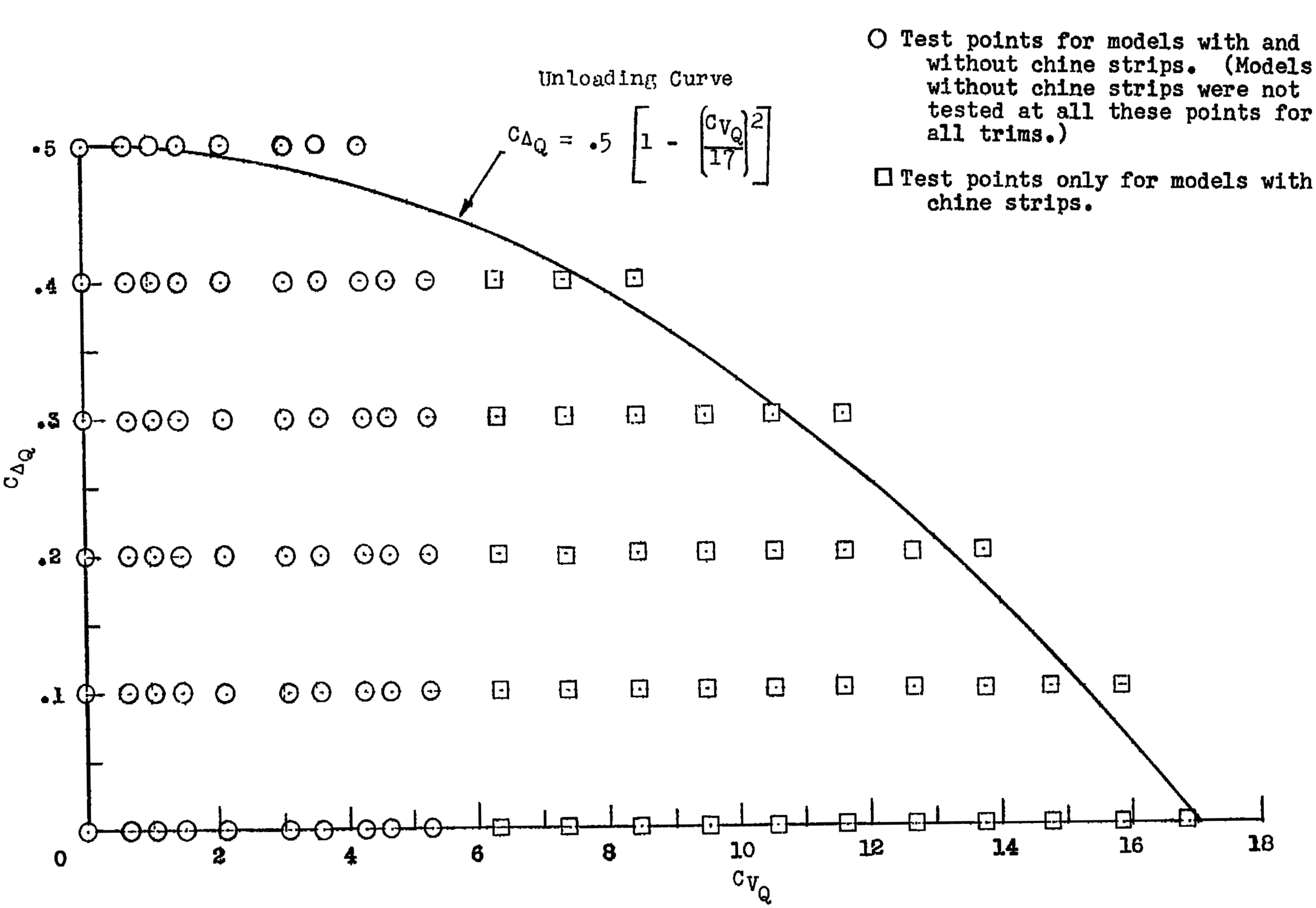
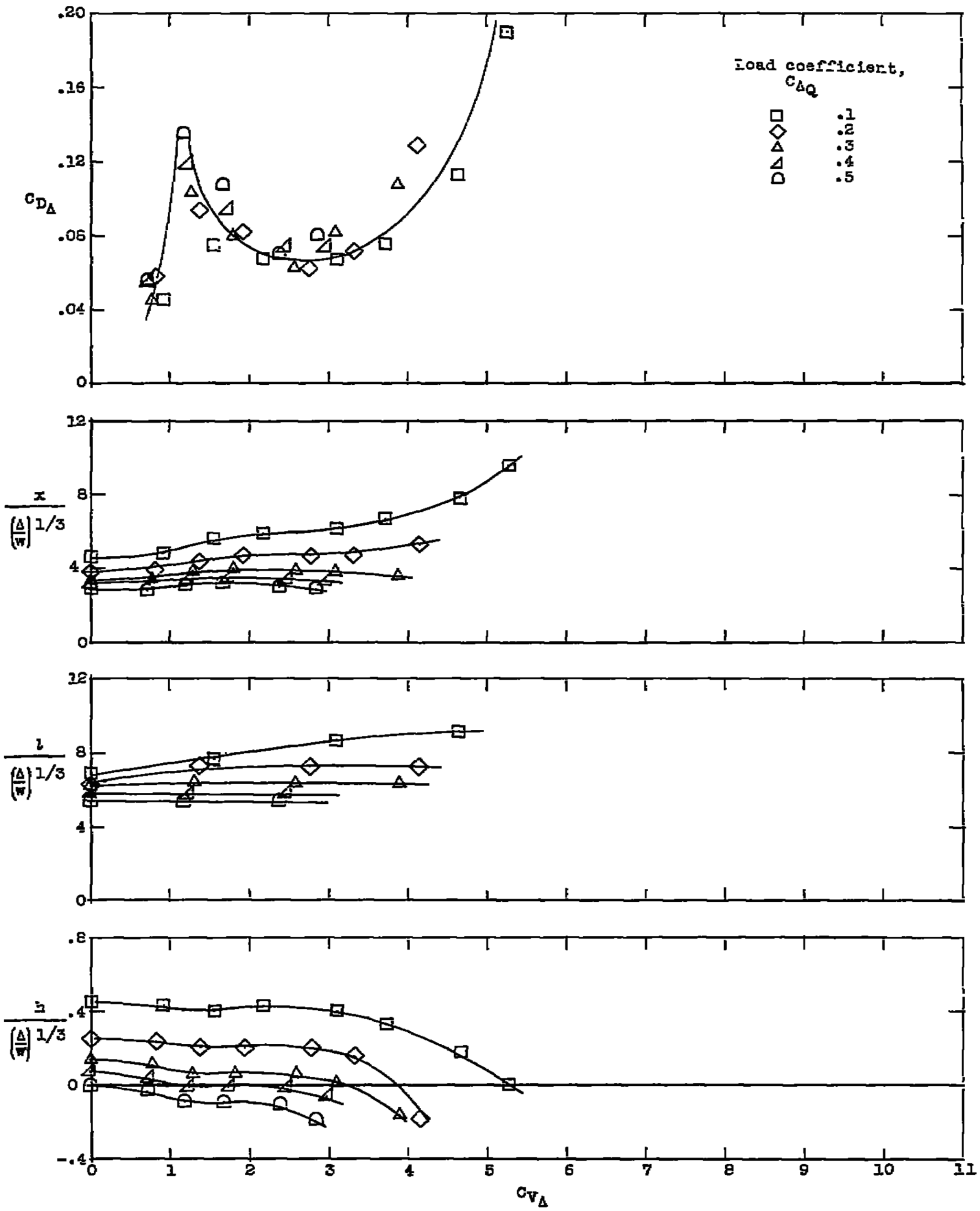
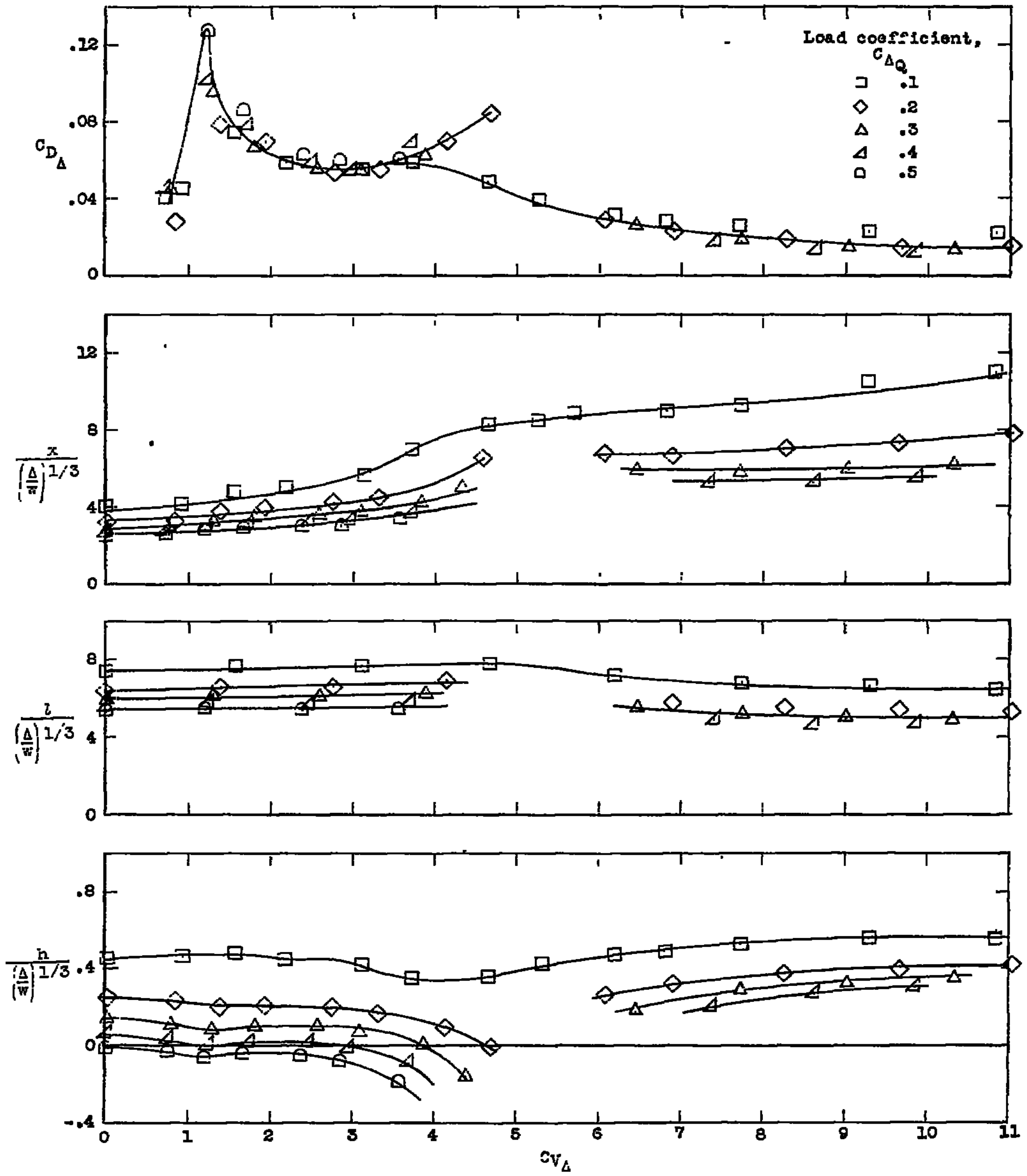



Figure 4.- Load-speed range investigated.



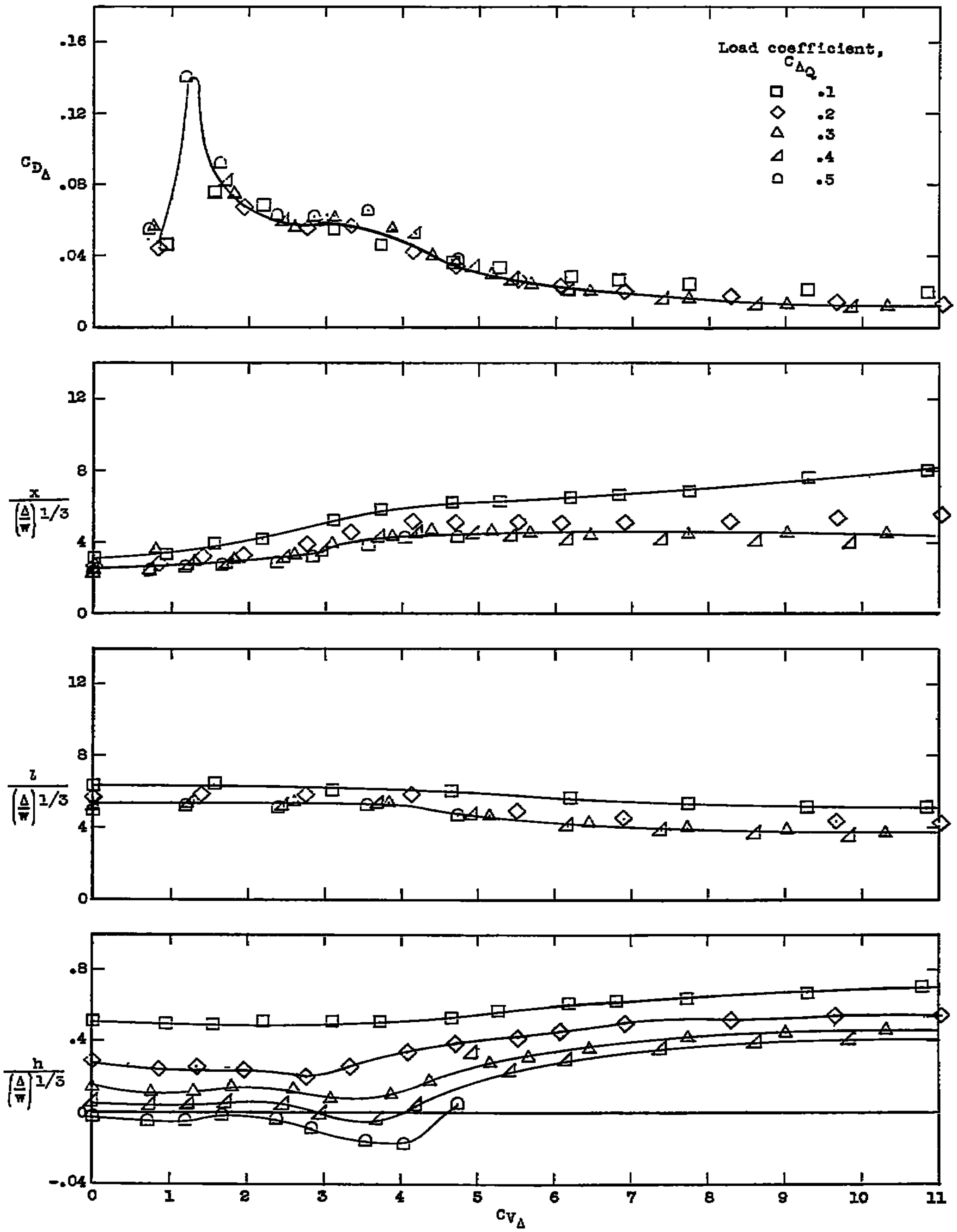

(a) Trim, 0°.

Figure 5.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 6; displacement condition.



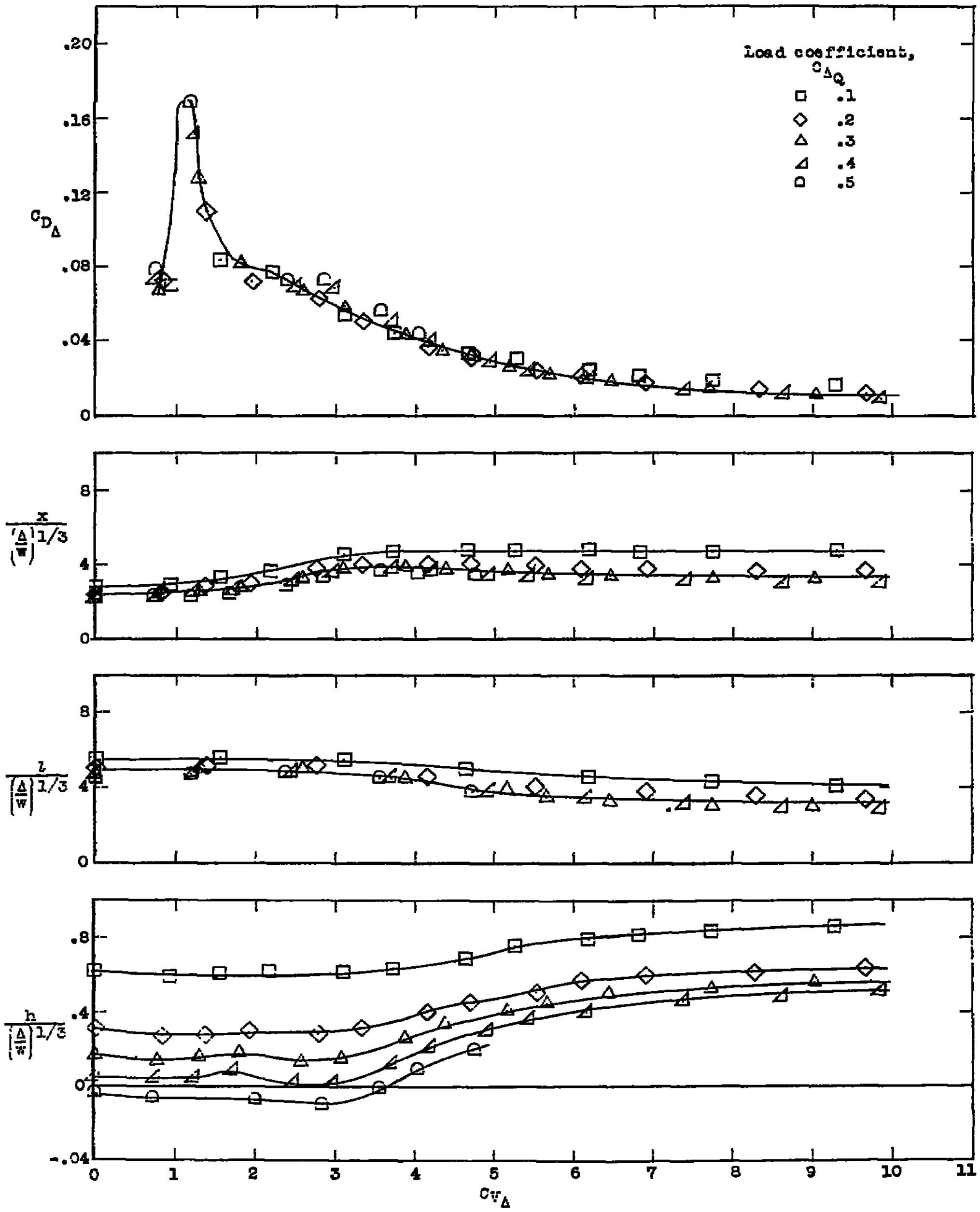

(b) Trim, 4°.

Figure 5.- Continued.



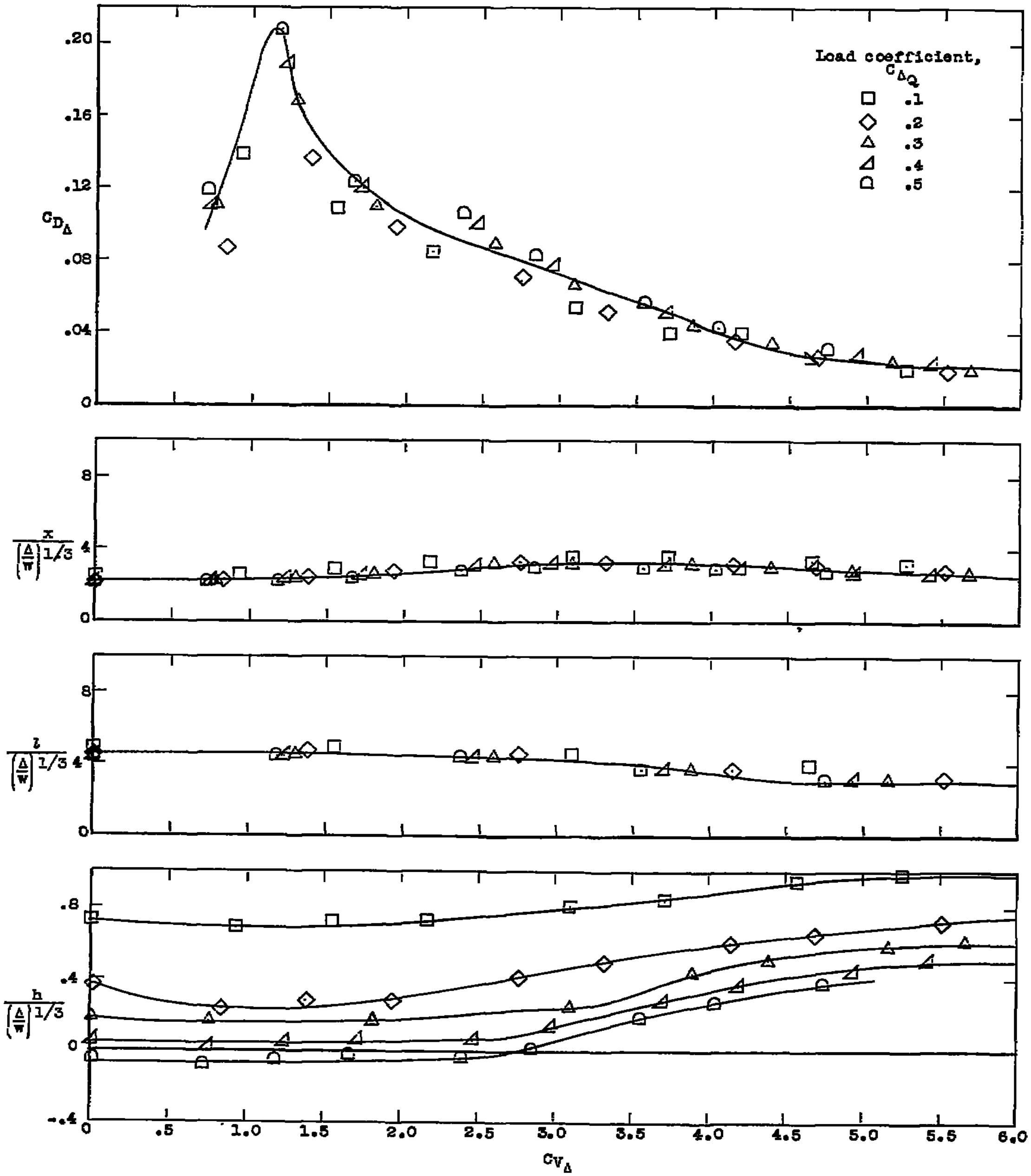

(c) Trim, 8°.

Figure 5.- Continued.



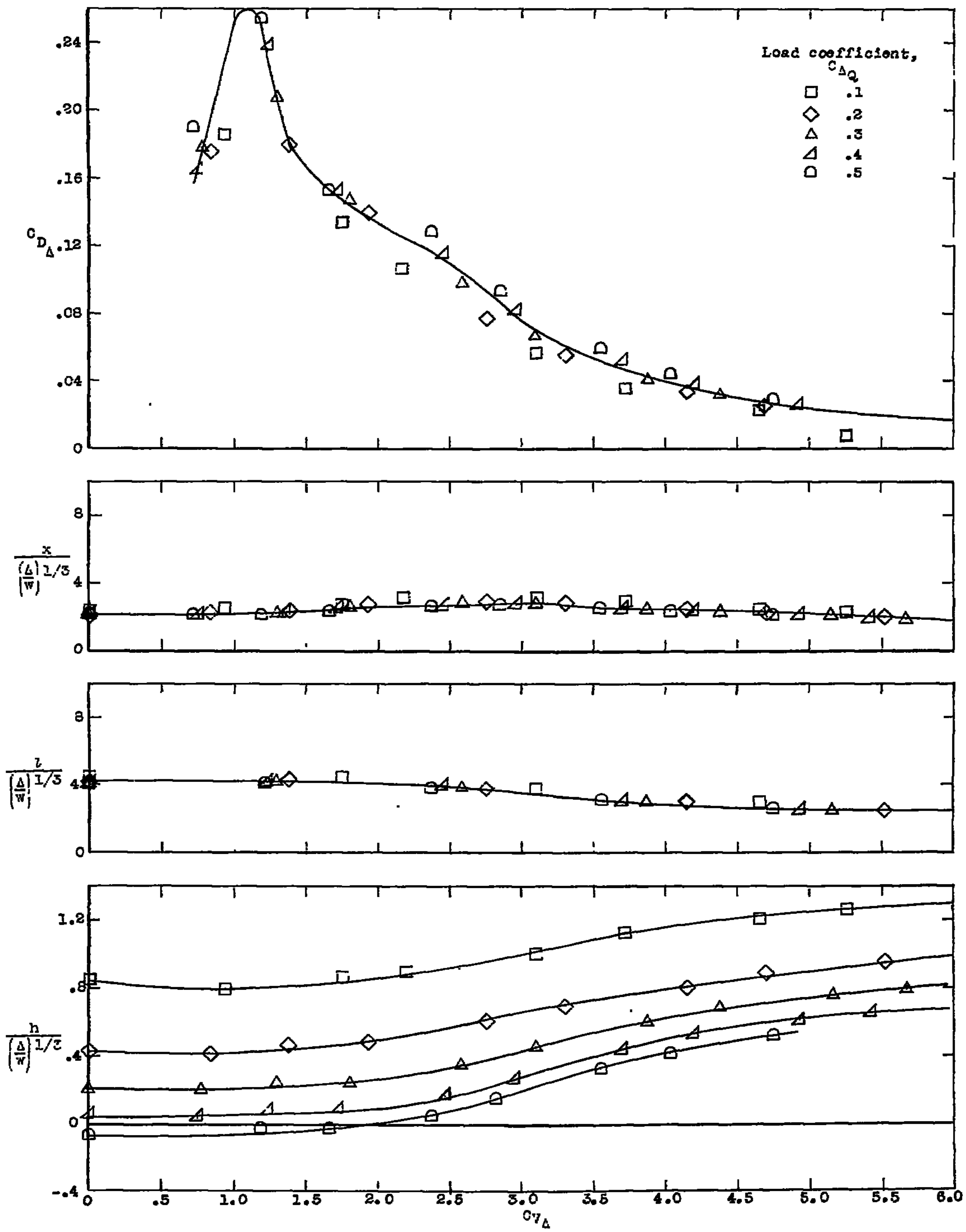

(d) Trim, 12°.

Figure 5.- Continued.



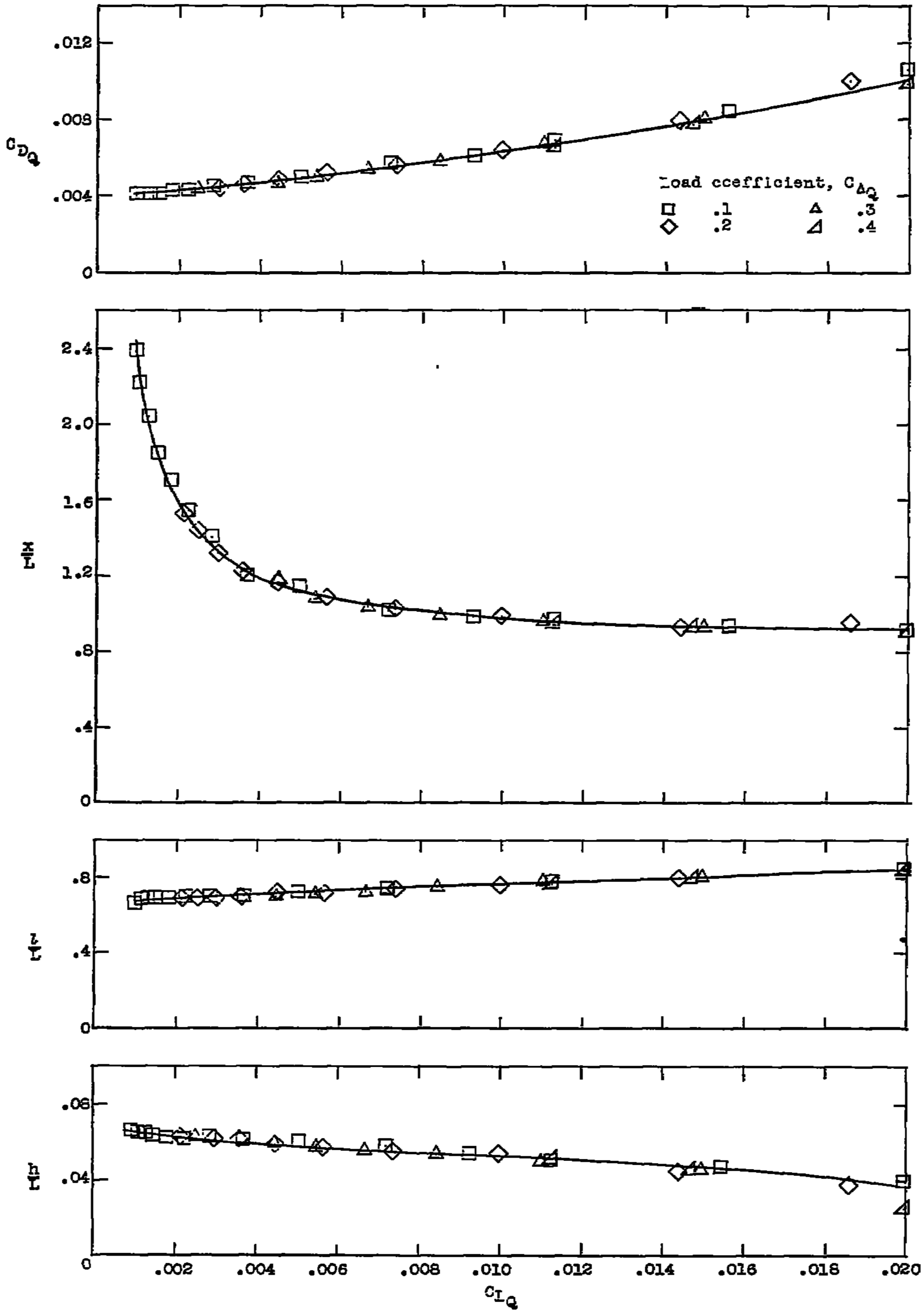

(e) Trim, 16°.

Figure 5.- Continued.



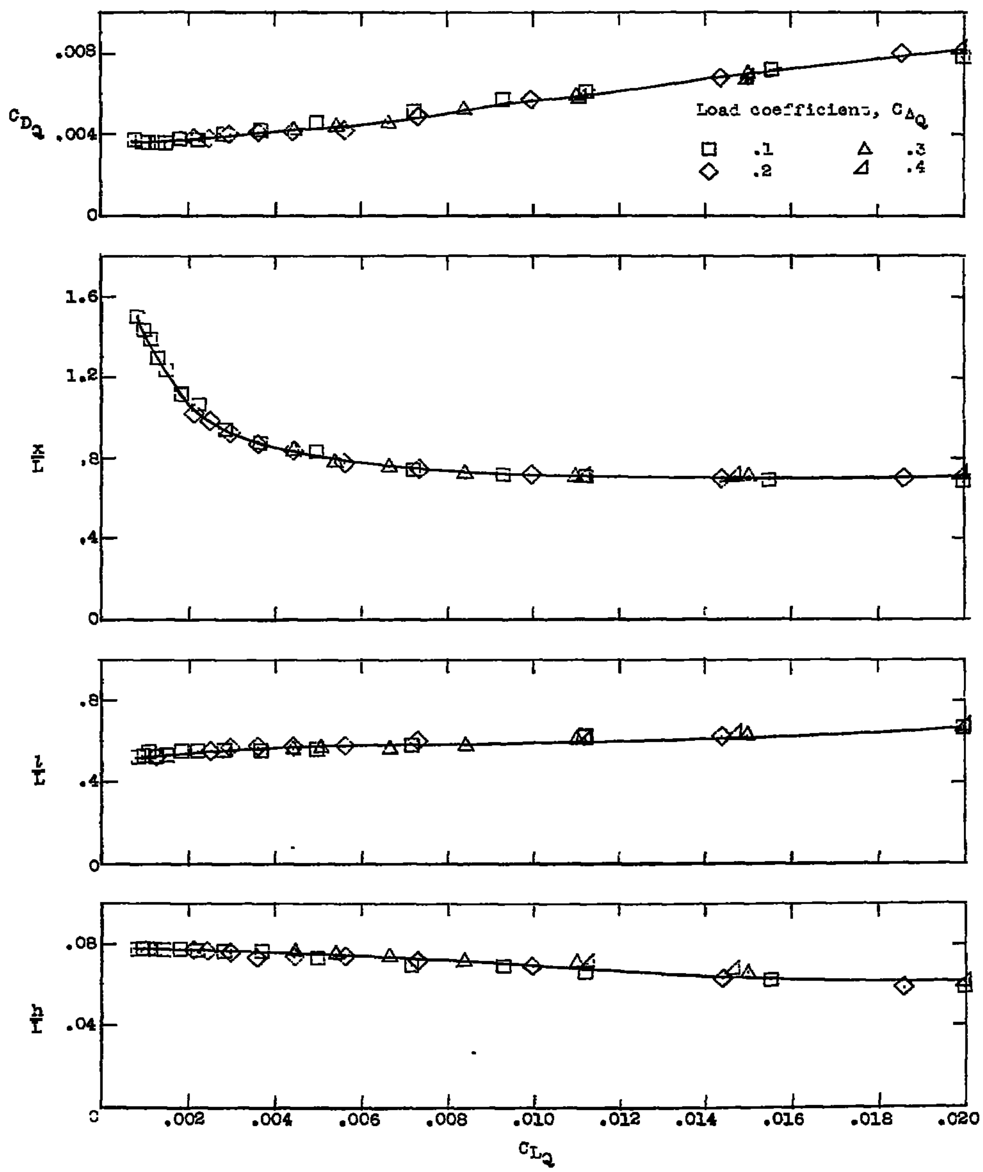

(f) Trim, 20°.

Figure 5.- Concluded.



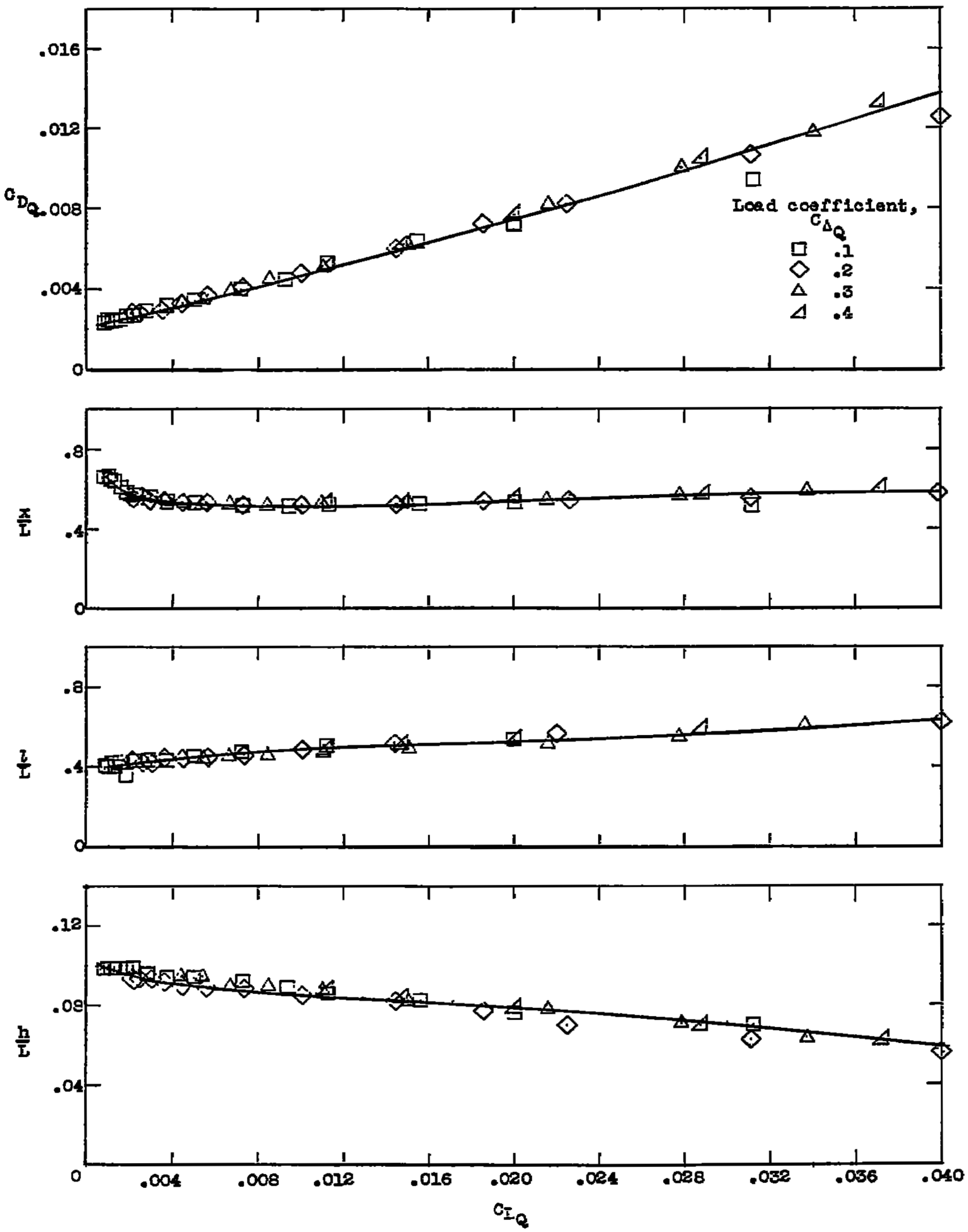

(a) Trim, 4°.

Figure 6.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 6; planing condition.



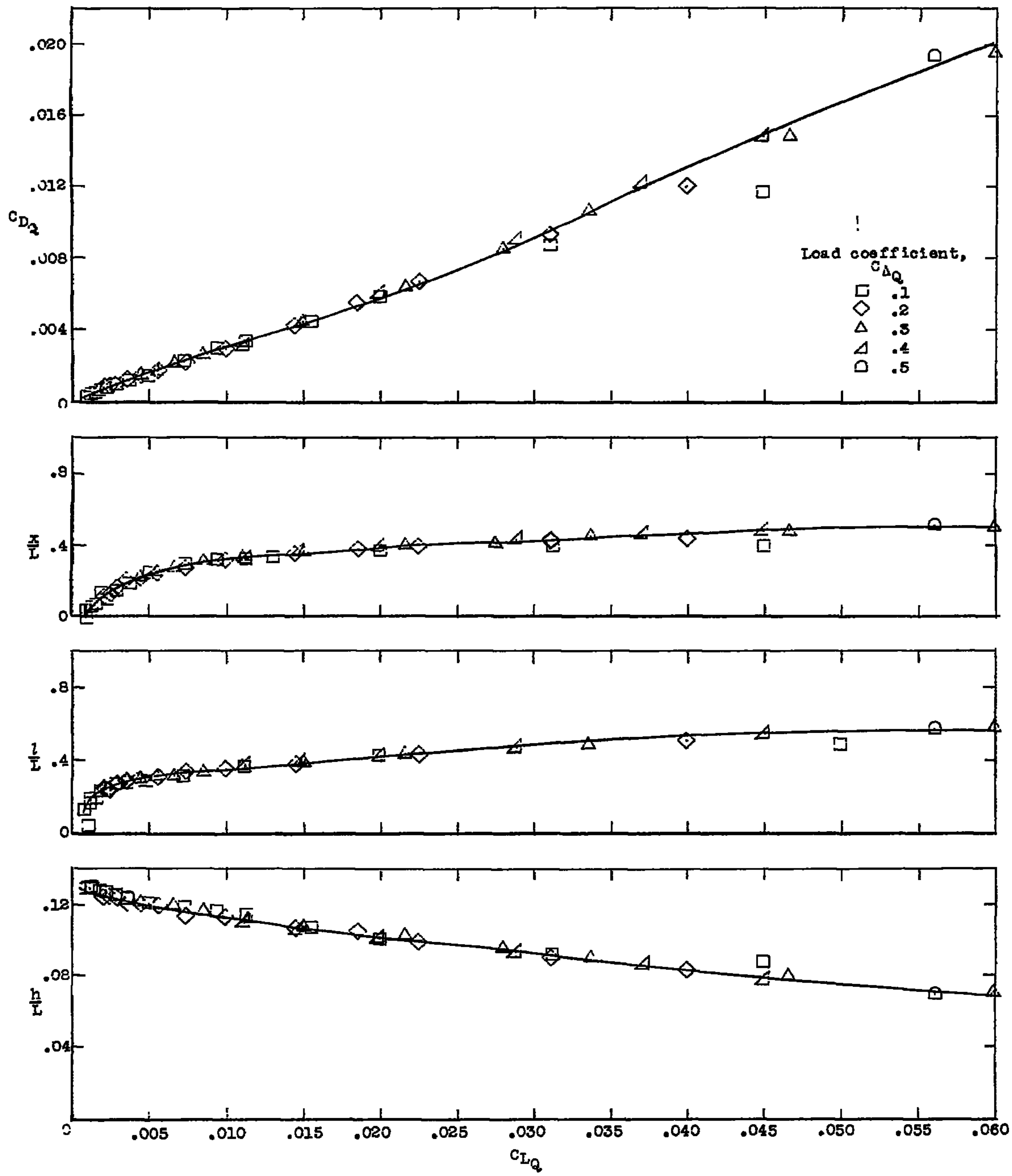

(b) Trim, 8°.

Figure 6.- Continued.



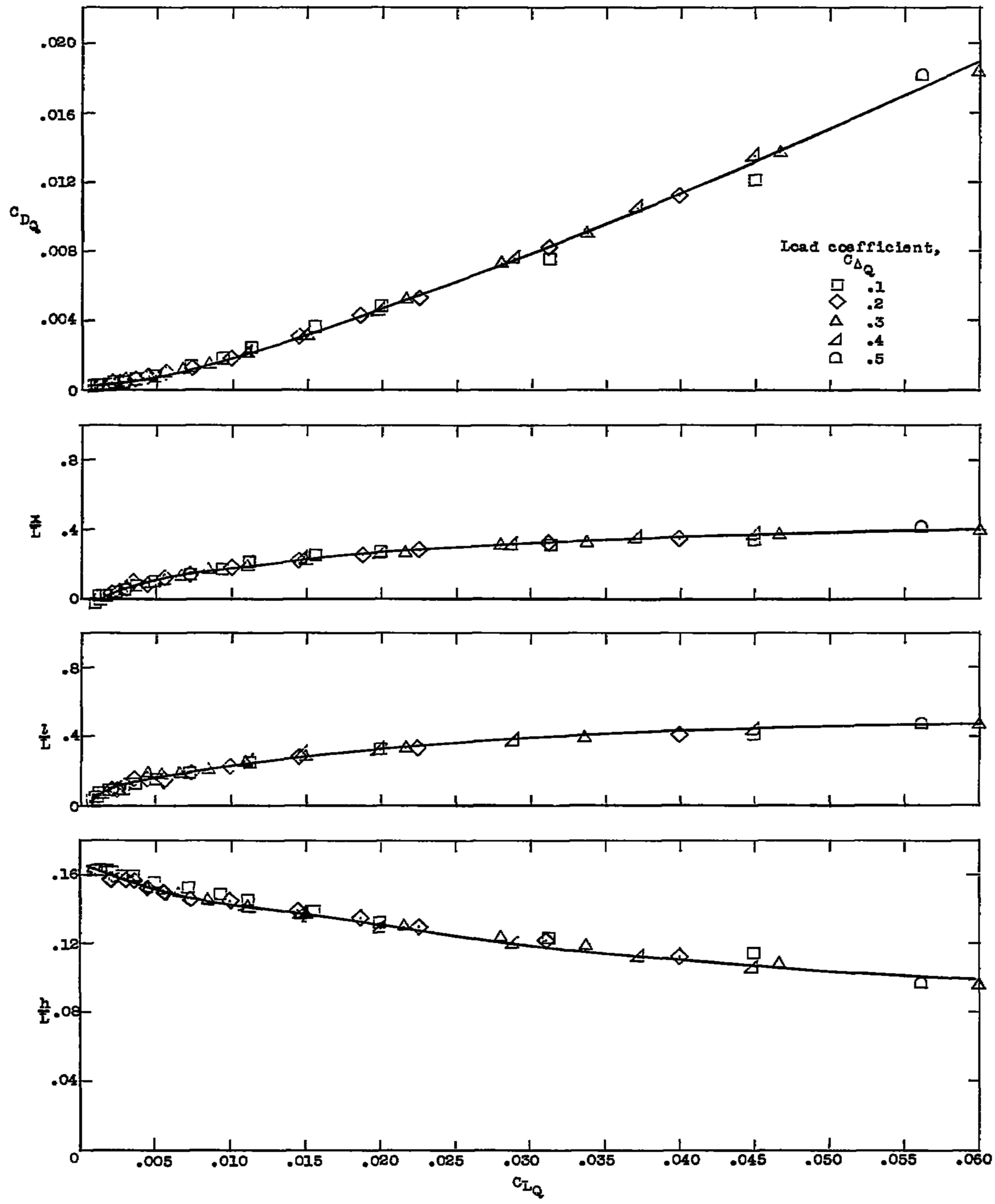

(c) Trim, 12°.

Figure 6.- Continued.



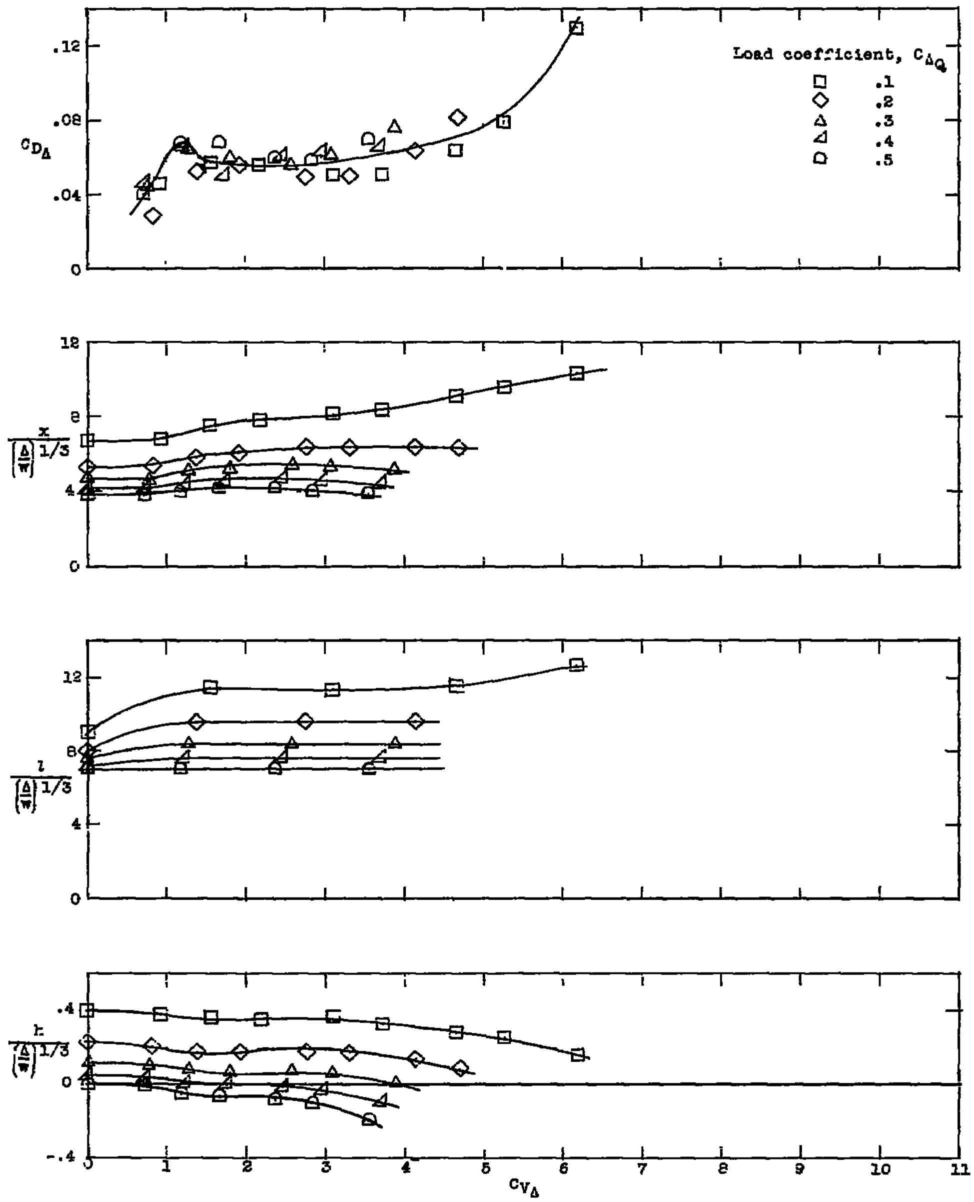

(d) Trim, 16°.

Figure 6.- Continued.




(e) Trim, 20°.

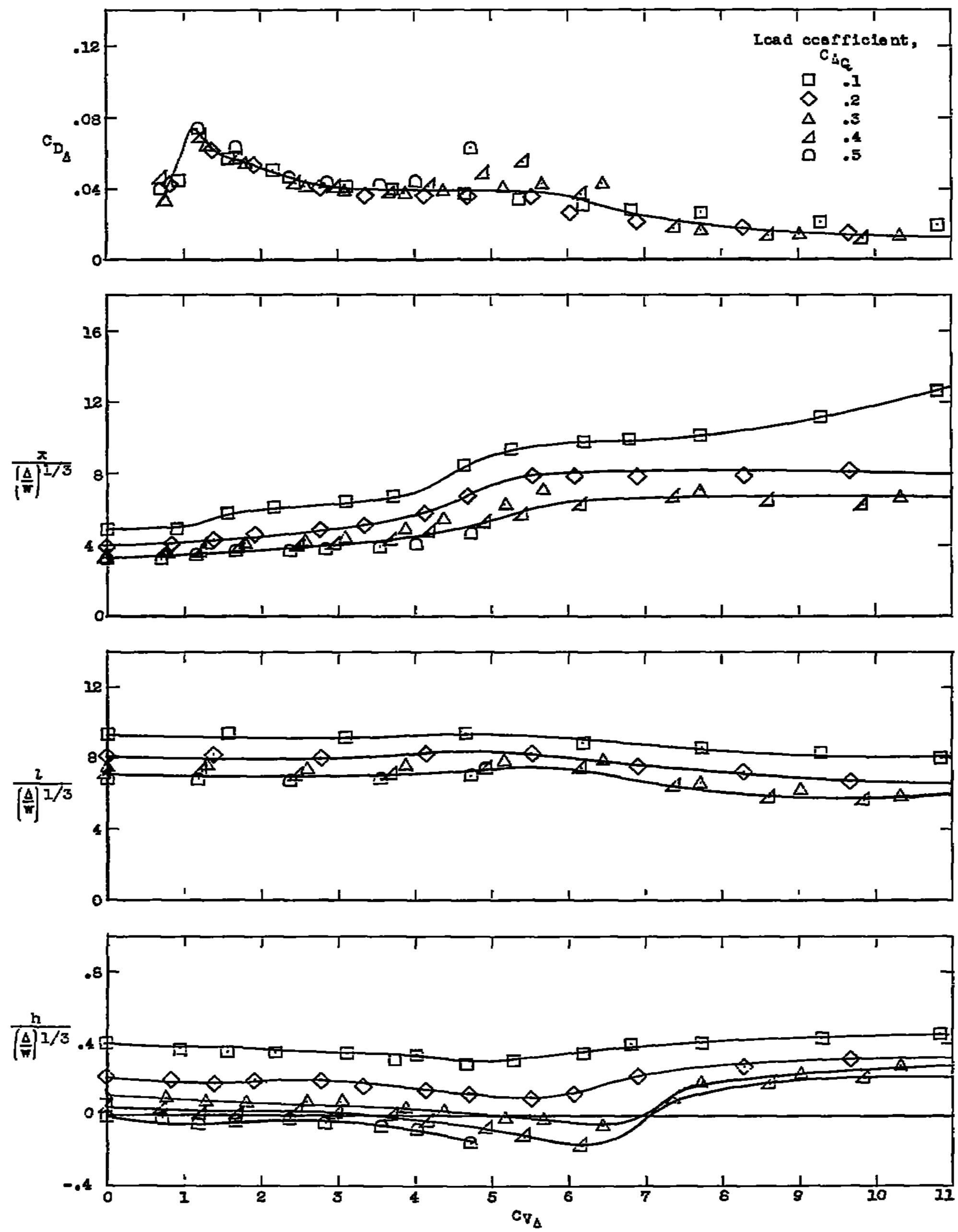
Figure 6.- Concluded.




(a) Trim, 0°.

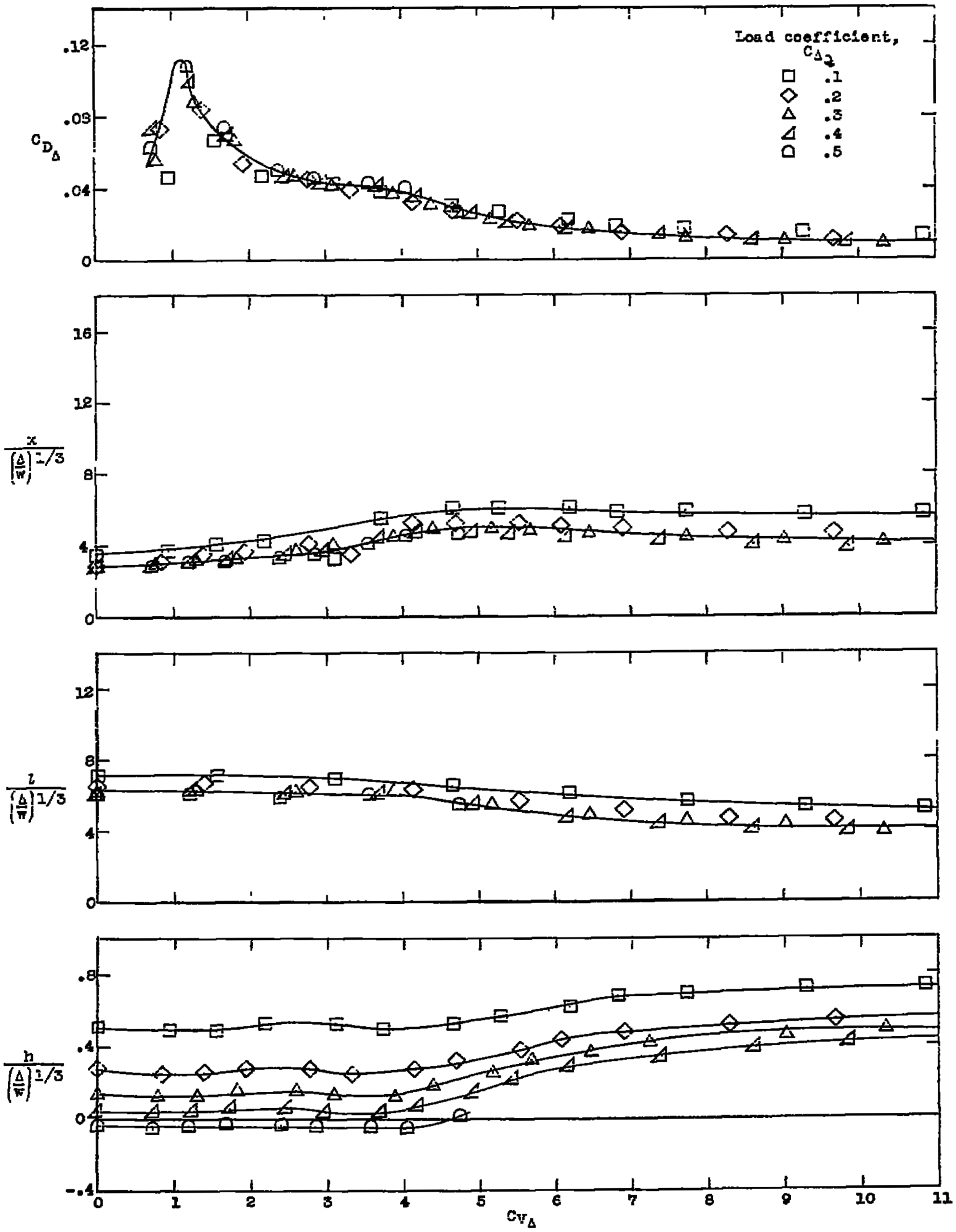
Figure 7.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 9; displacement condition.

[redacted]



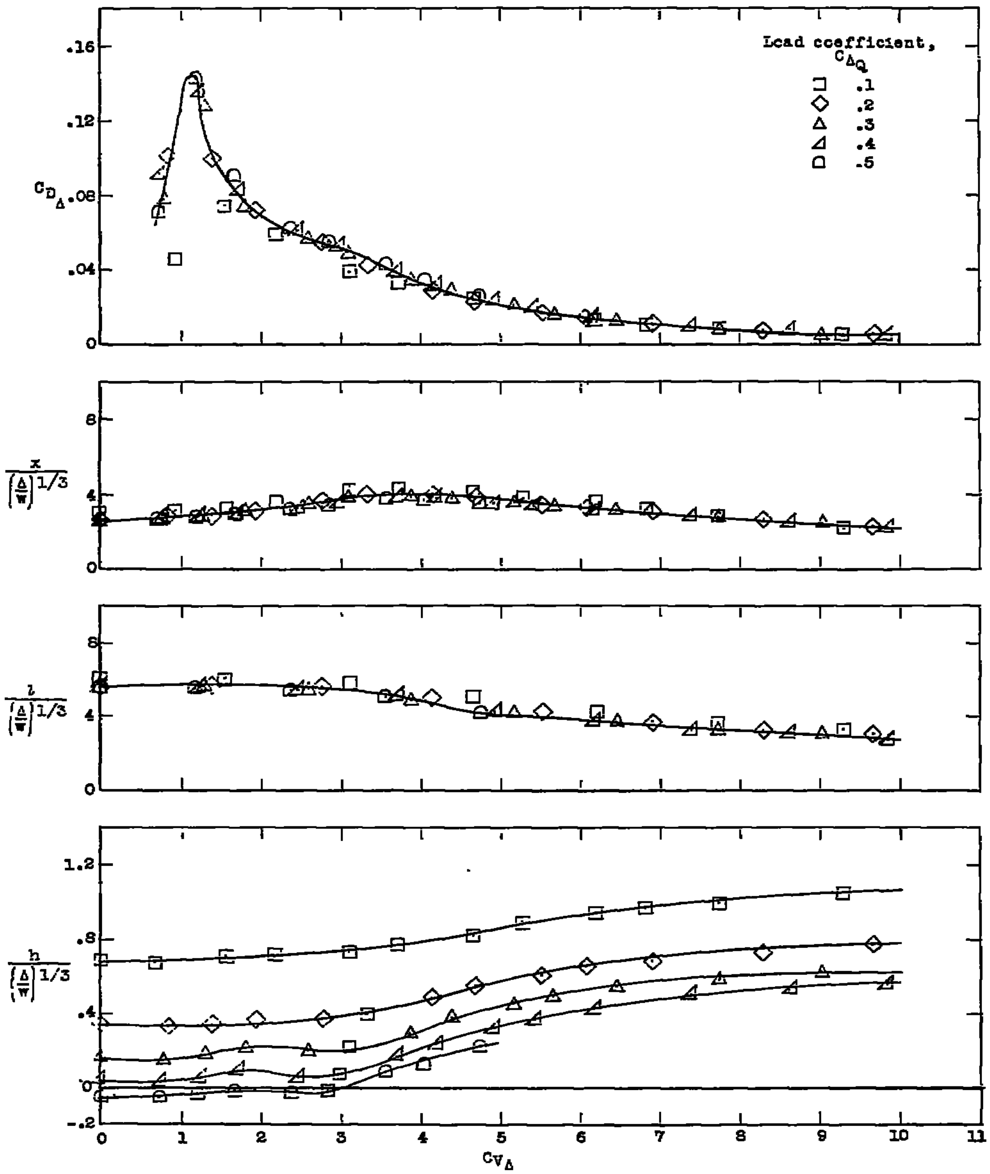

(b) Trim, 4°.

Figure 7.- Continued.



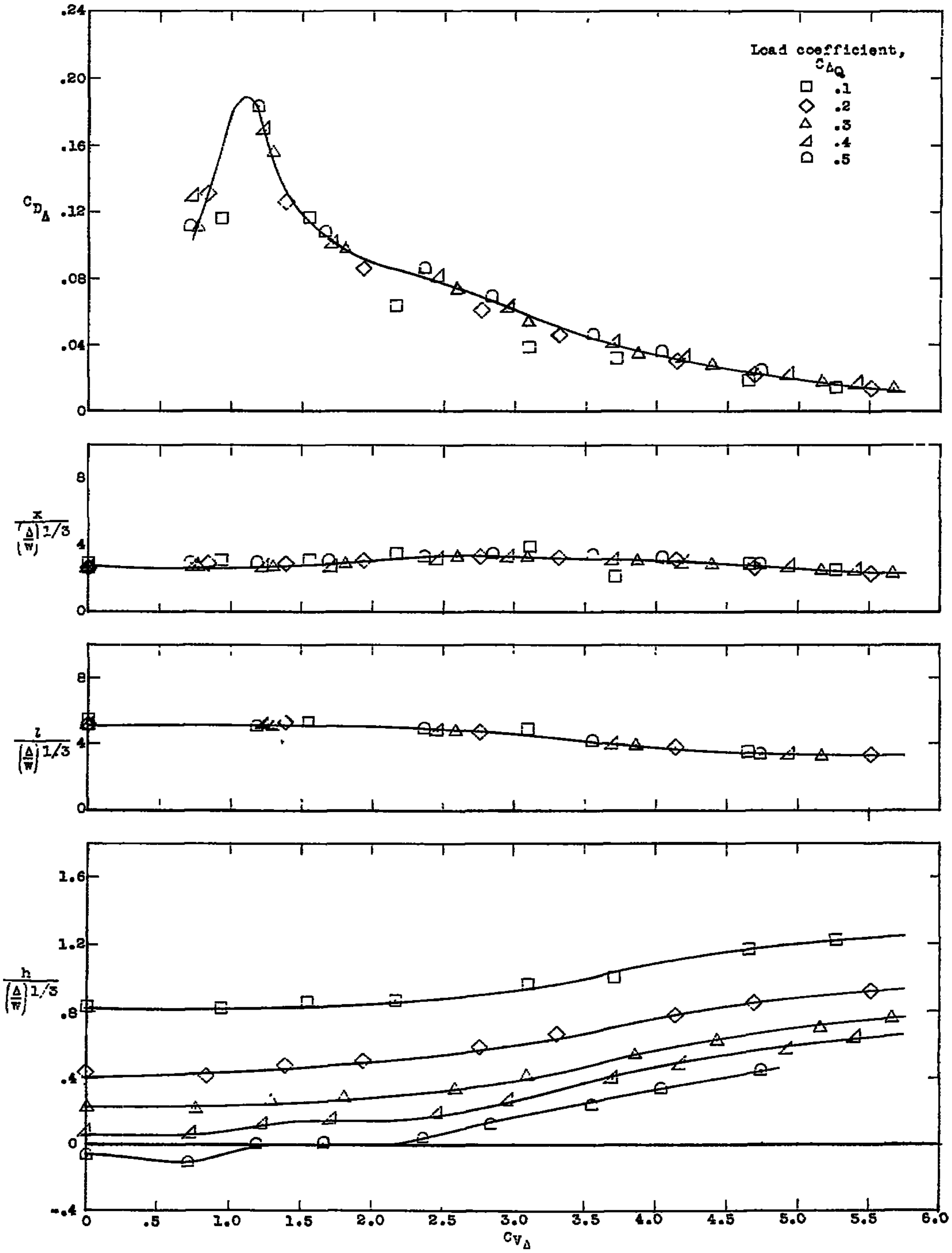

(c) Trim, 8°.

Figure 7.- Continued.



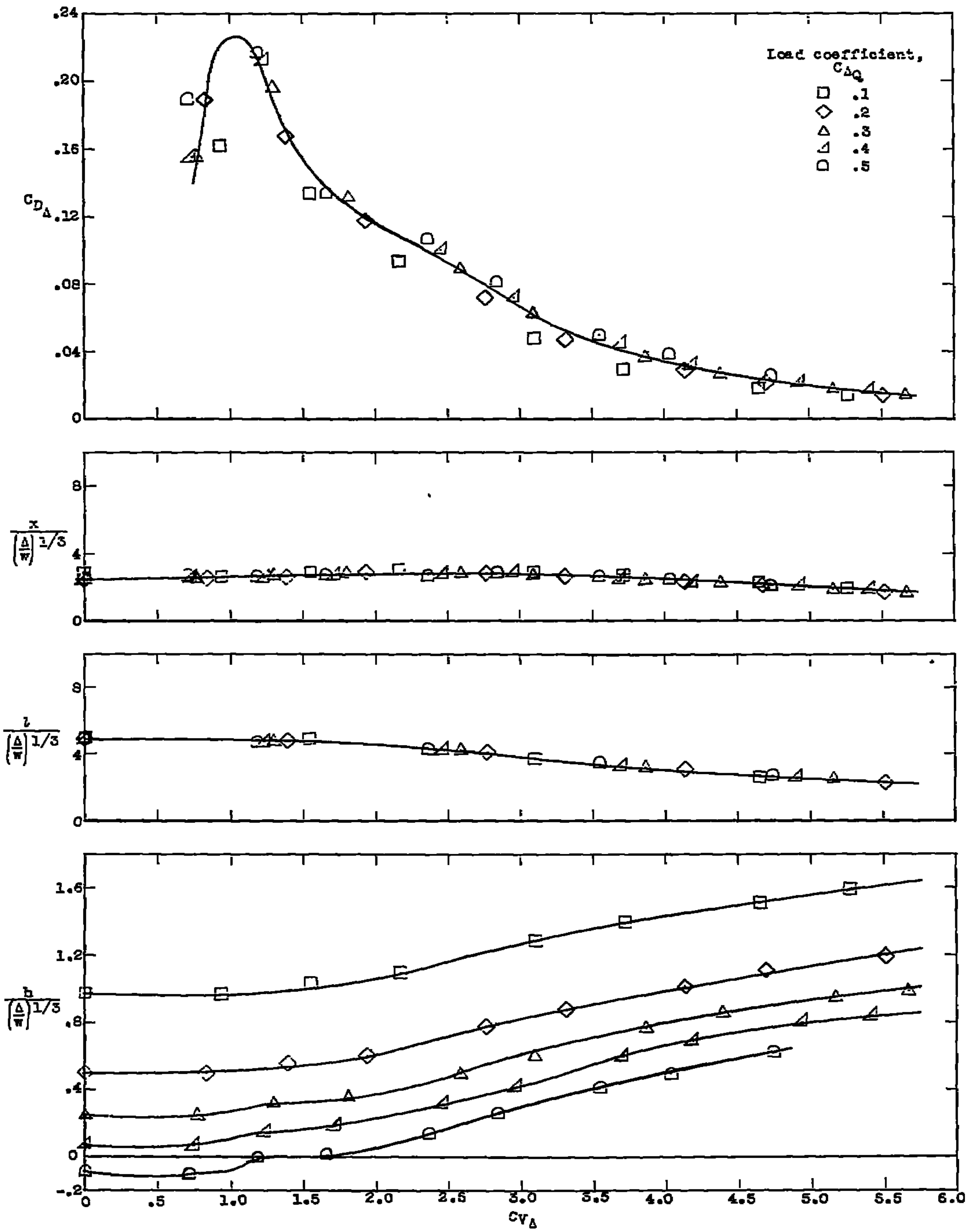

(d) Trim, 12°.

Figure 7.- Continued.



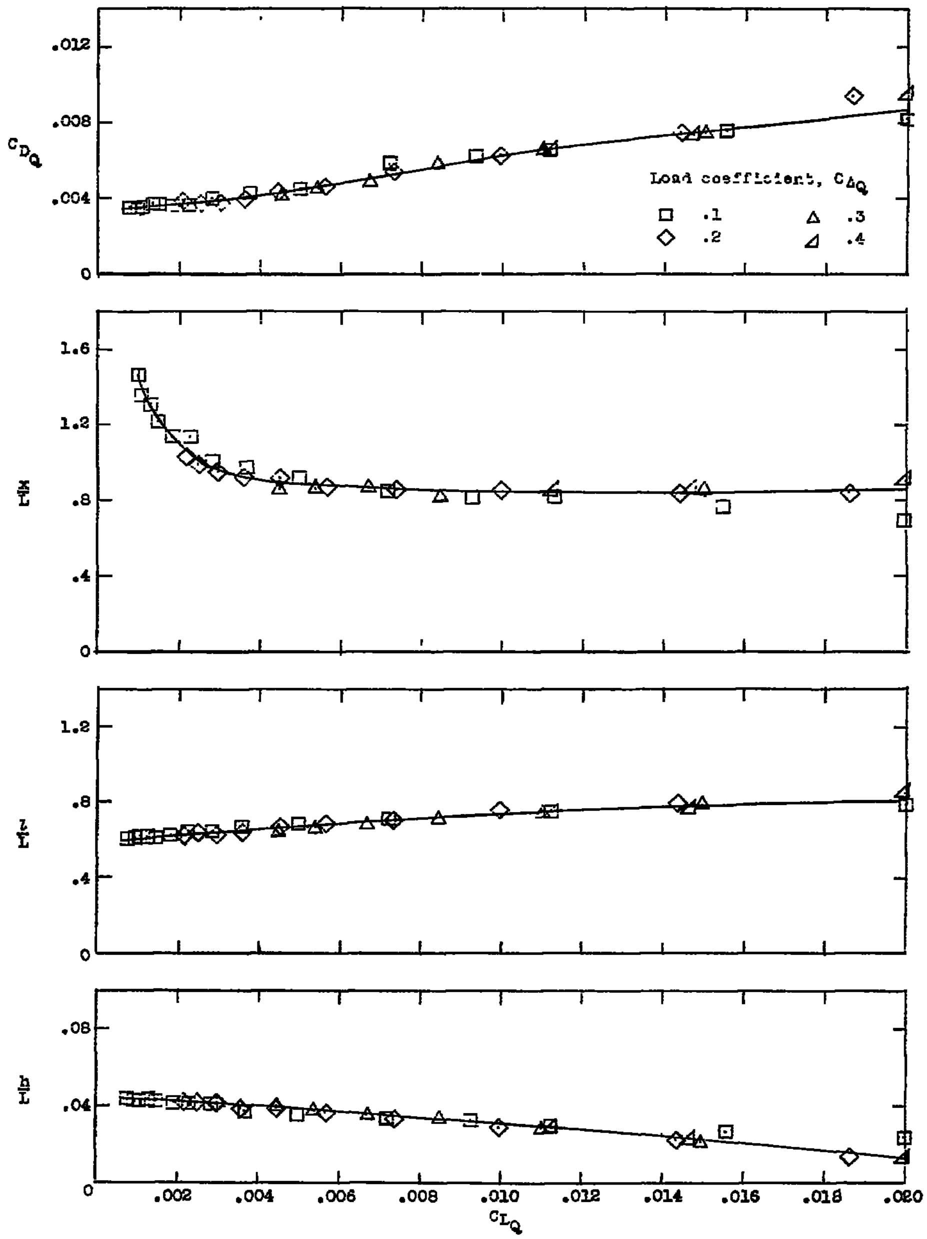

(e) Trim, 16°.

Figure 7.- Continued.



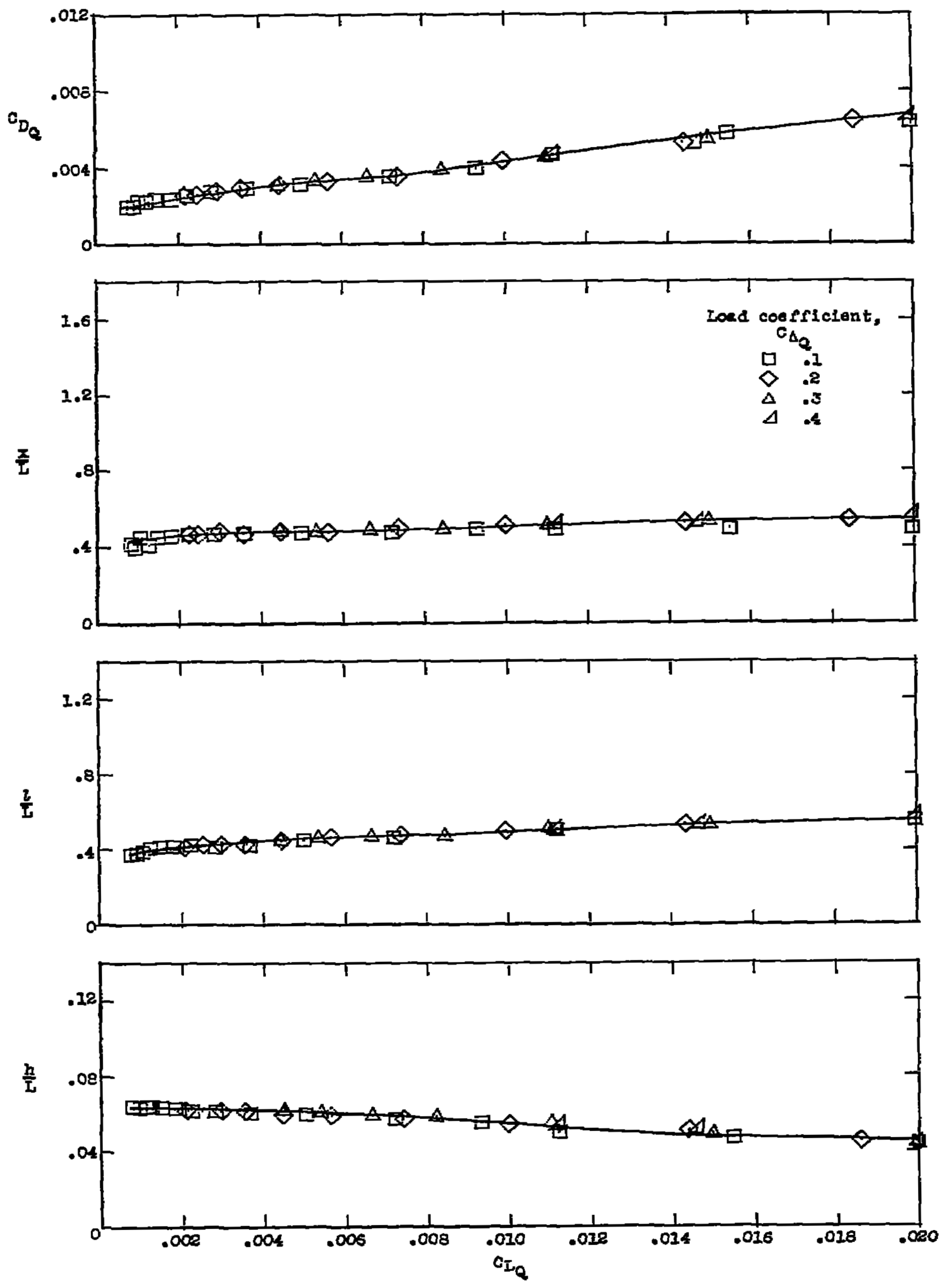

(f) Trim, 20°.

Figure 7.- Concluded.




(a) Trim, 4°.

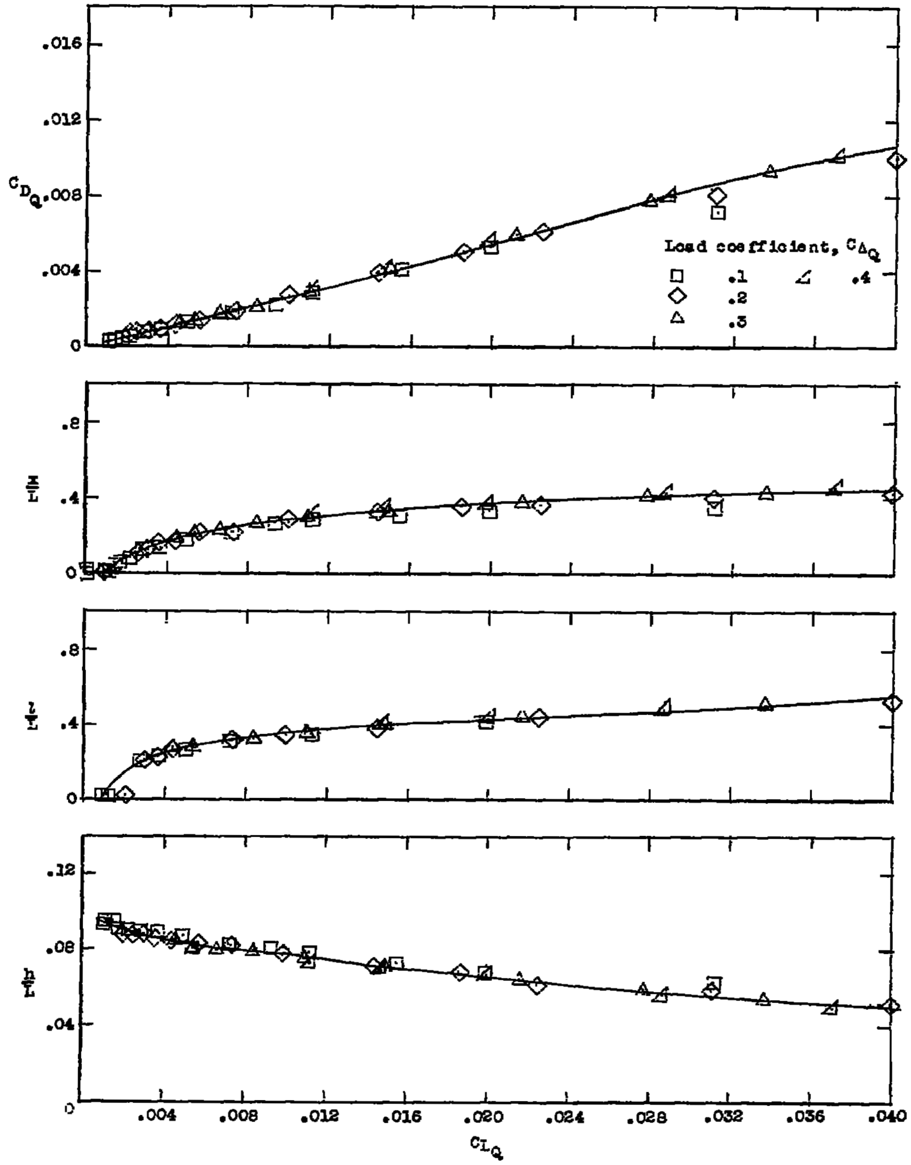
Figure 8.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 9; planing condition.




(b) Trim, 8°.

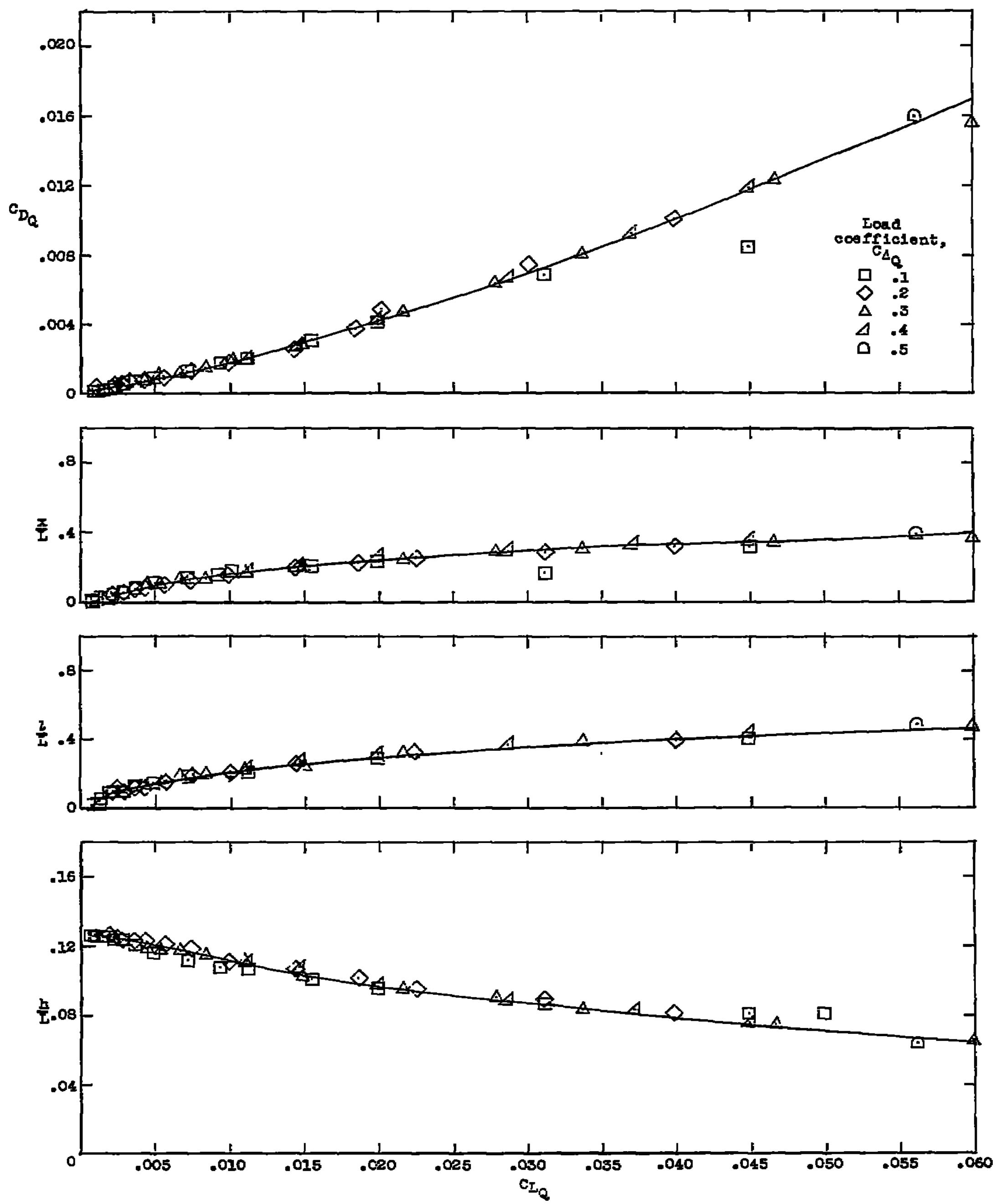
Figure 8.- Continued.

[redacted]



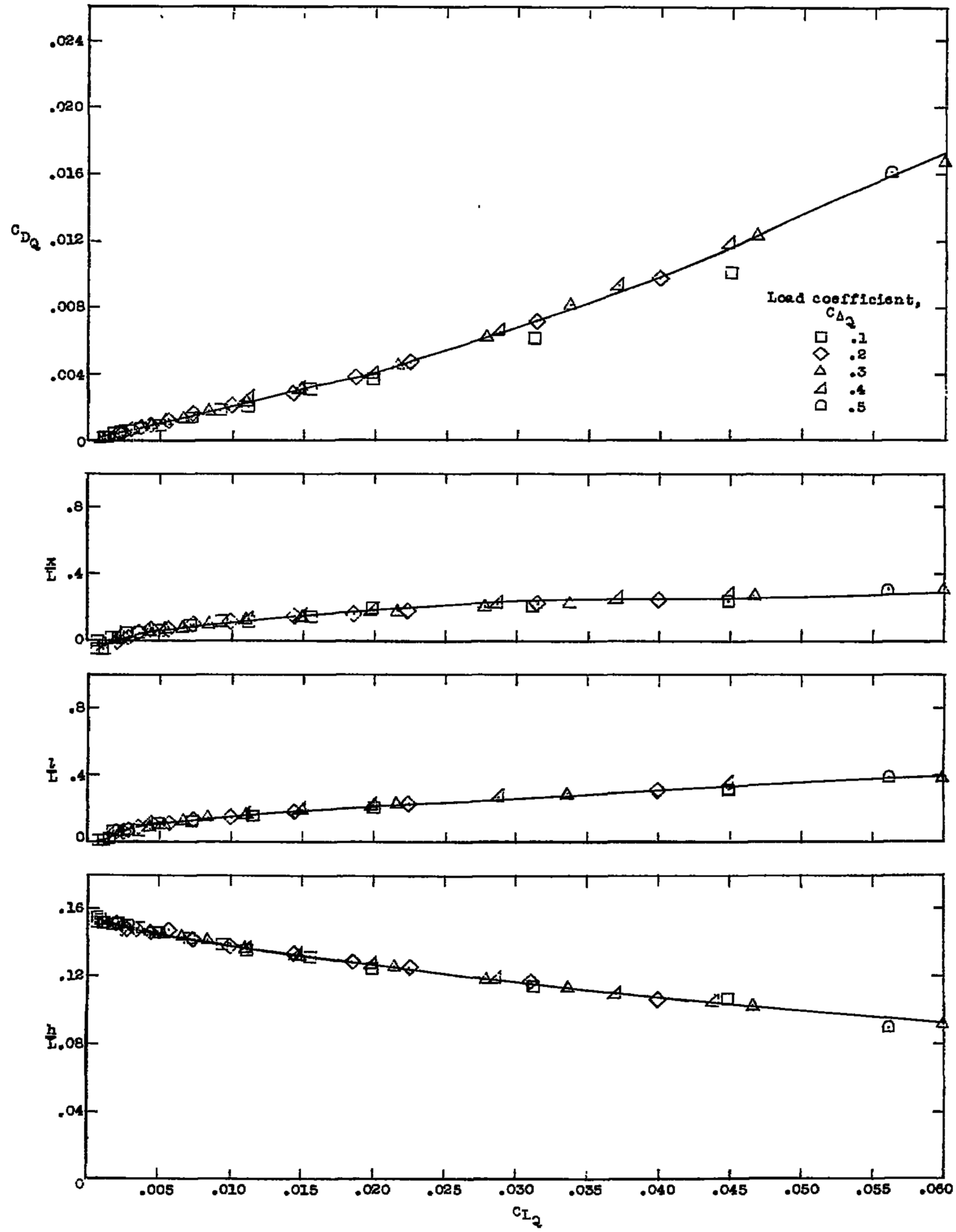

(c) Trim, 12°.

Figure 8.- Continued.



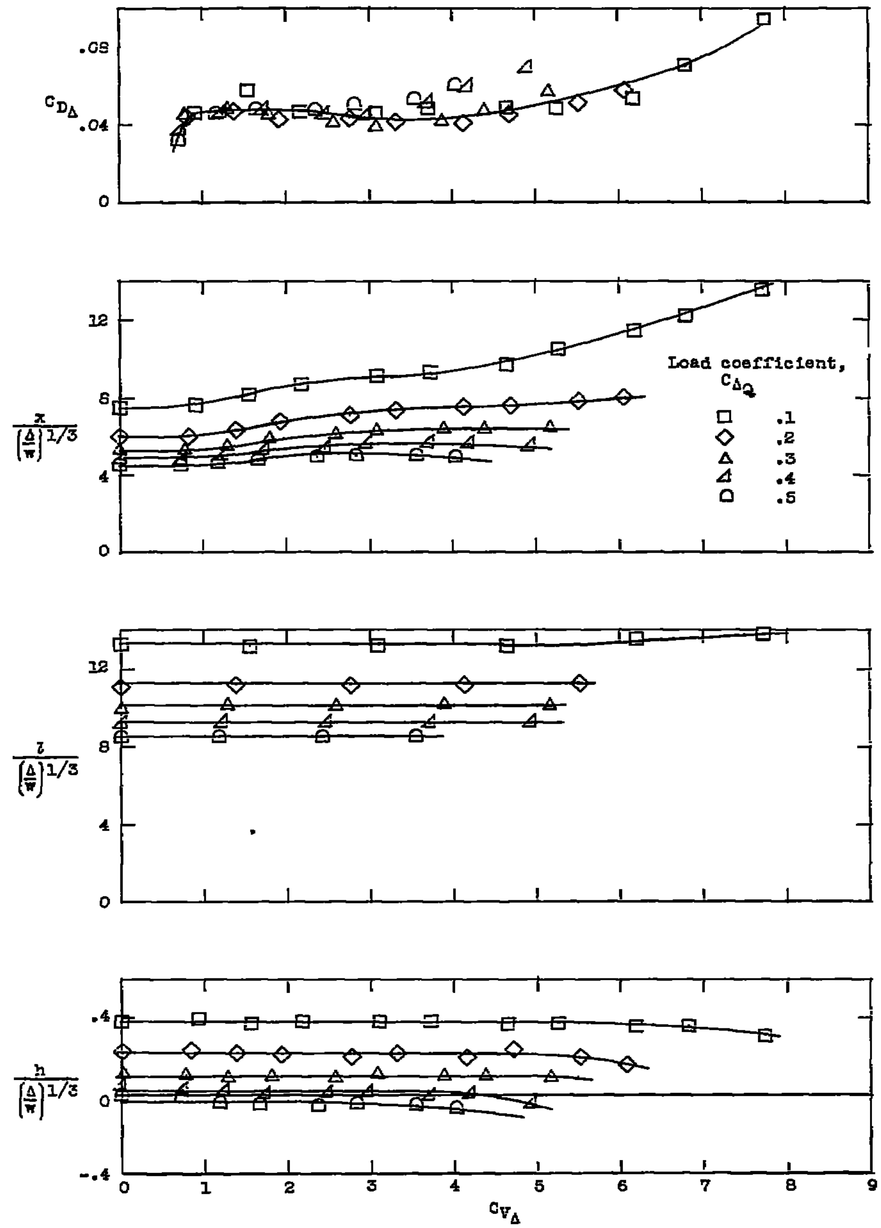

(d) Trim, 16°.

Figure 8.- Continued.




(e) Trim, 20°.

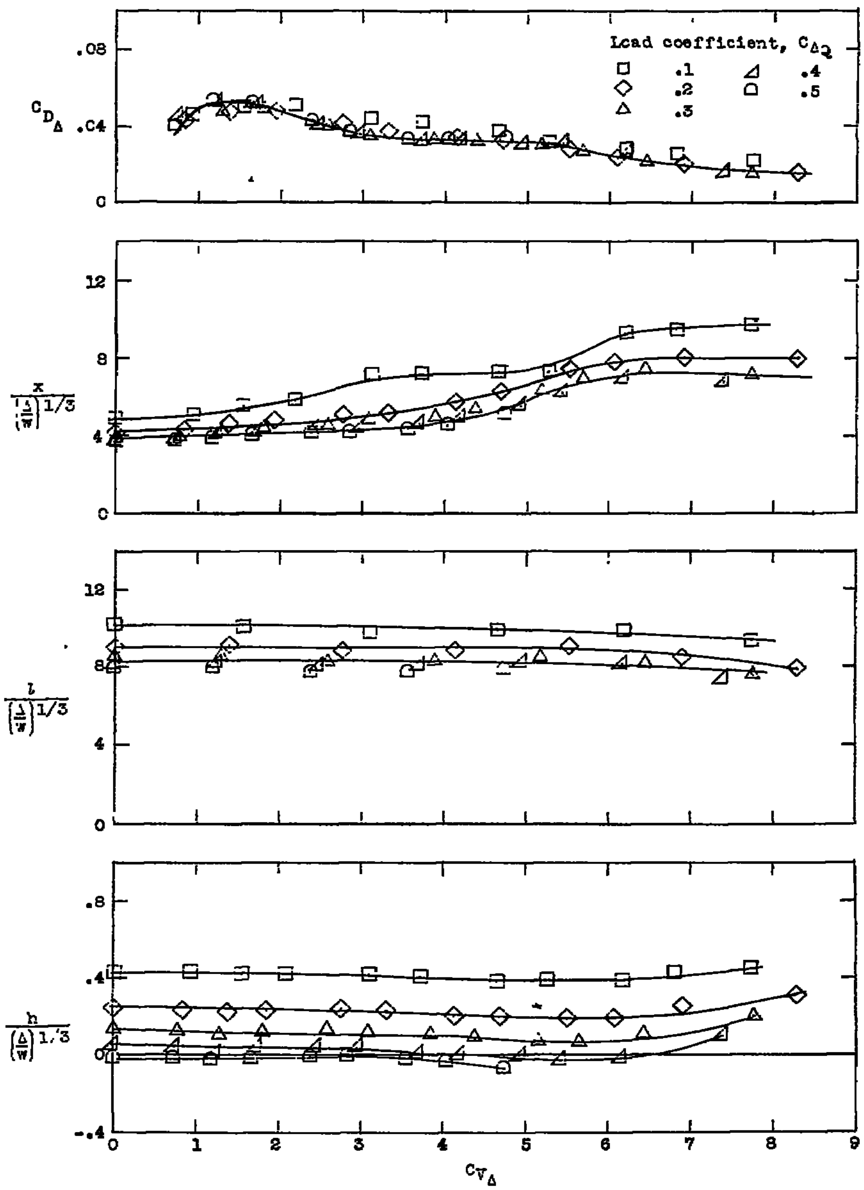
Figure 8.- Concluded.




(a) Trim, 0°.

Figure 9.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 12; displacement condition.

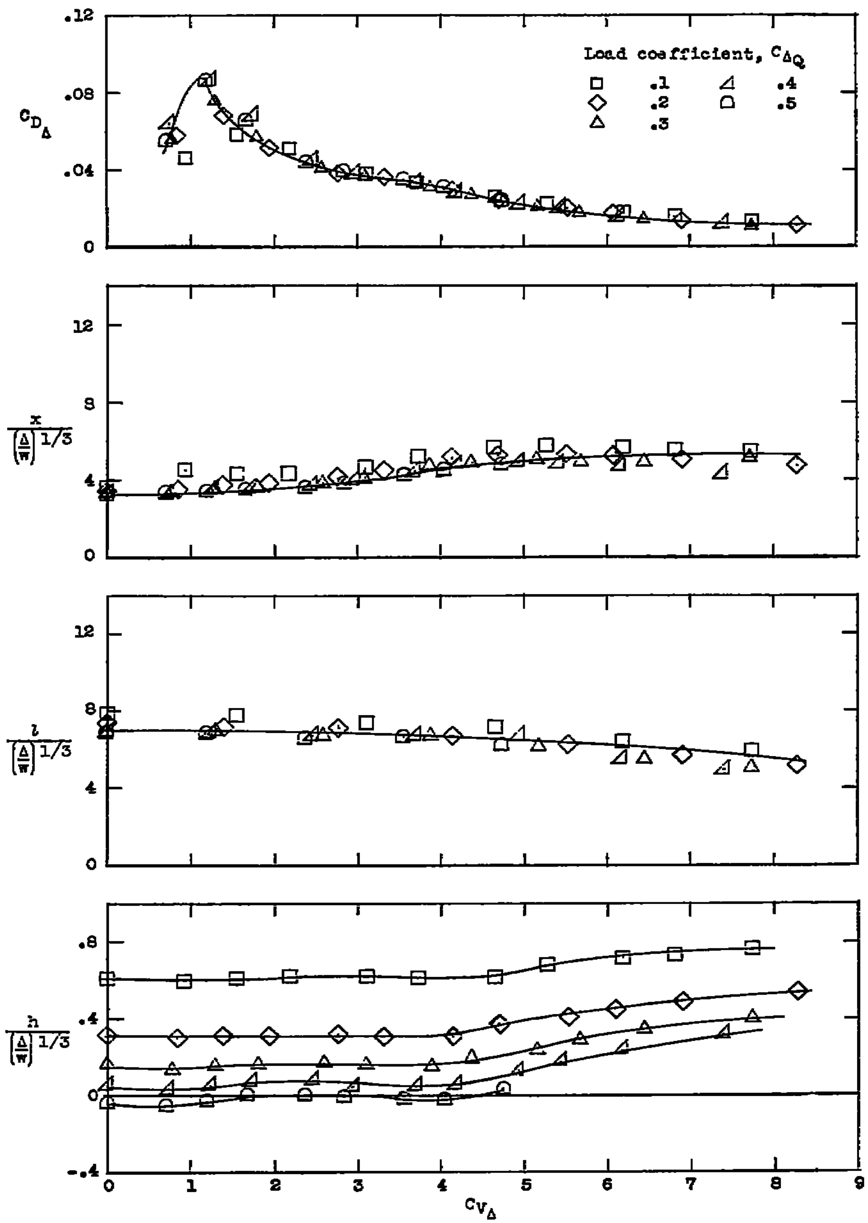
[redacted]




(b) Trim, 4°.

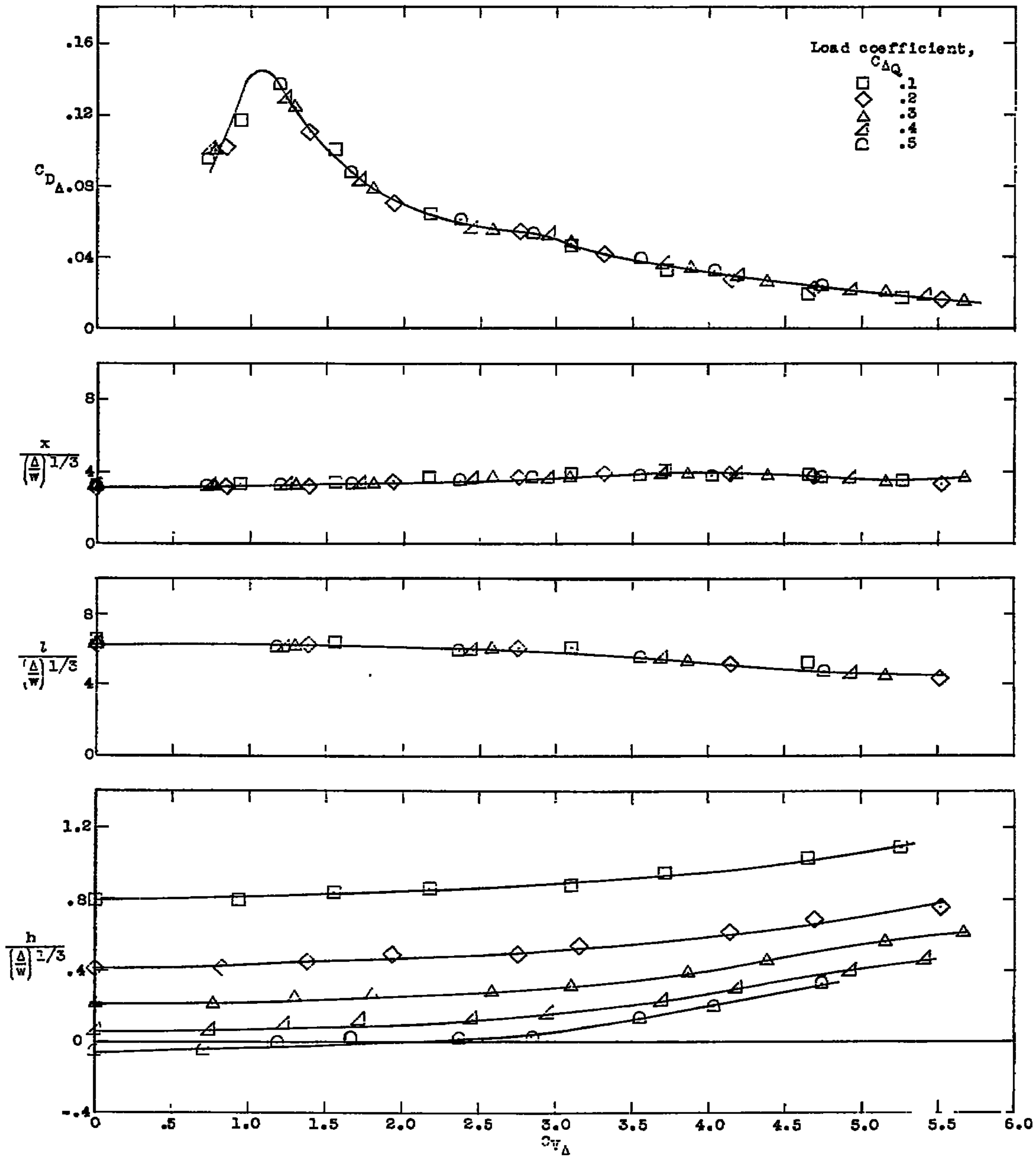
Figure 9.- Continued.

[redacted]



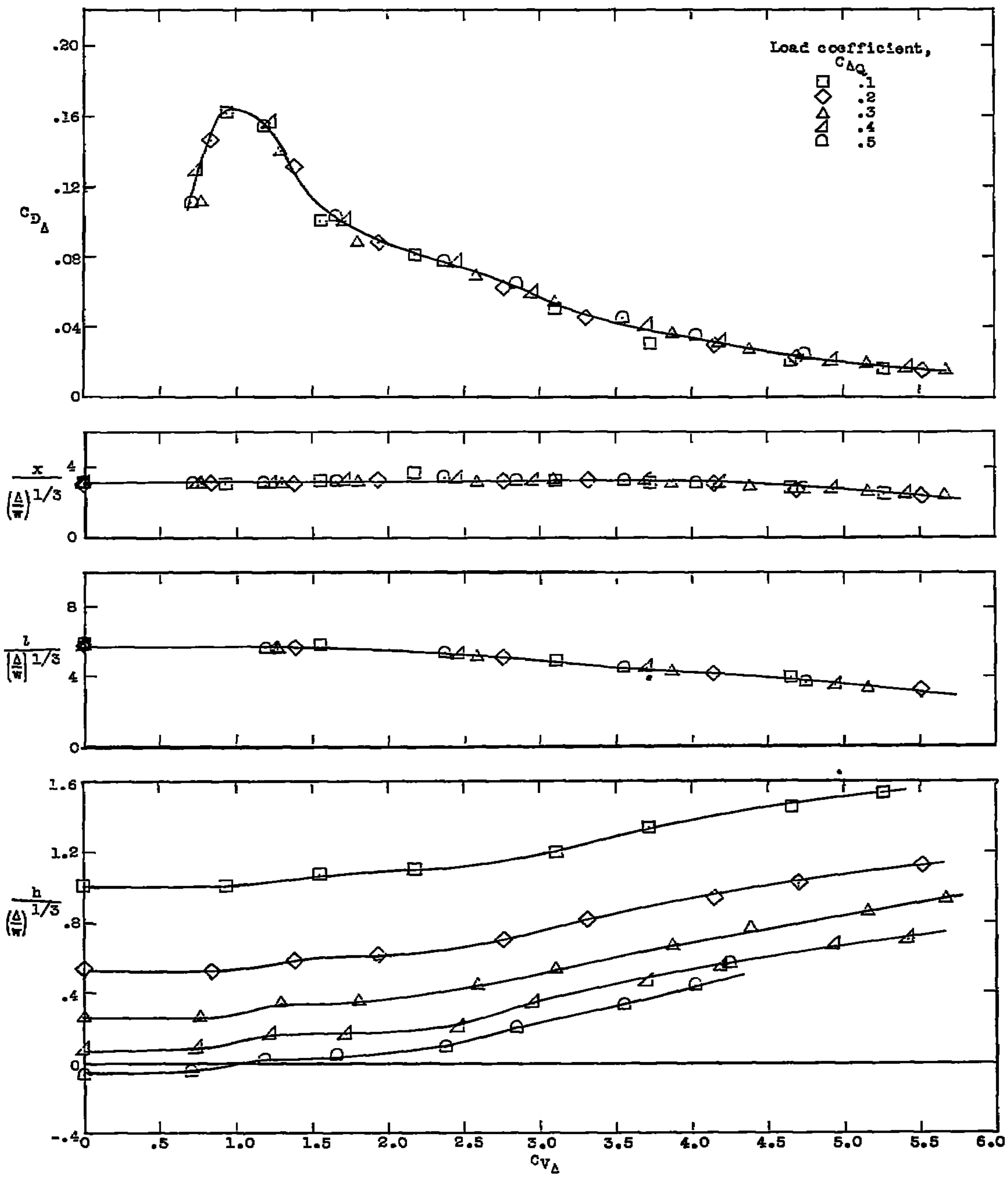

(c) Trim, 8°.

Figure 9.- Continued.




(d) Trim, 12°.

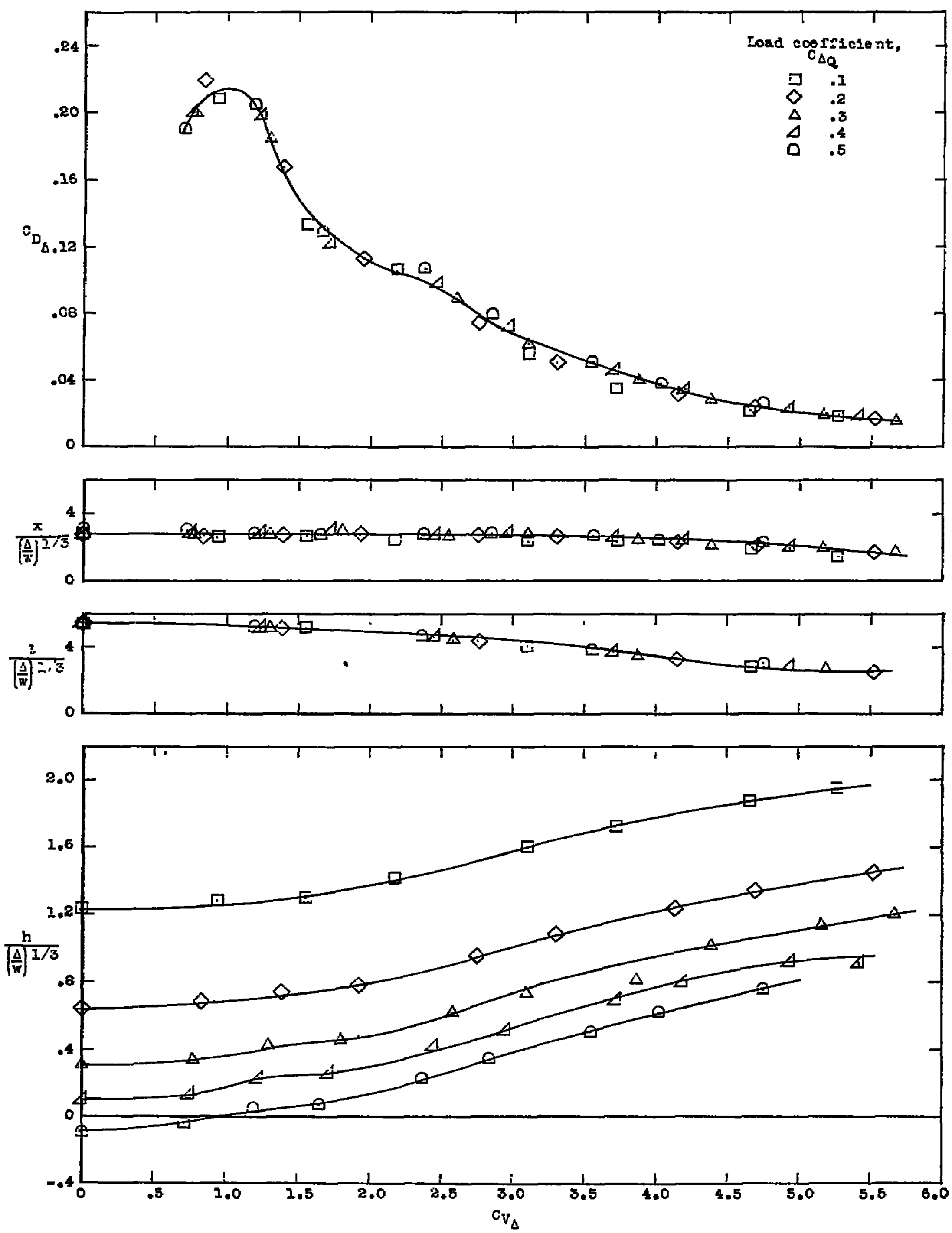
Figure 9.- Continued.




(e) Trim, 16°.

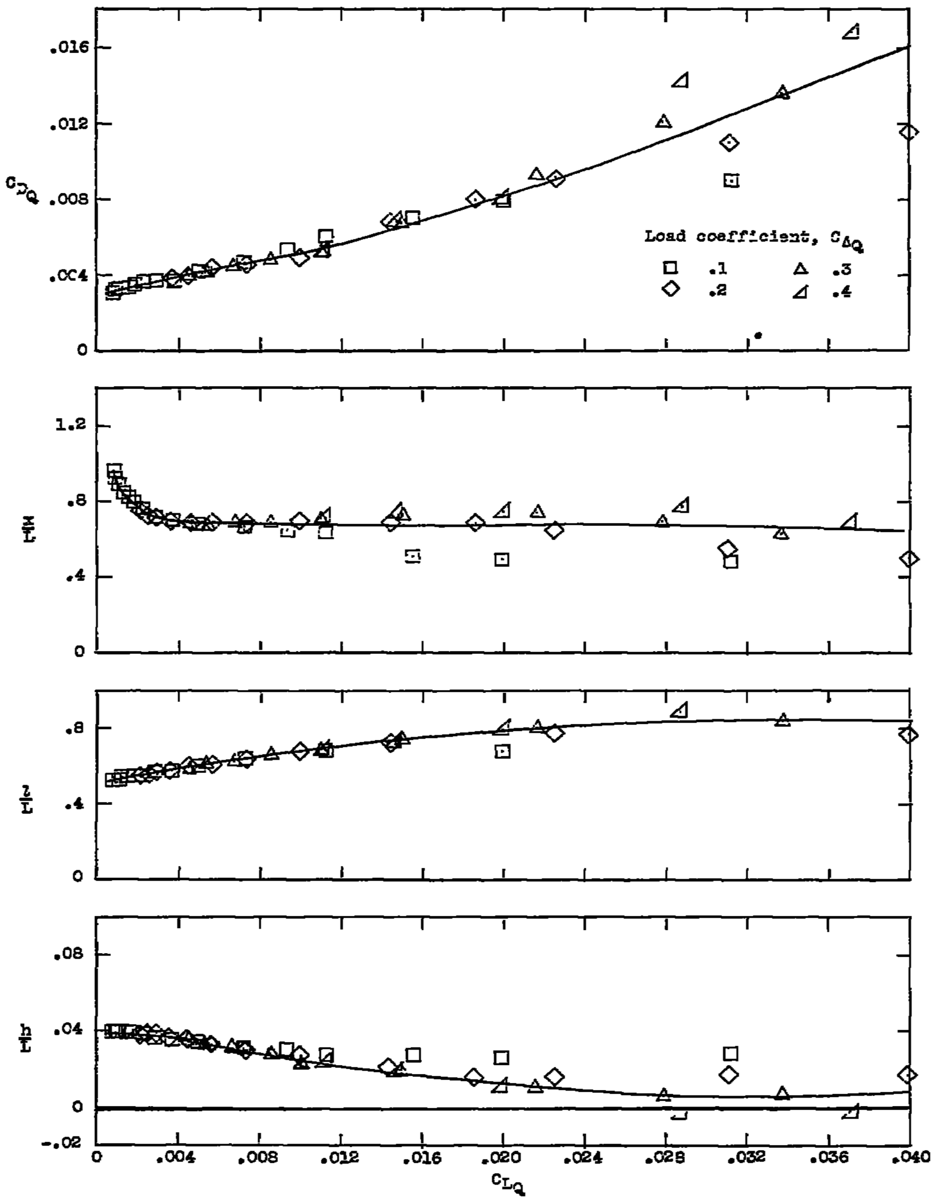
Figure 9.- Continued.

[redacted]



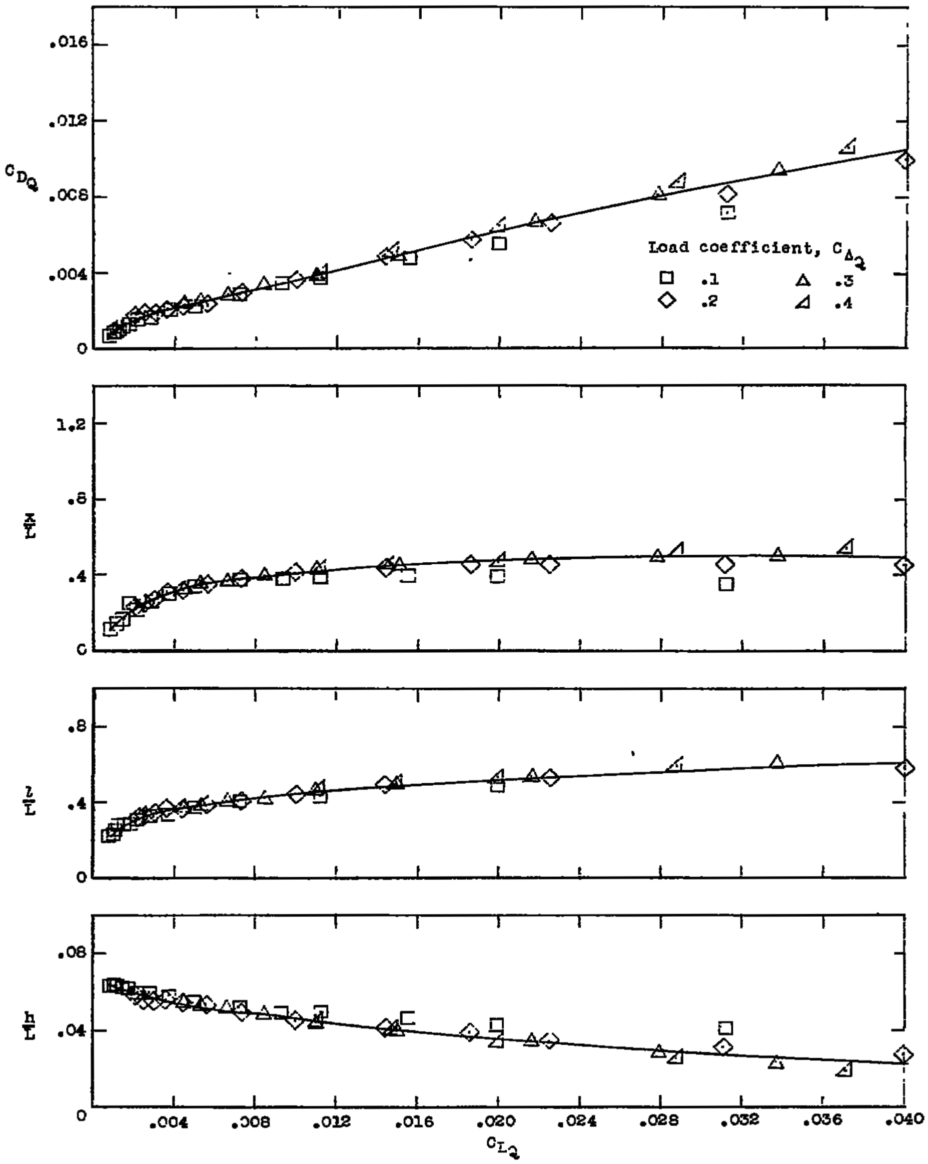

(f) Trim, 20°.

Figure 9.- Concluded.



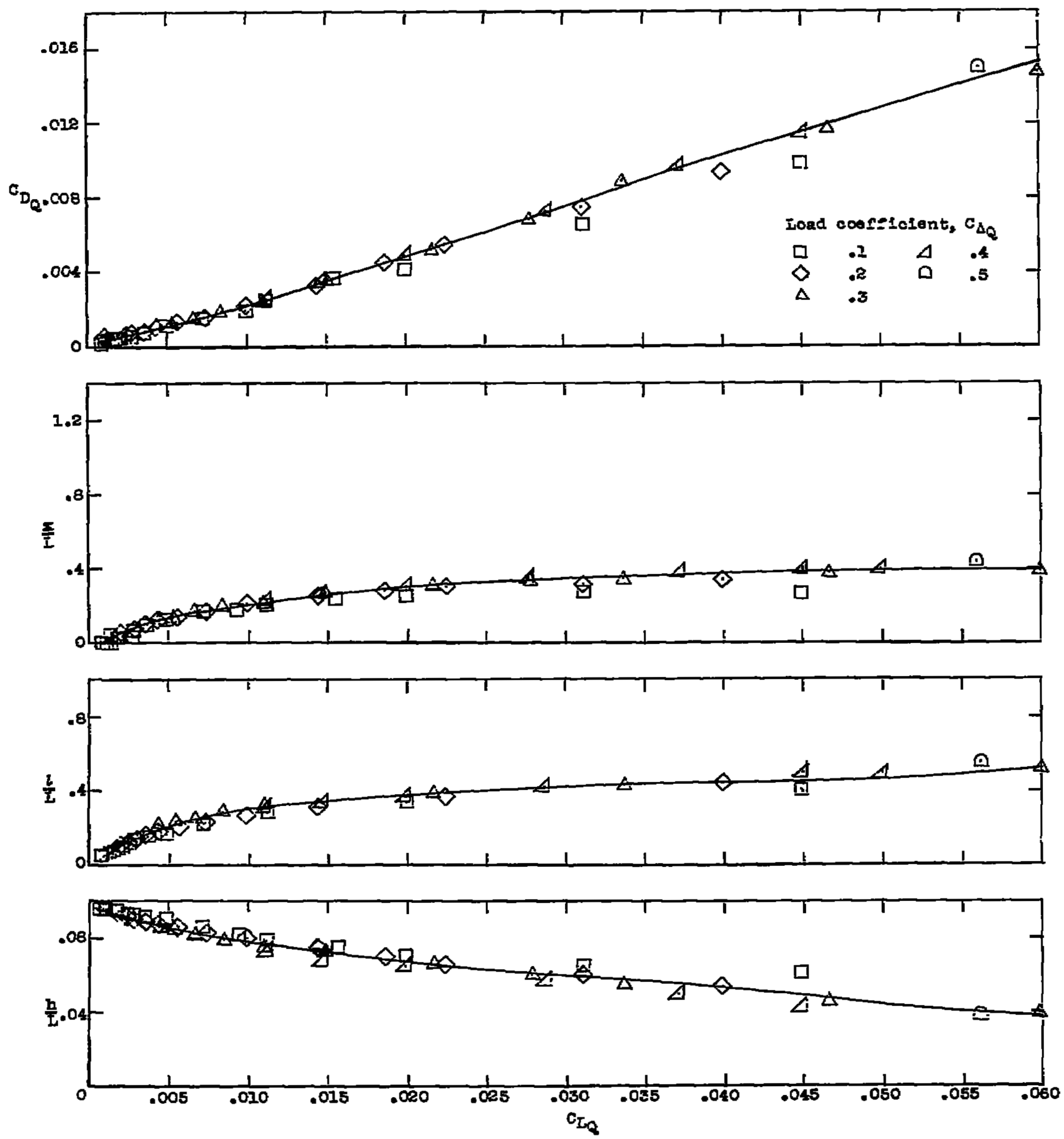

(a) Trim, 4°.

Figure 10.- Hydrodynamic characteristics of model with chine strips. Fineness ratio 12; planing condition.



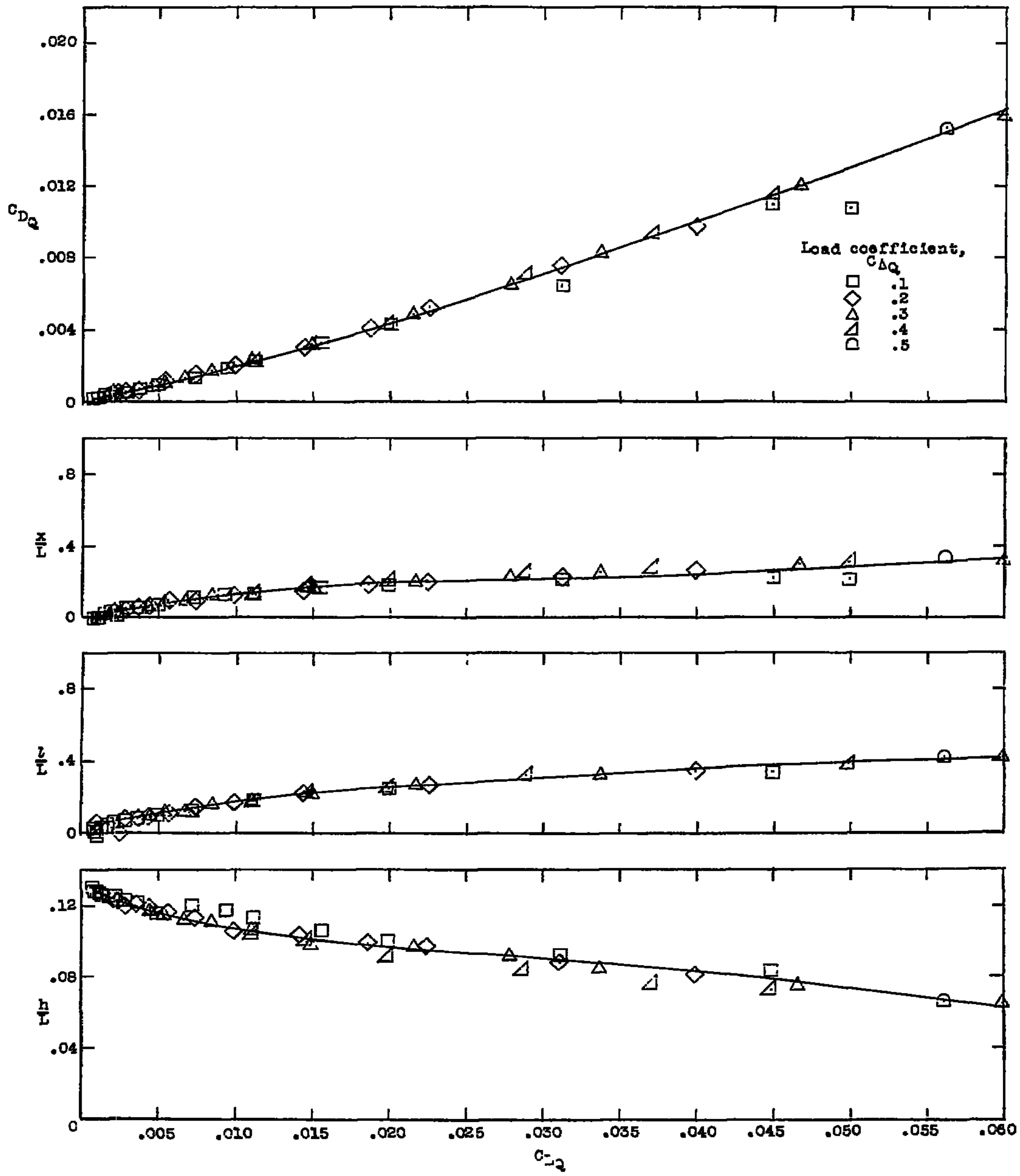

(b) Trim, 8°.

Figure 10.- Continued.



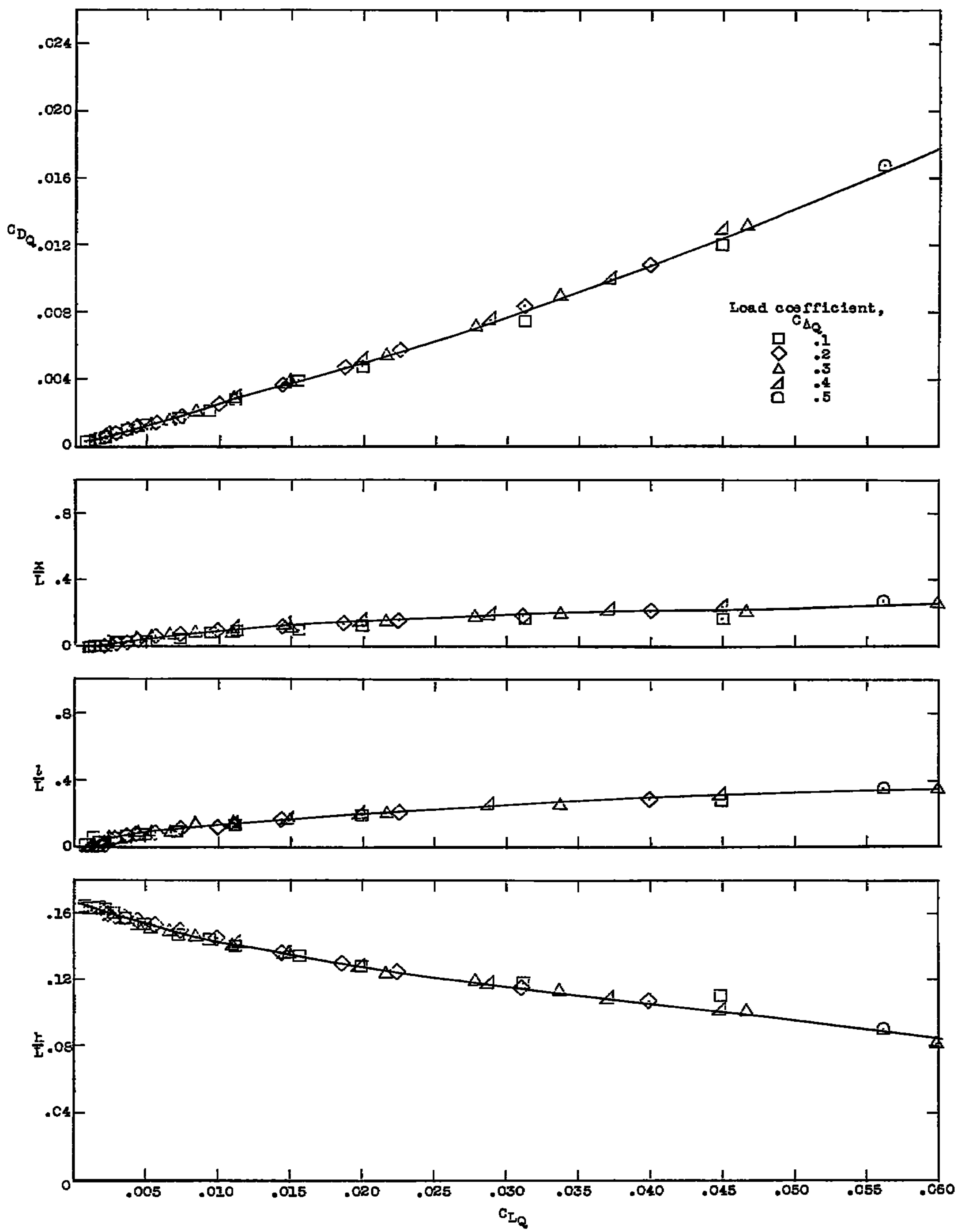

(c) Trim, 12°.

Figure 10.- Continued.




(d) Trim, 16°.

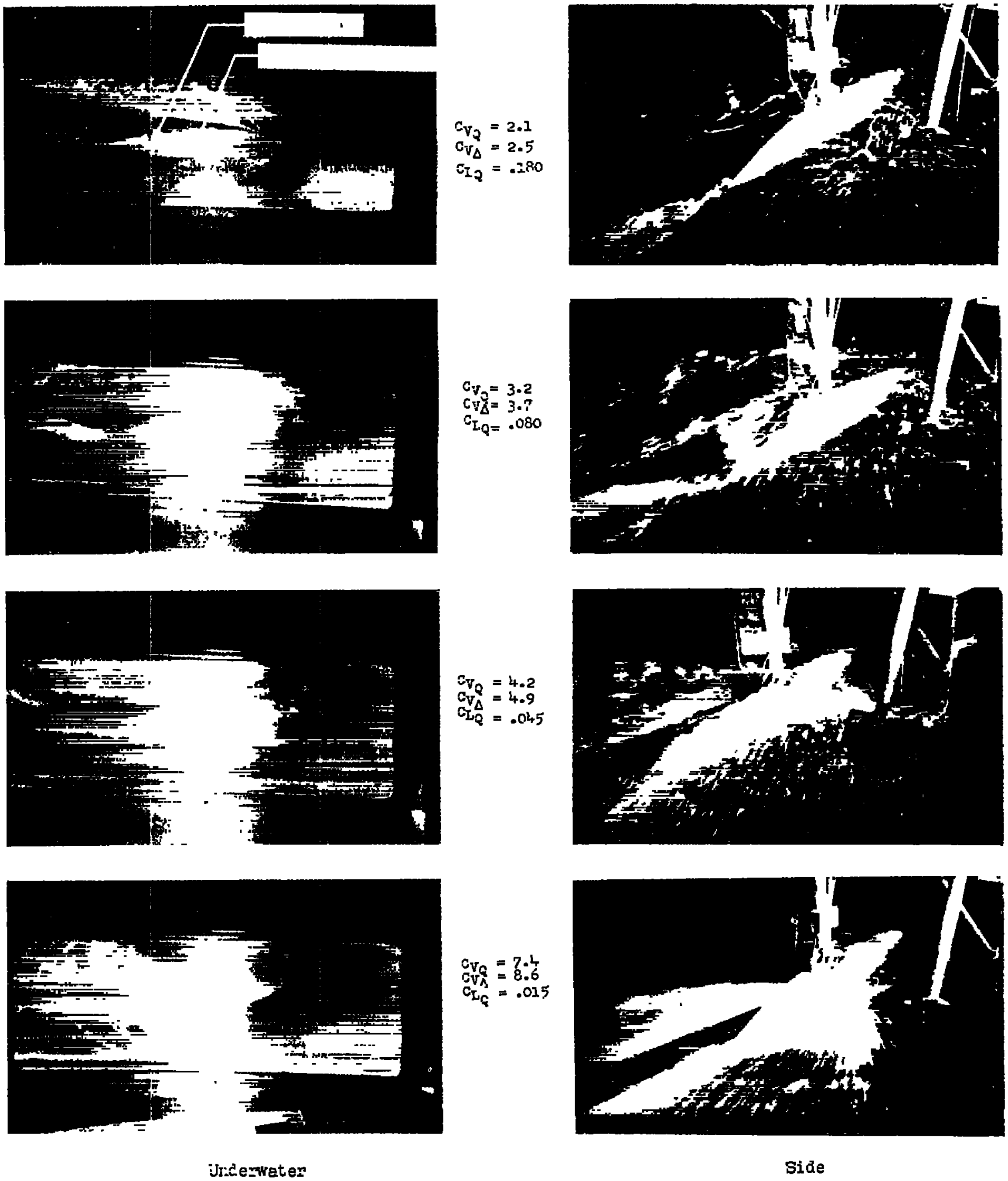
Figure 10.- Continued.




(e) Trim, 20°.

Figure 10.- Concluded.

[redacted]

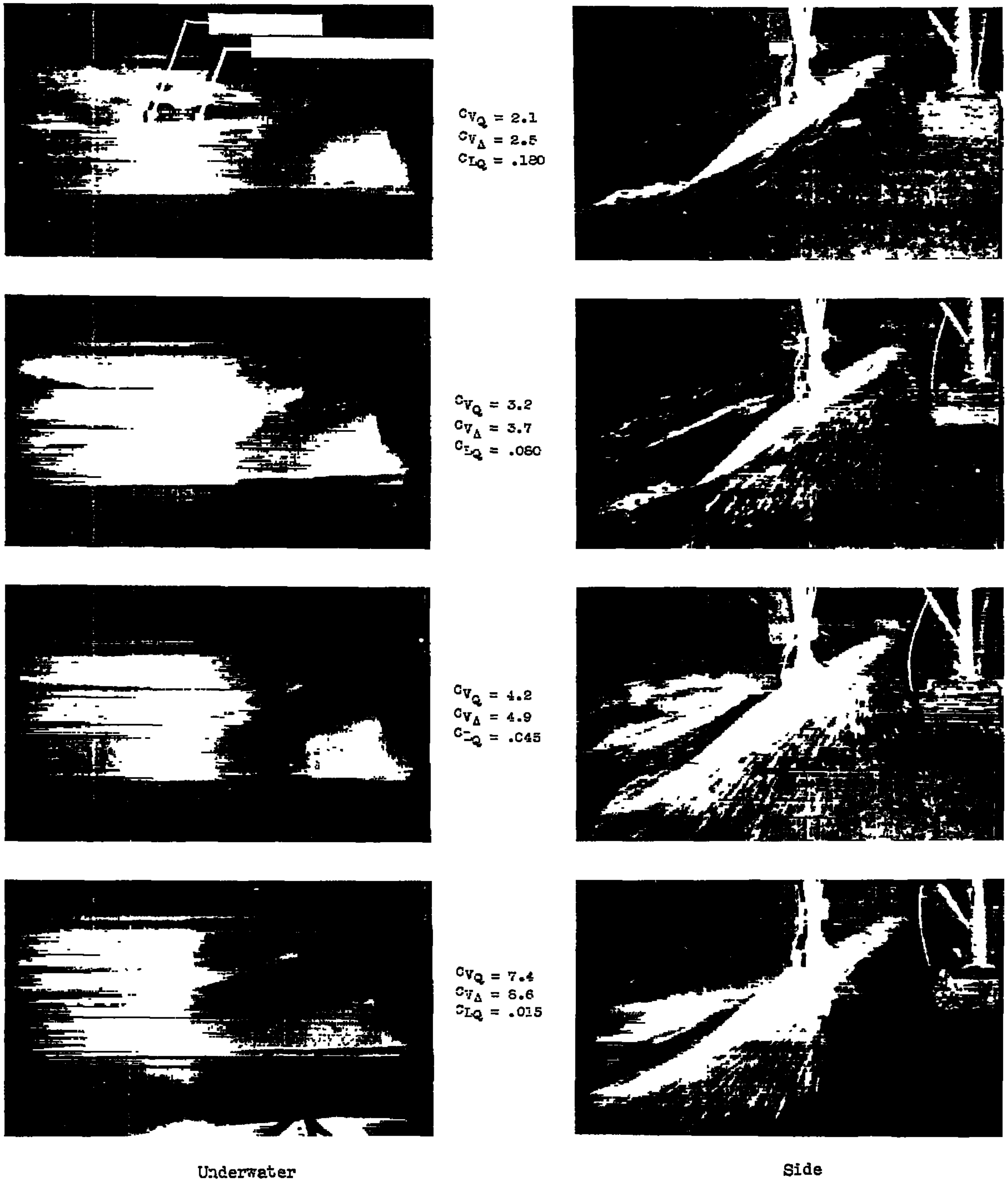



(a) Fineness ratio 6.

L-86475

Figure 11.- Spray characteristics of model with chine strips. Trim, 8°; load coefficient $C_{\Delta_Q} = 0.4$.

[redacted]

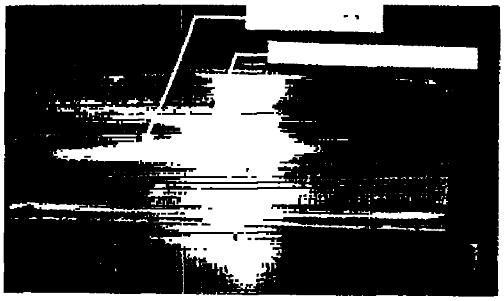



(b) Fineness ratio 9.

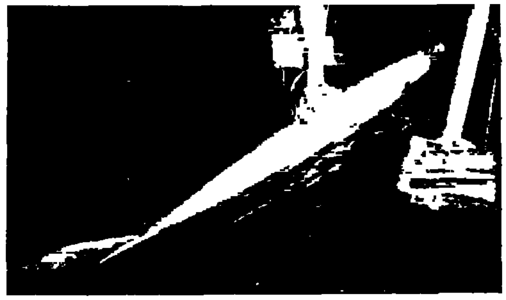
L-86476

Figure 11.- Continued.

[redacted]

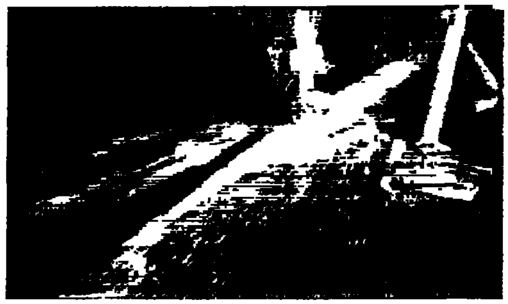


$C_{V_Q} = 2.1$
$C_{V_\Delta} = 2.5$
$C_{L_Q} = .180$



$C_{V_Q} = 3.2$
$C_{V_\Delta} = 3.7$
$C_{L_Q} = .080$

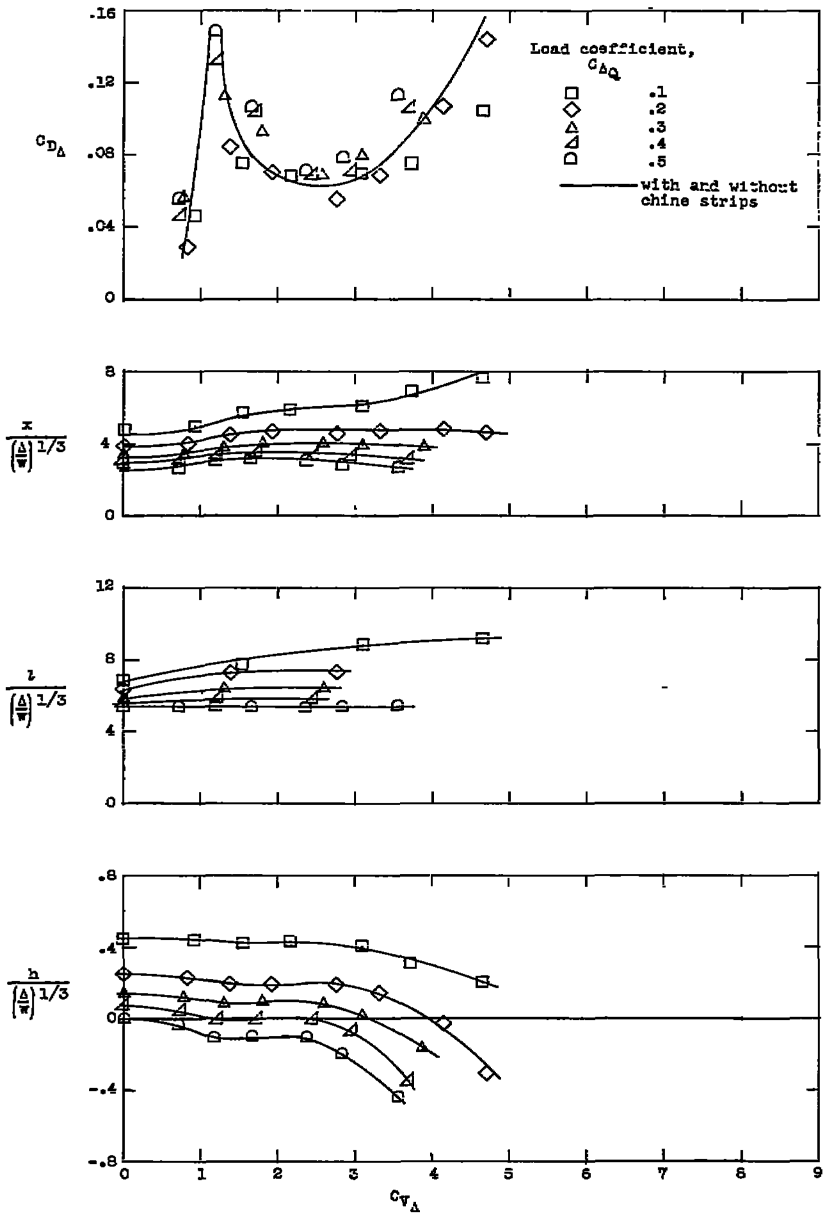
$C_{V_Q} = 4.2$
$C_{V_\Delta} = 4.9$
$C_{L_Q} = .045$



$C_{V_Q} = 7.4$
$C_{V_\Delta} = 8.6$
$C_{L_Q} = .015$

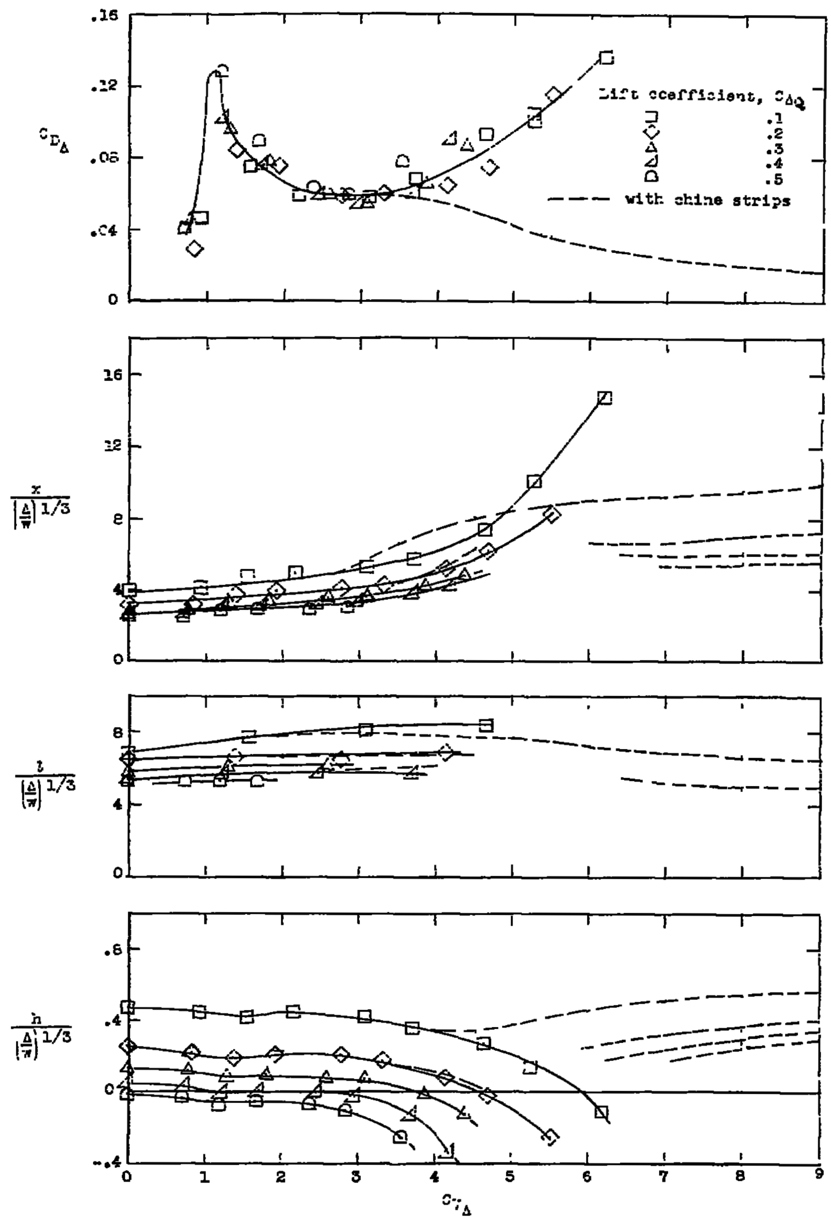
(c) Fineness ratio 12. L-86477

Figure 11.- Concluded.



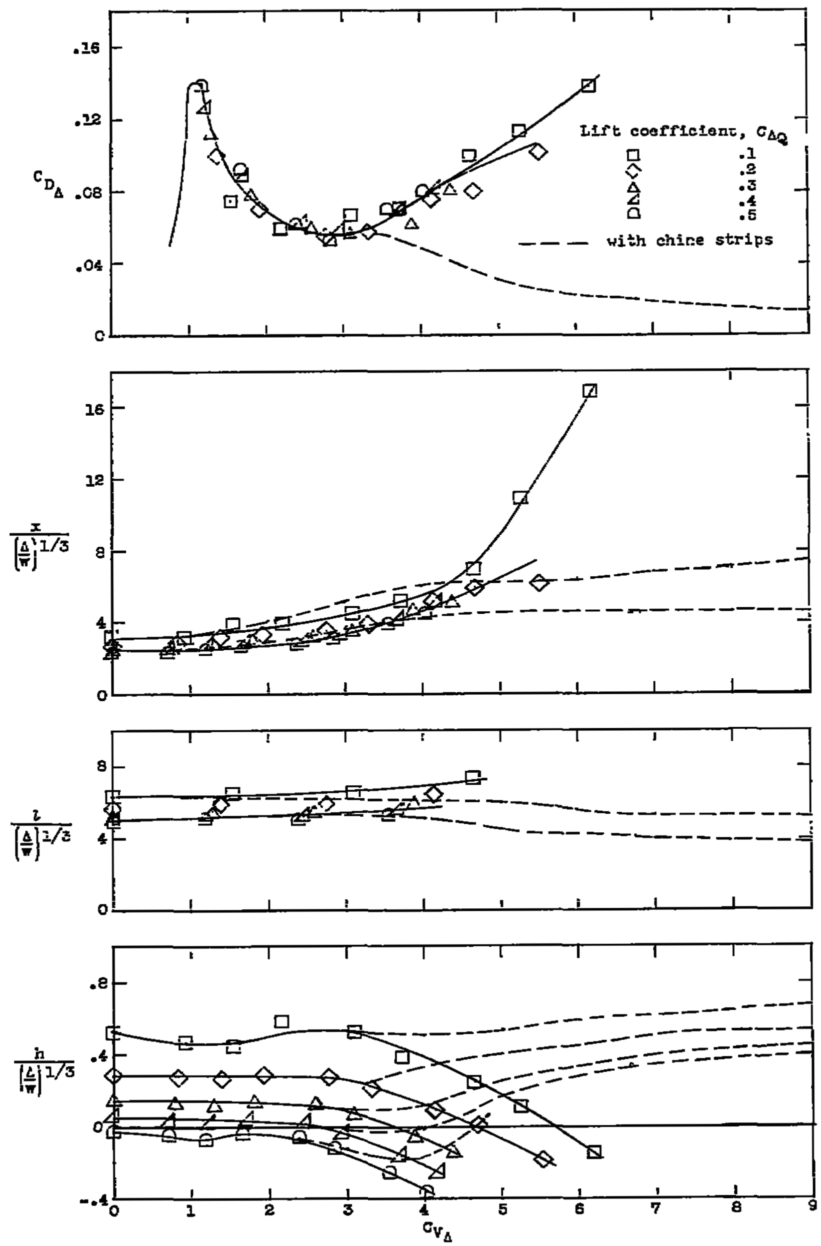

(a) Trim, 0°.

Figure 12.- Hydrodynamic characteristics of models without chine strips. Fineness ratio 6; displacement condition.




(b) Trim, 4°.

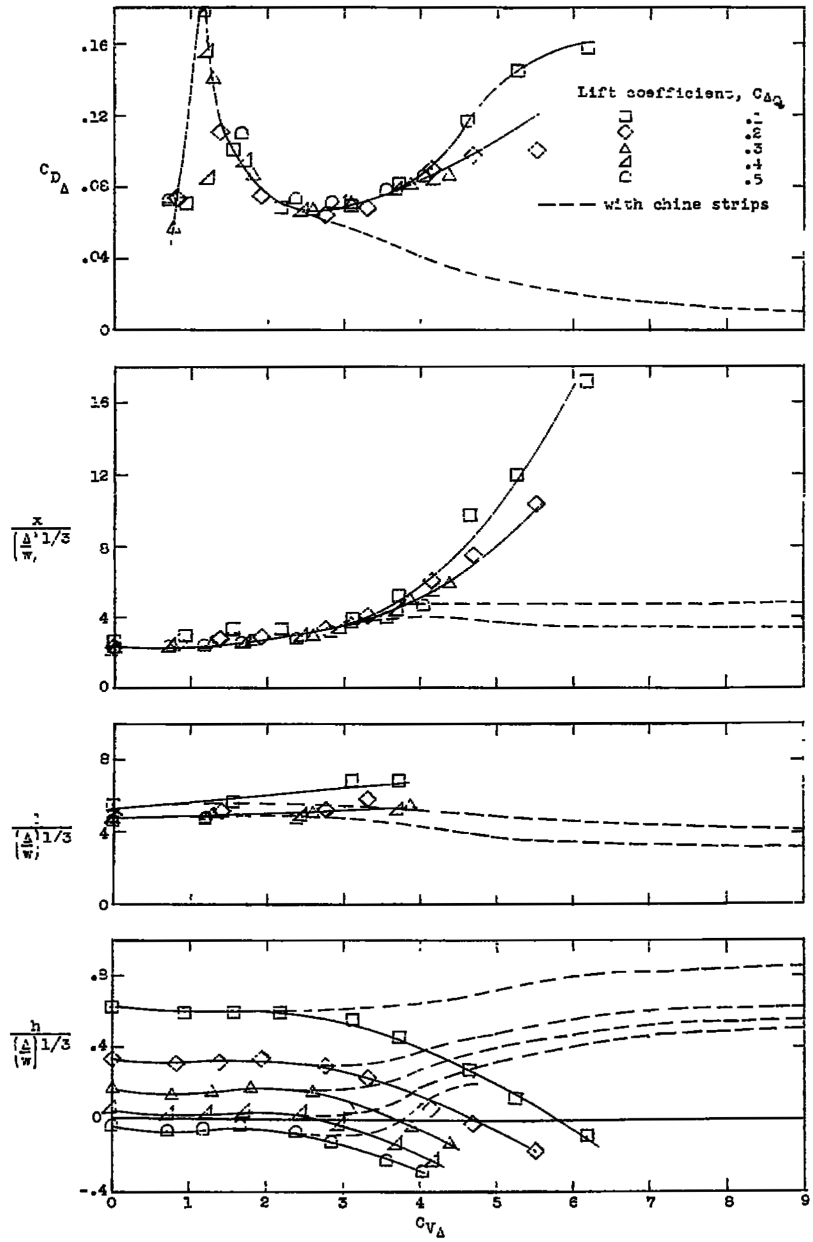
Figure 12.- Continued.




(c) Trim, 8°.

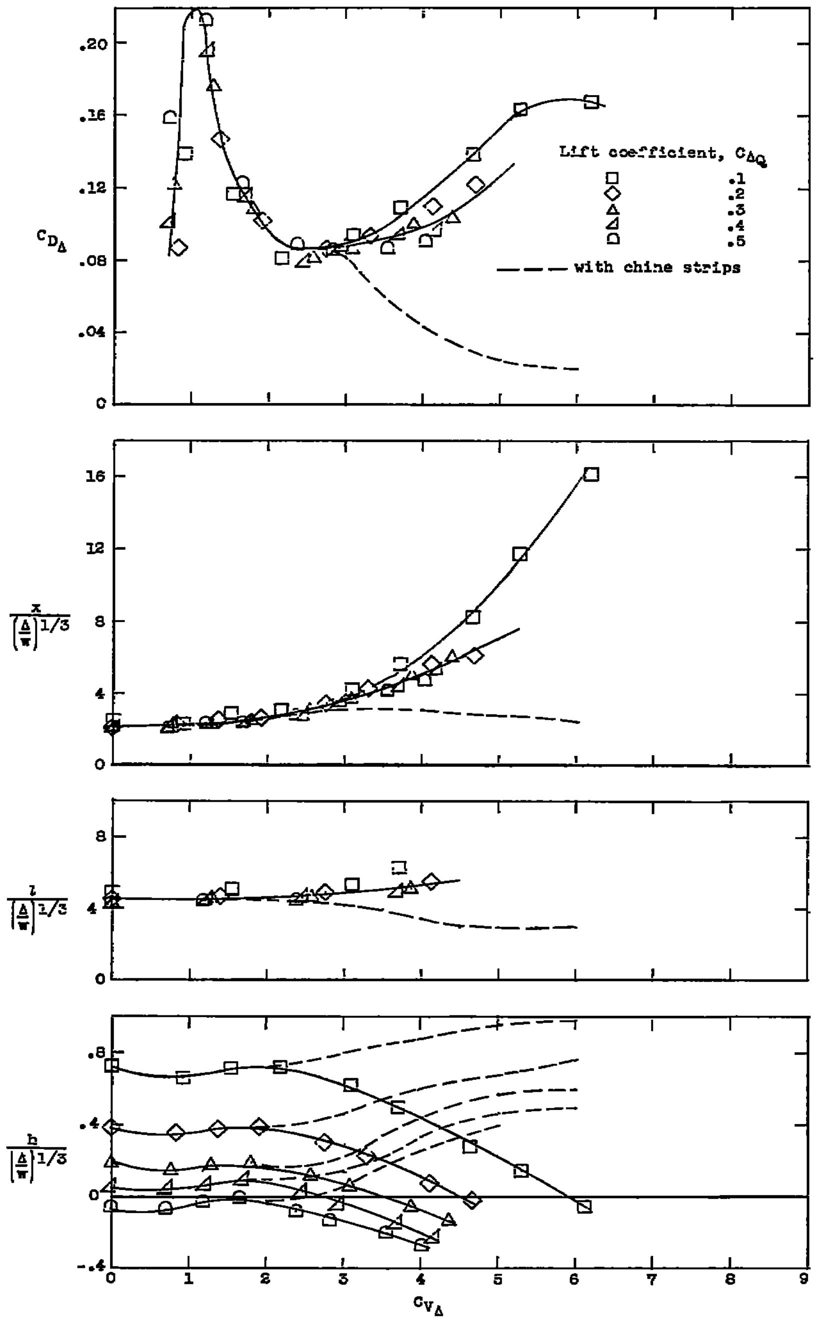
Figure 12.- Continued.

[redacted]



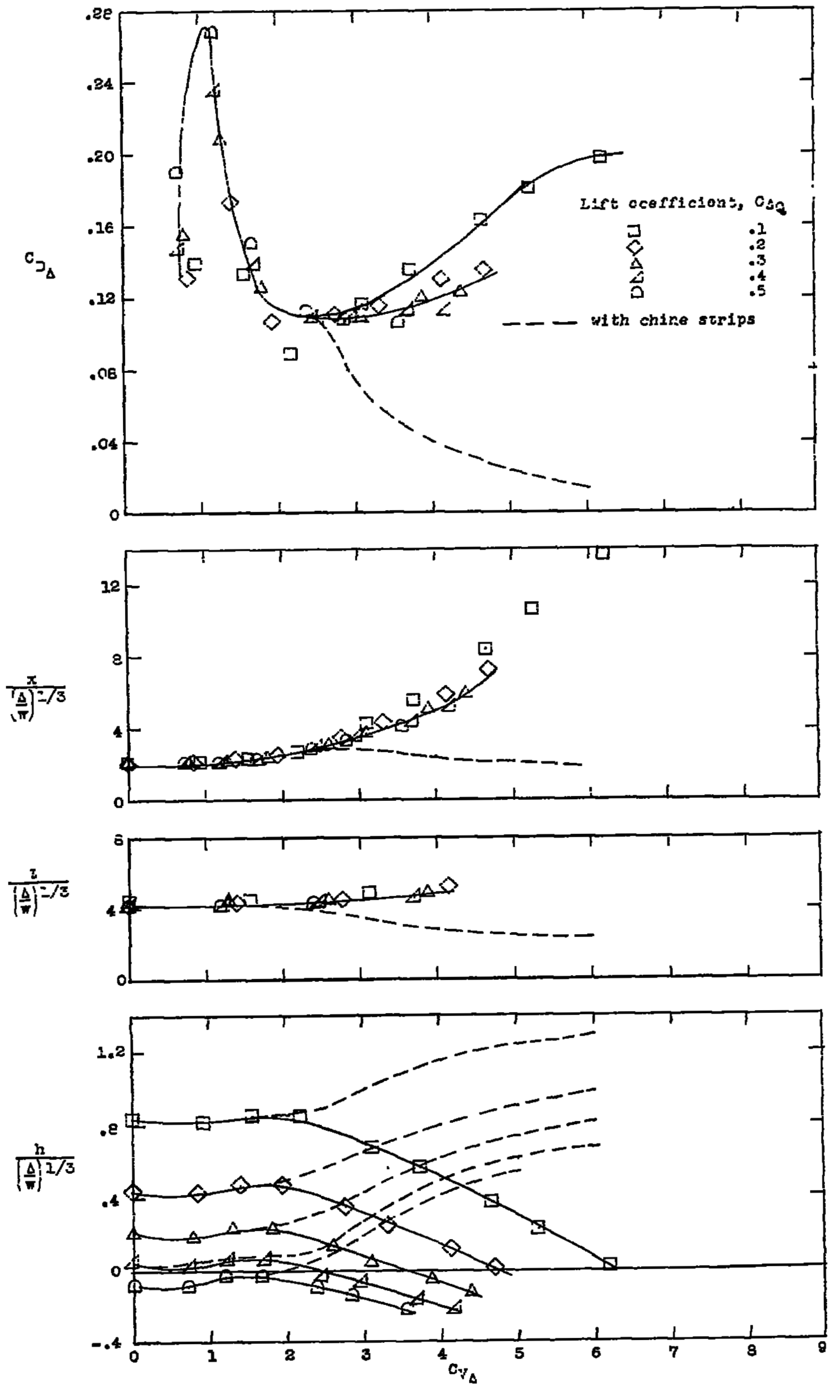

(d) Trim, 12°.

Figure 12.- Continued.



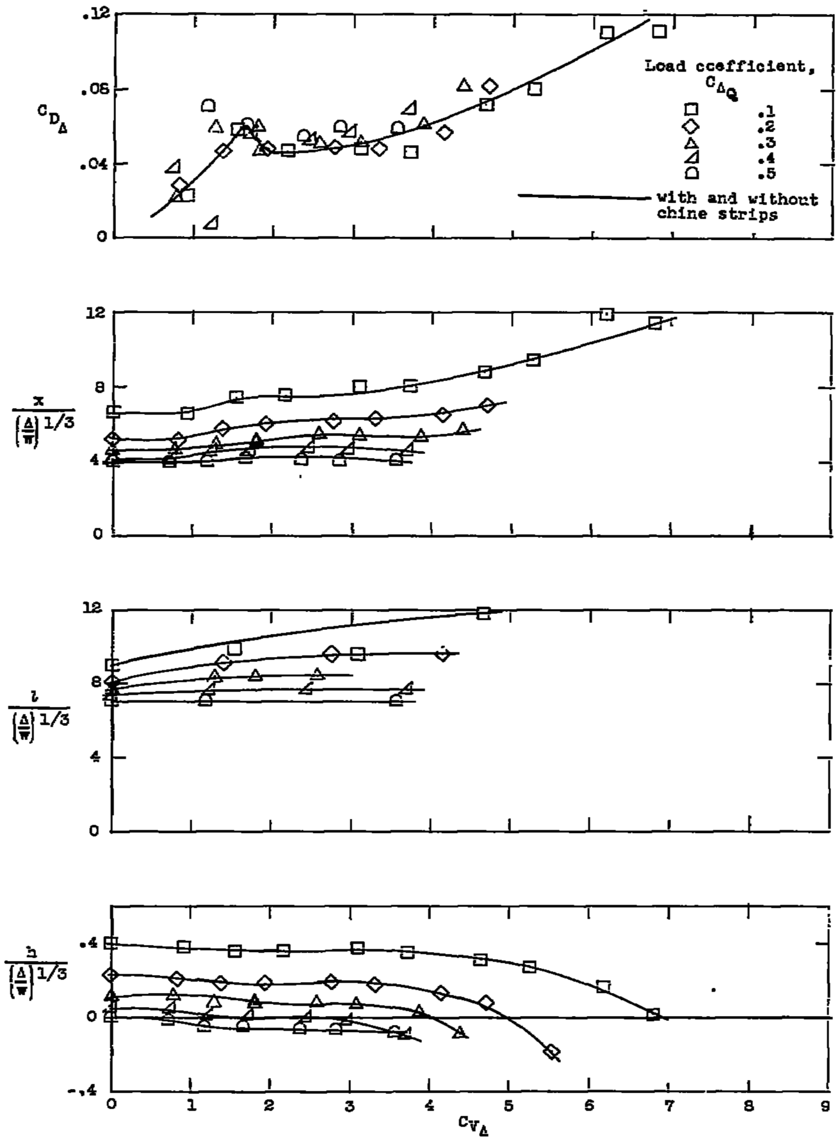

(e) Trim, 16°.

Figure 12.- Continued.



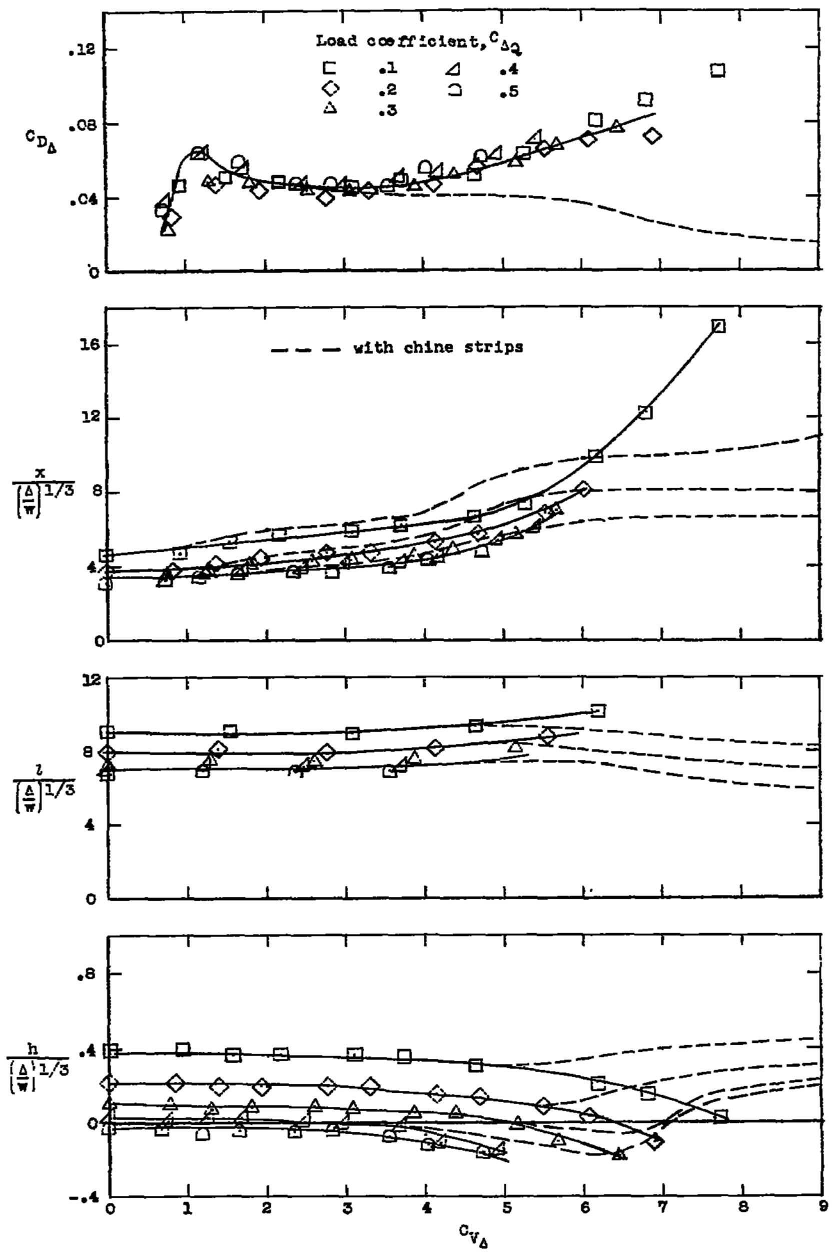

(f) Trim, 20°.

Figure 12.- Concluded.



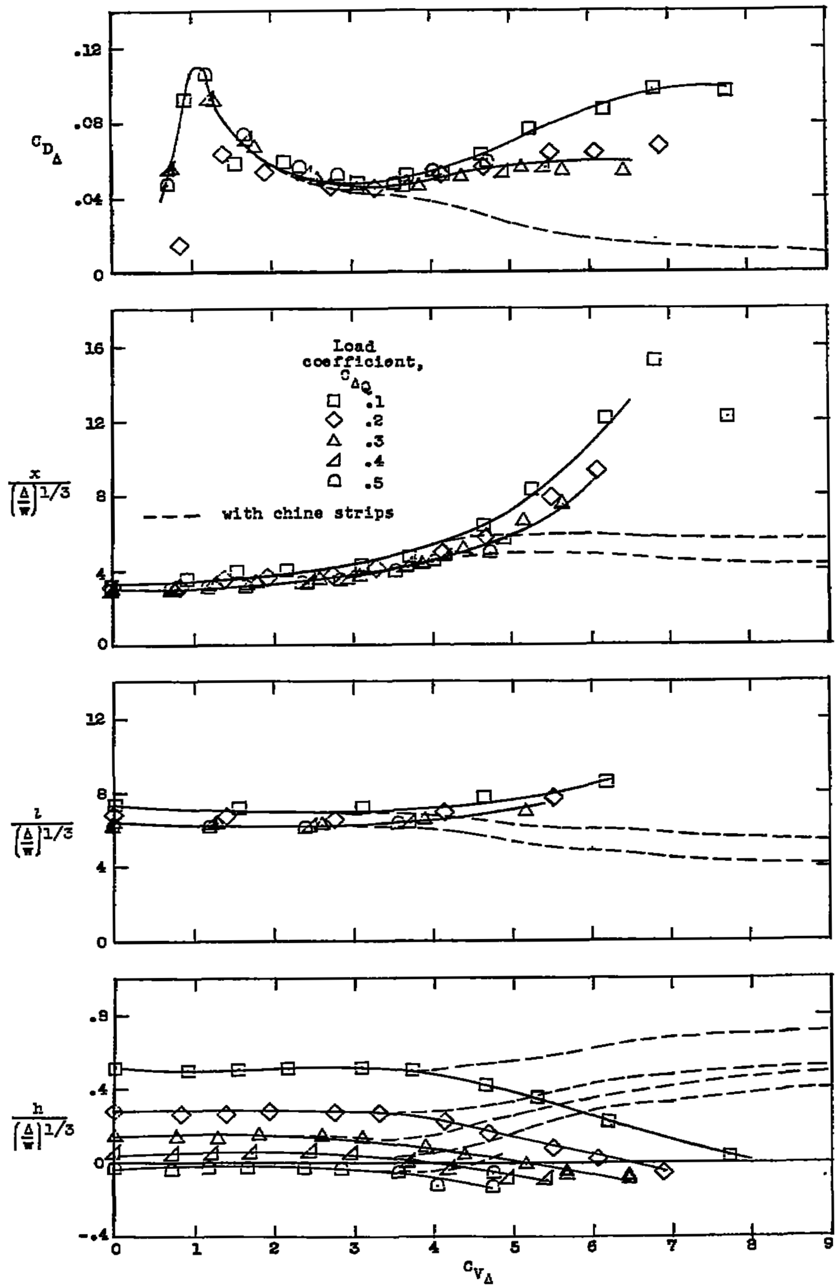

(a) Trim, 0°.

Figure 13.- Hydrodynamic characteristics of models without chine strips. Fineness ratio 9; displacement condition.



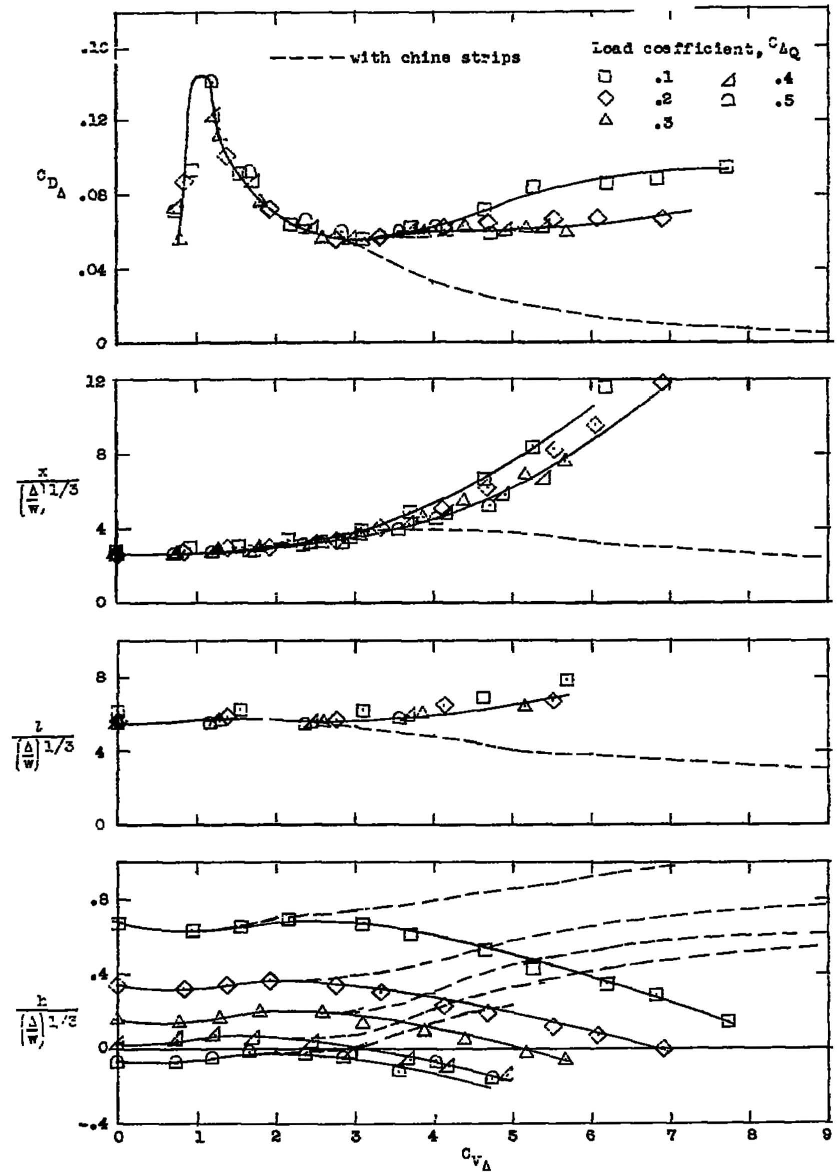

(b) Trim, 4°.

Figure 13.- Continued.



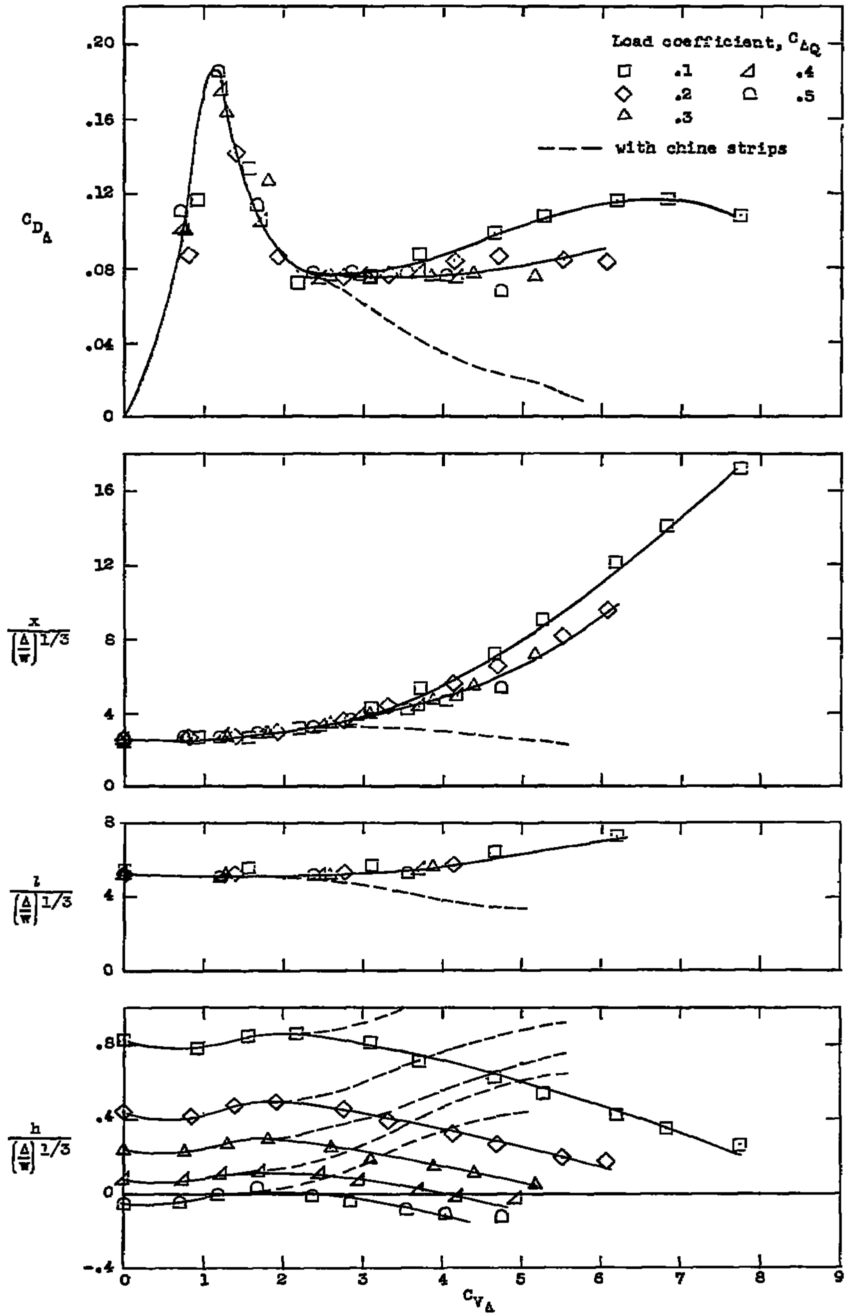

(c) Trim, 8°.

Figure 13.- Continued.



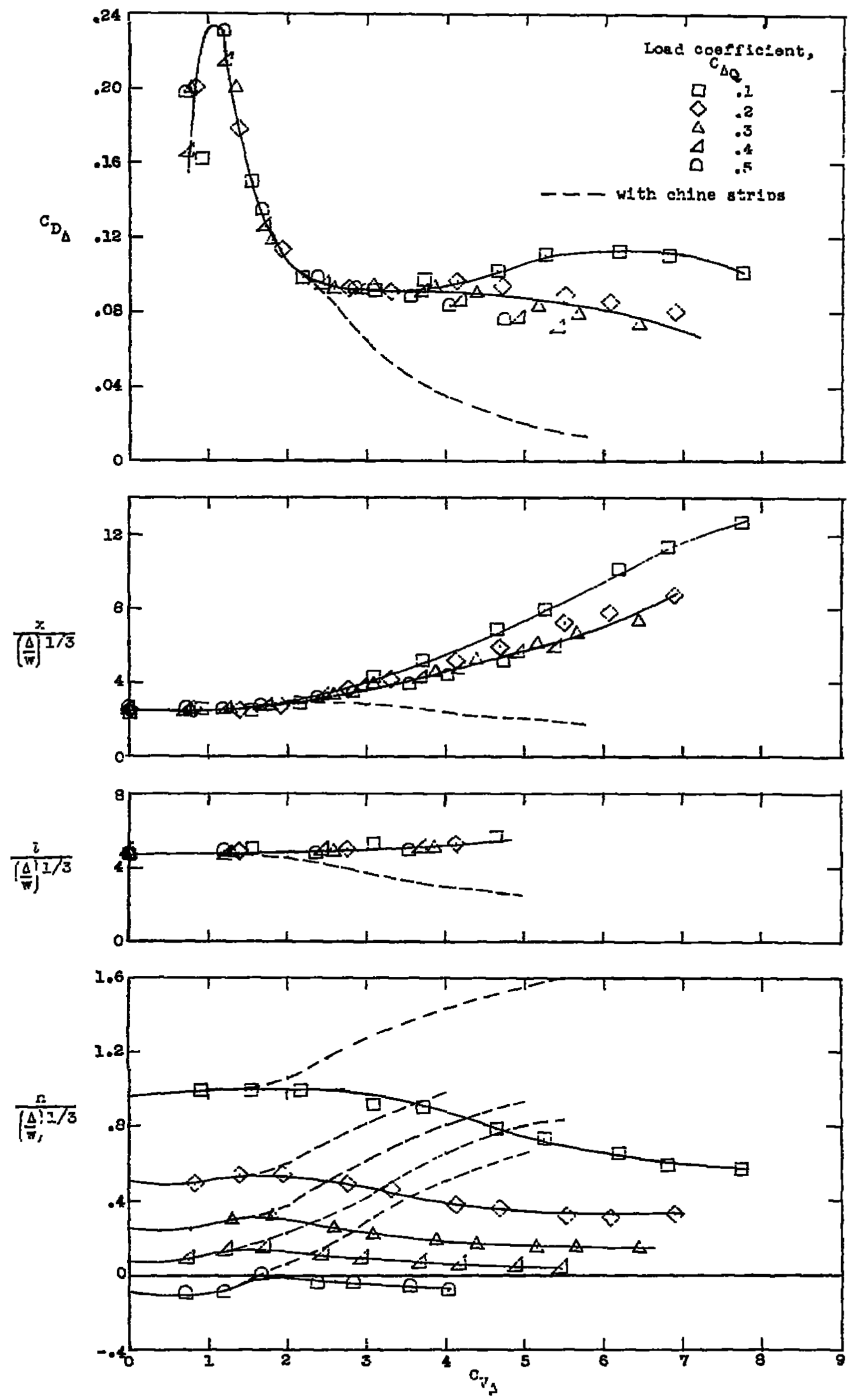

(d) Trim, 12°.

Figure 13.- Continued.




(e) Trim, 16°.

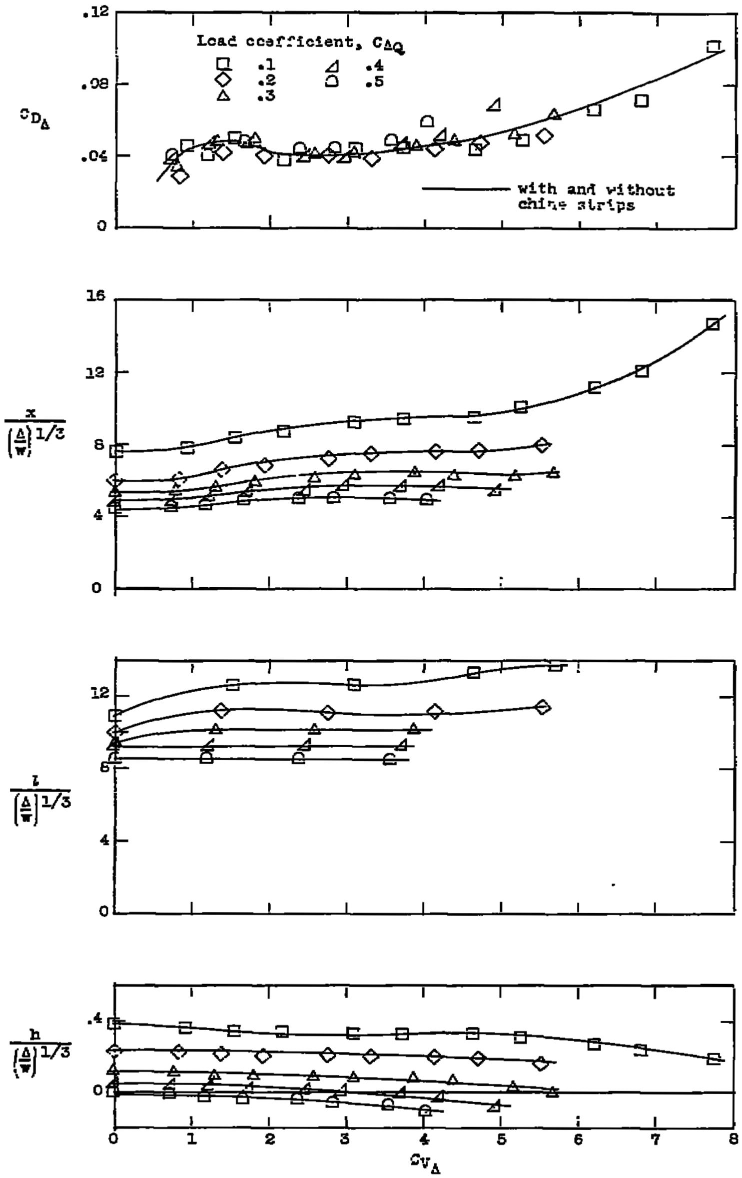
Figure 13.- Continued.




(f) Trim, 20°.

Figure 13.- Concluded.

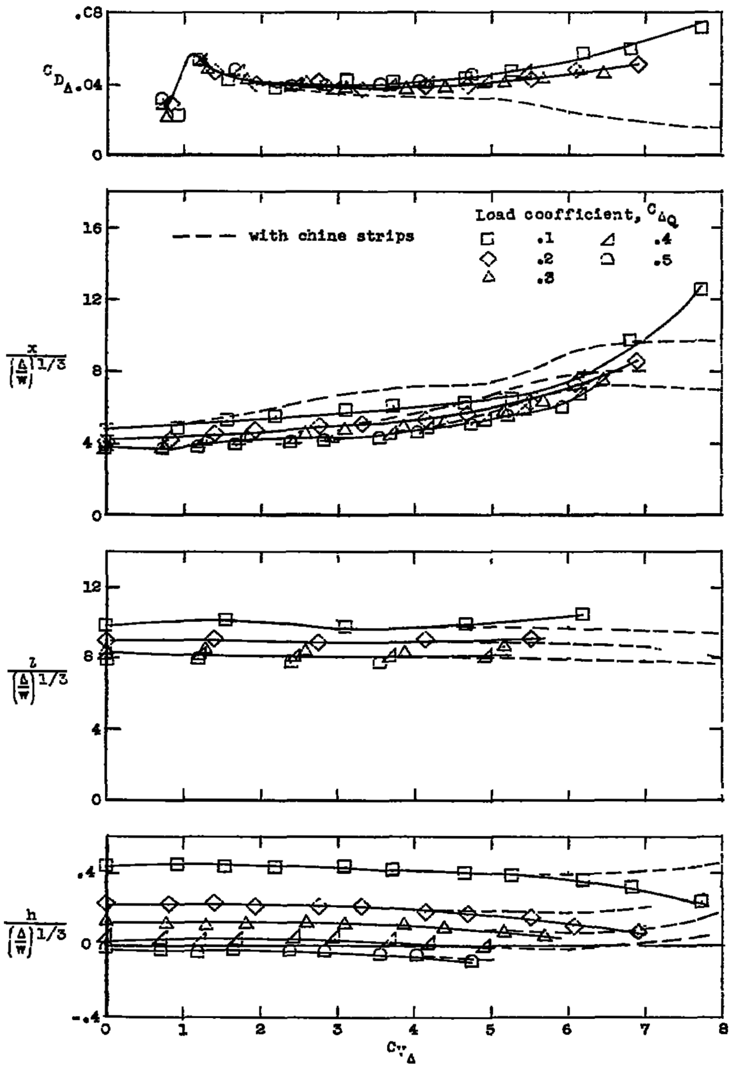
[redacted]




(a) Trim, $0^{\circ}$.

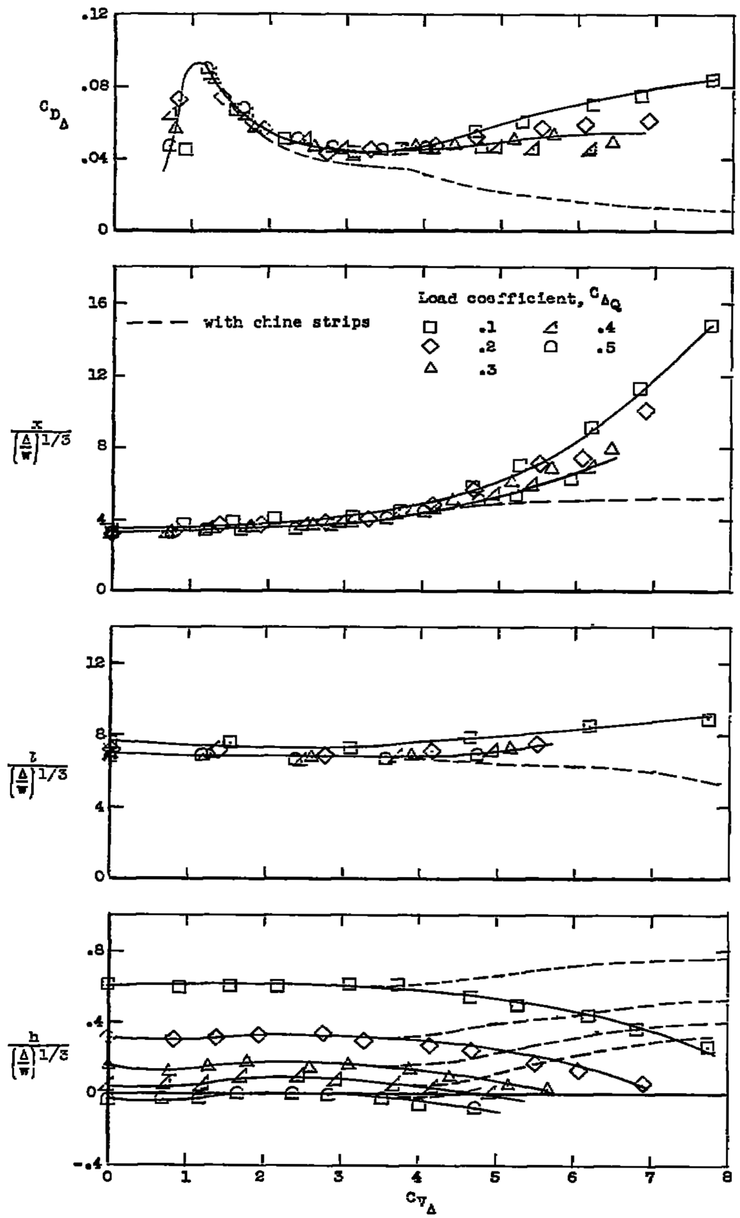
Figure 14.- Hydrodynamic characteristics of models without chine strips. Fineness ratio 12; displacement condition.

[redacted]




(b) Trim, 4°.

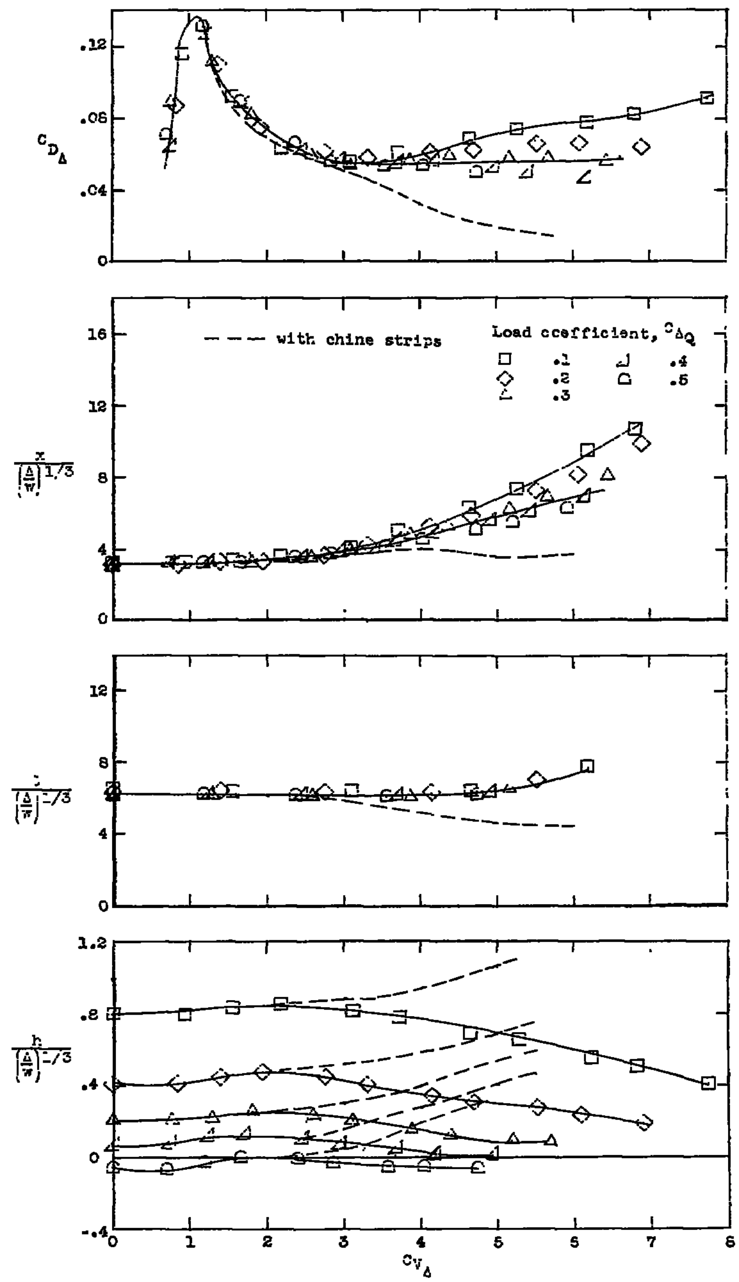
Figure 14.- Continued.




(c) Trim, 8°.

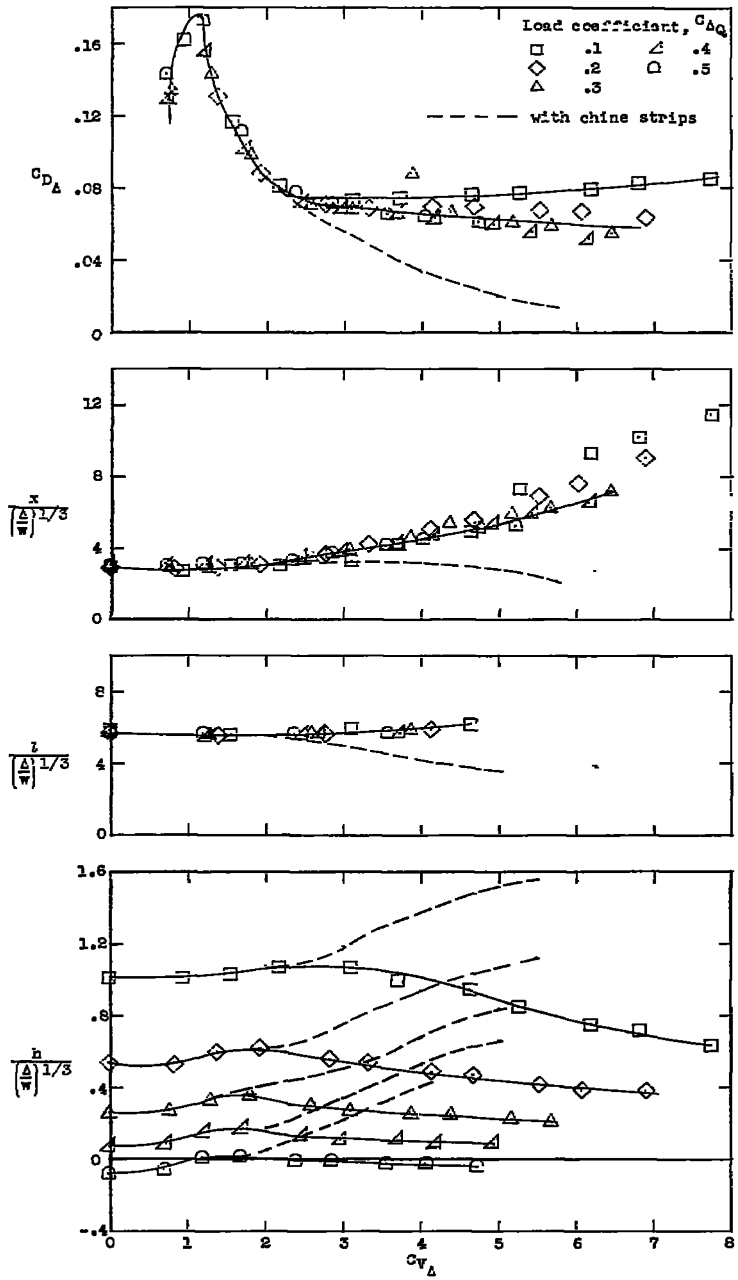
Figure 14.- Continued.

[redacted]




(d) Trim, 12°.

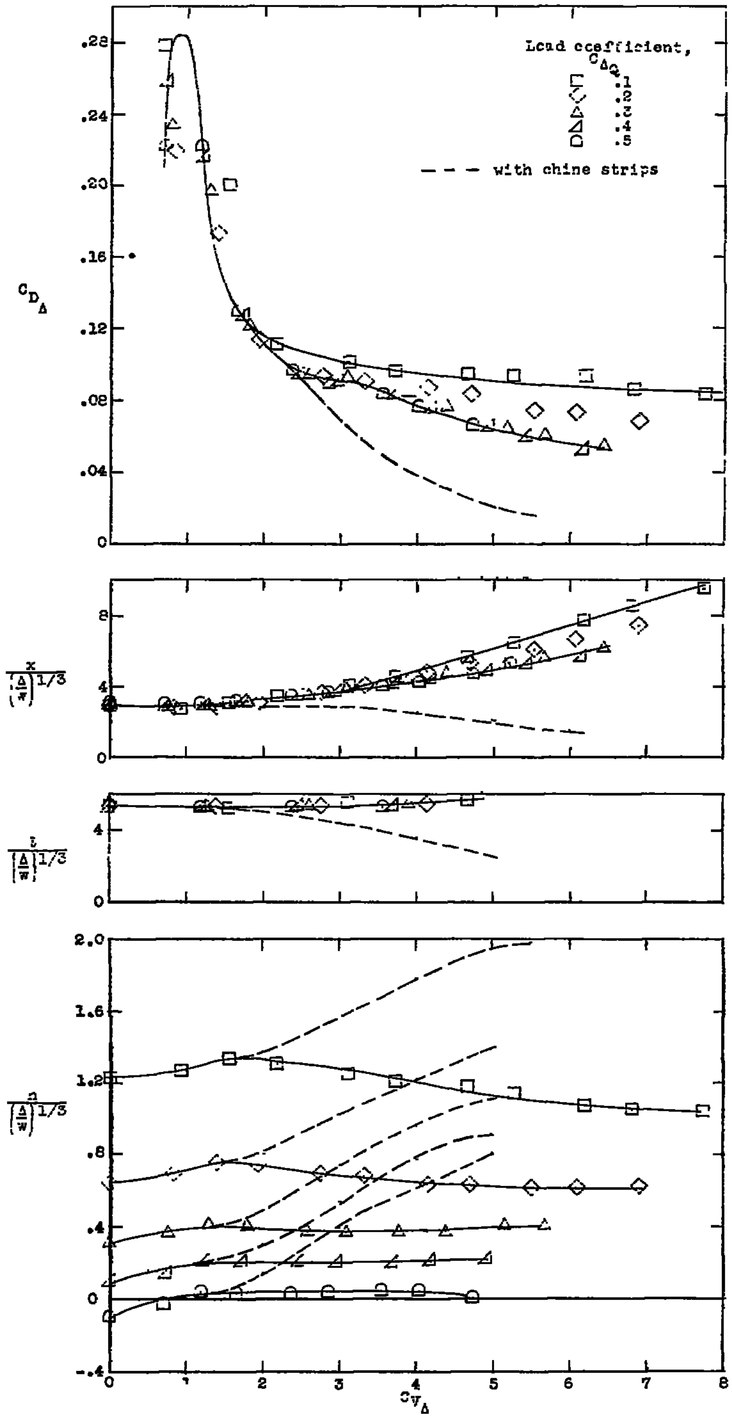
Figure 14.- Continued.




(e) Trim, 16°.

Figure 14.- Continued.

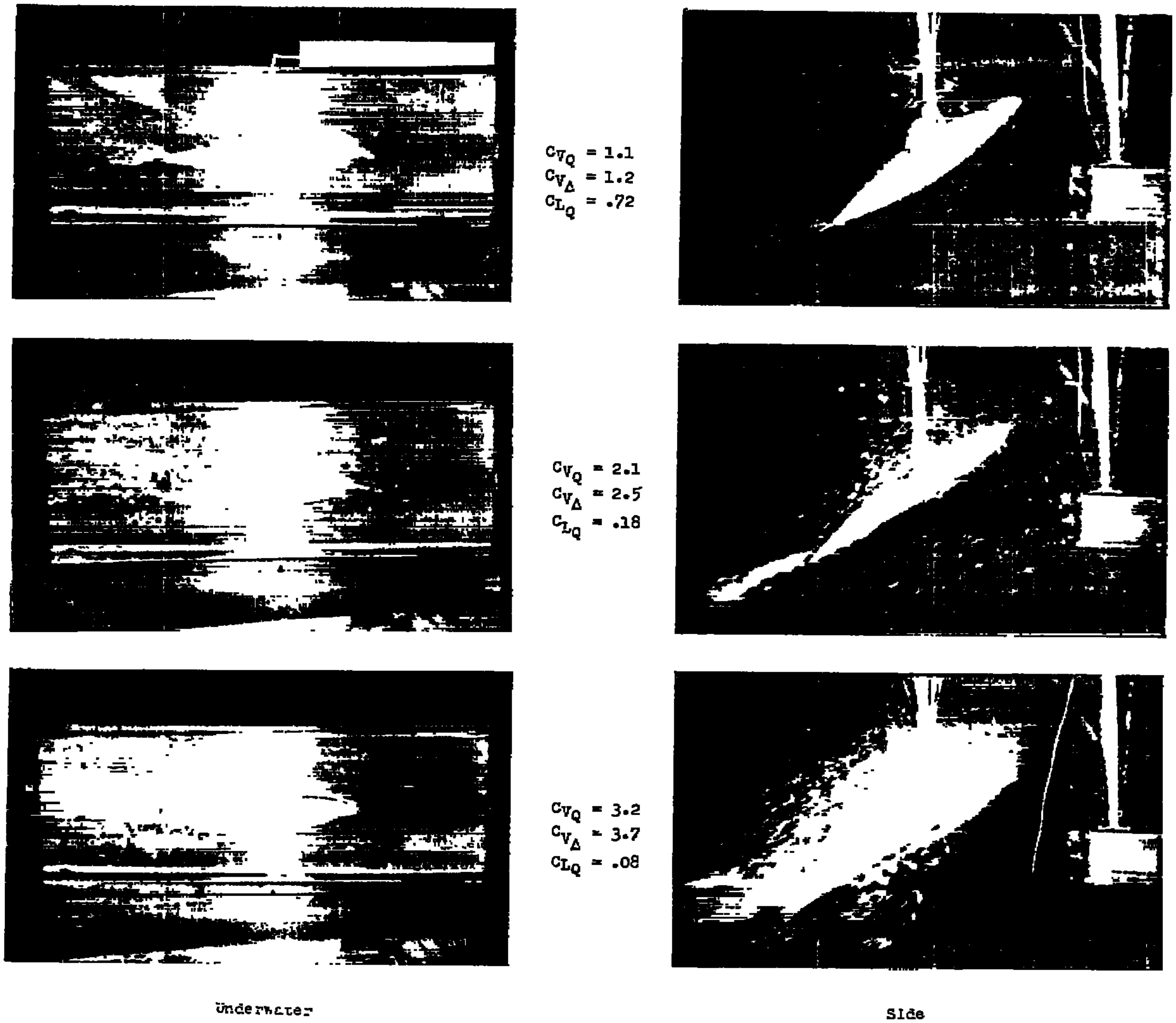
[redacted]




(f) Trim, 20°.

Figure 14.- Concluded.

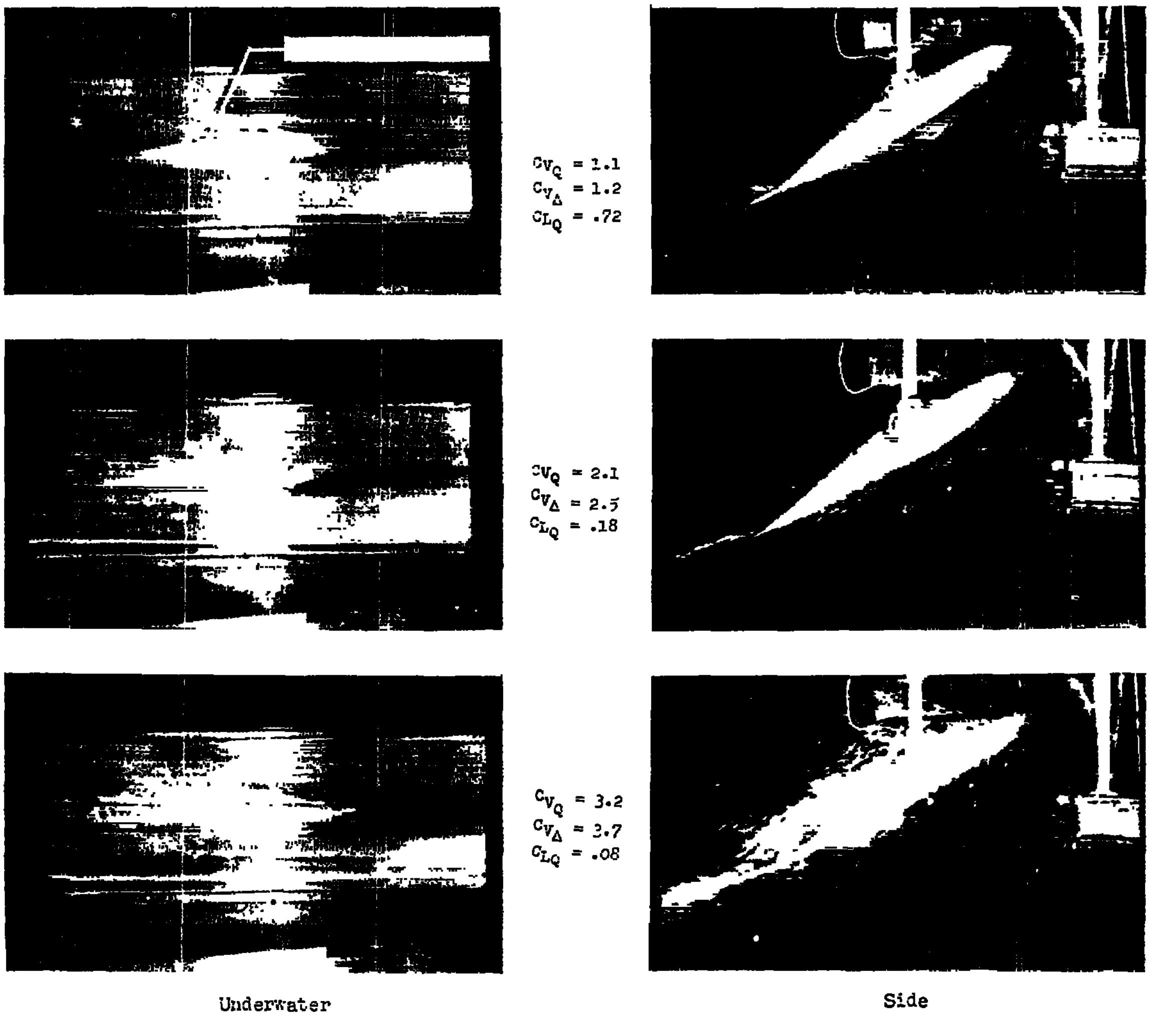
[redacted]




(a) Fineness ratio 6.

L-86478

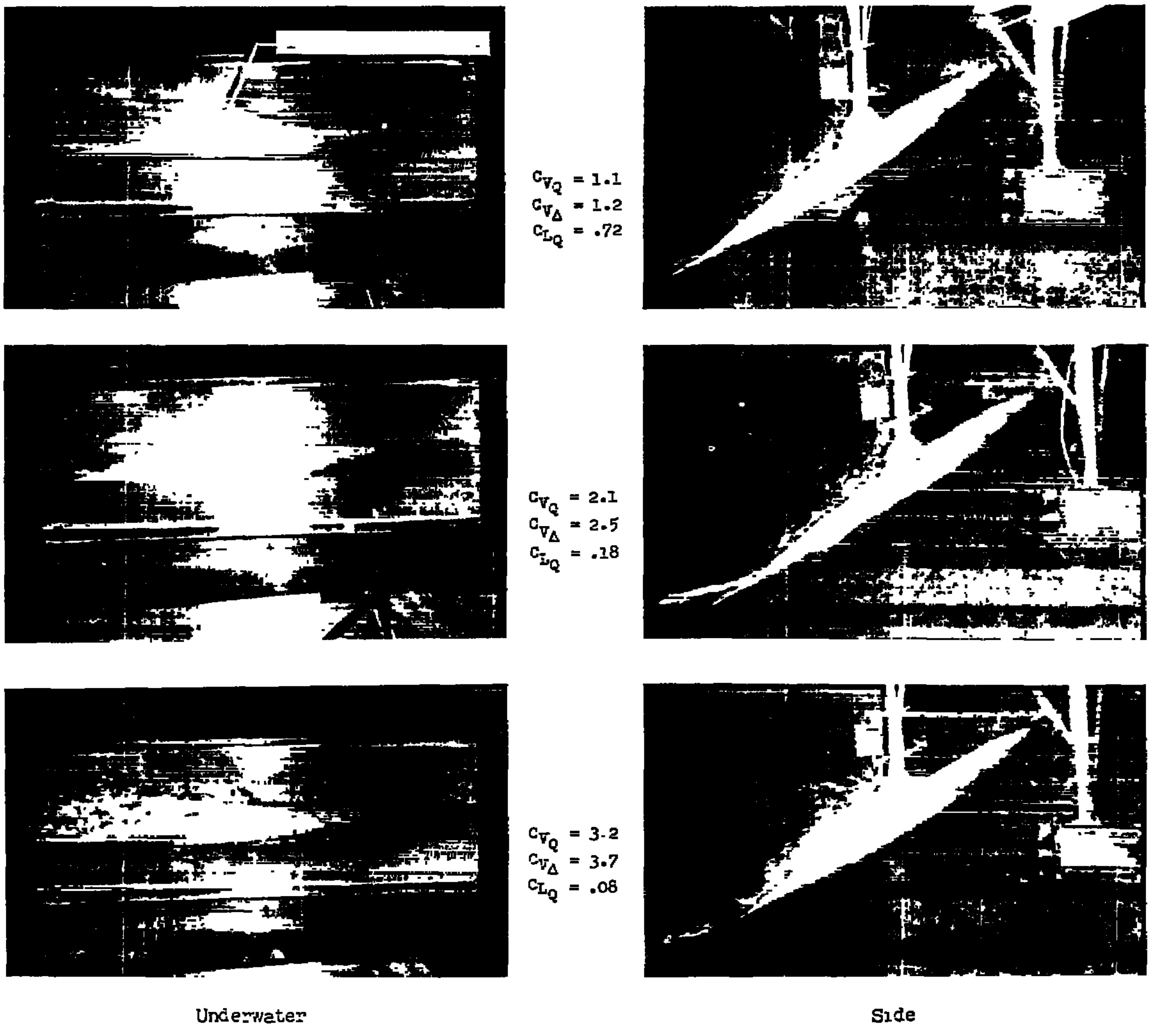
Figure 15.- Spray characteristics of models without chine strips. Trim, $8^{\circ}$; load coefficient $C_{\Delta_Q} = 0.4$.




L-86479

(b) Fineness ratio 9.

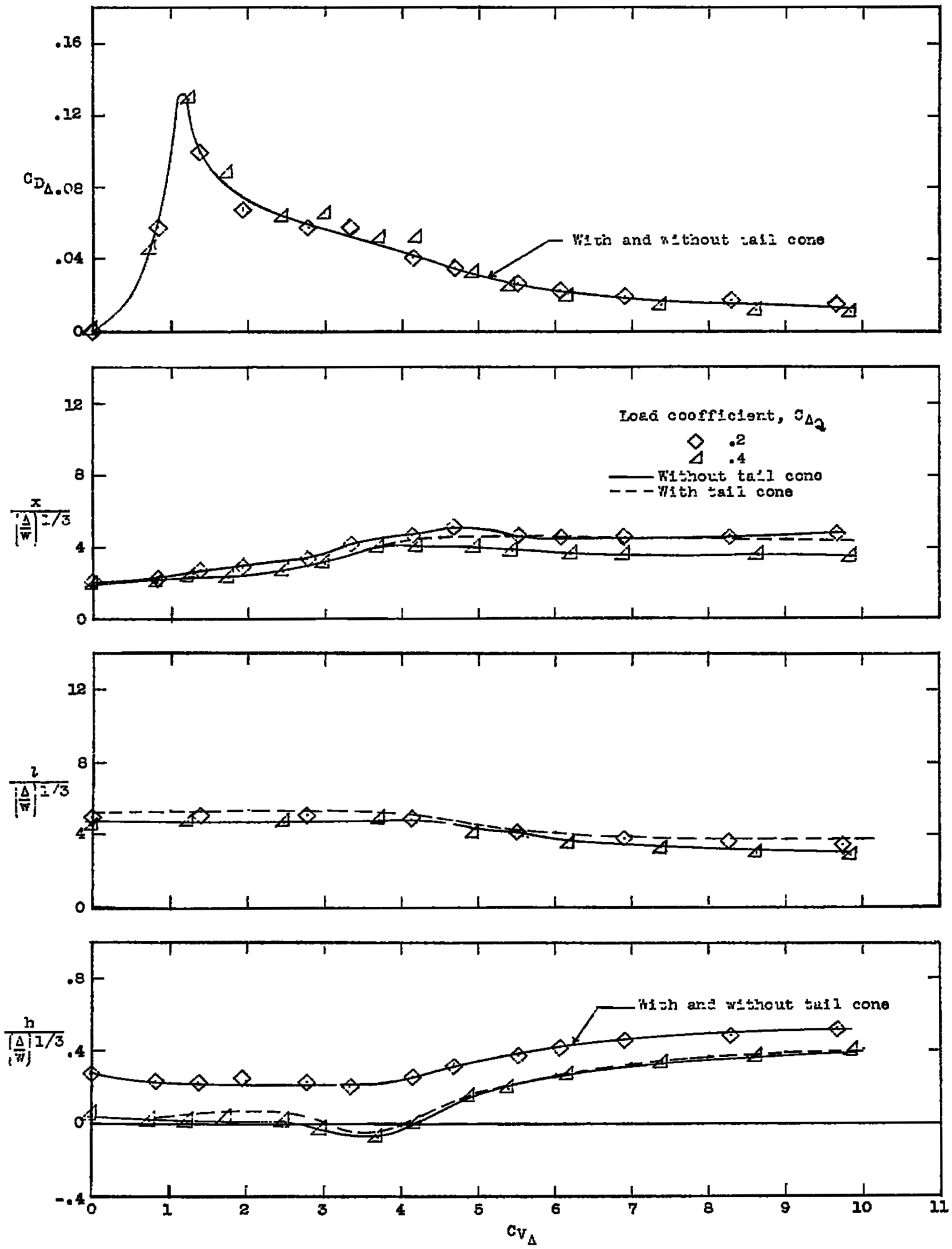
Figure 15.- Continued.




L-86480

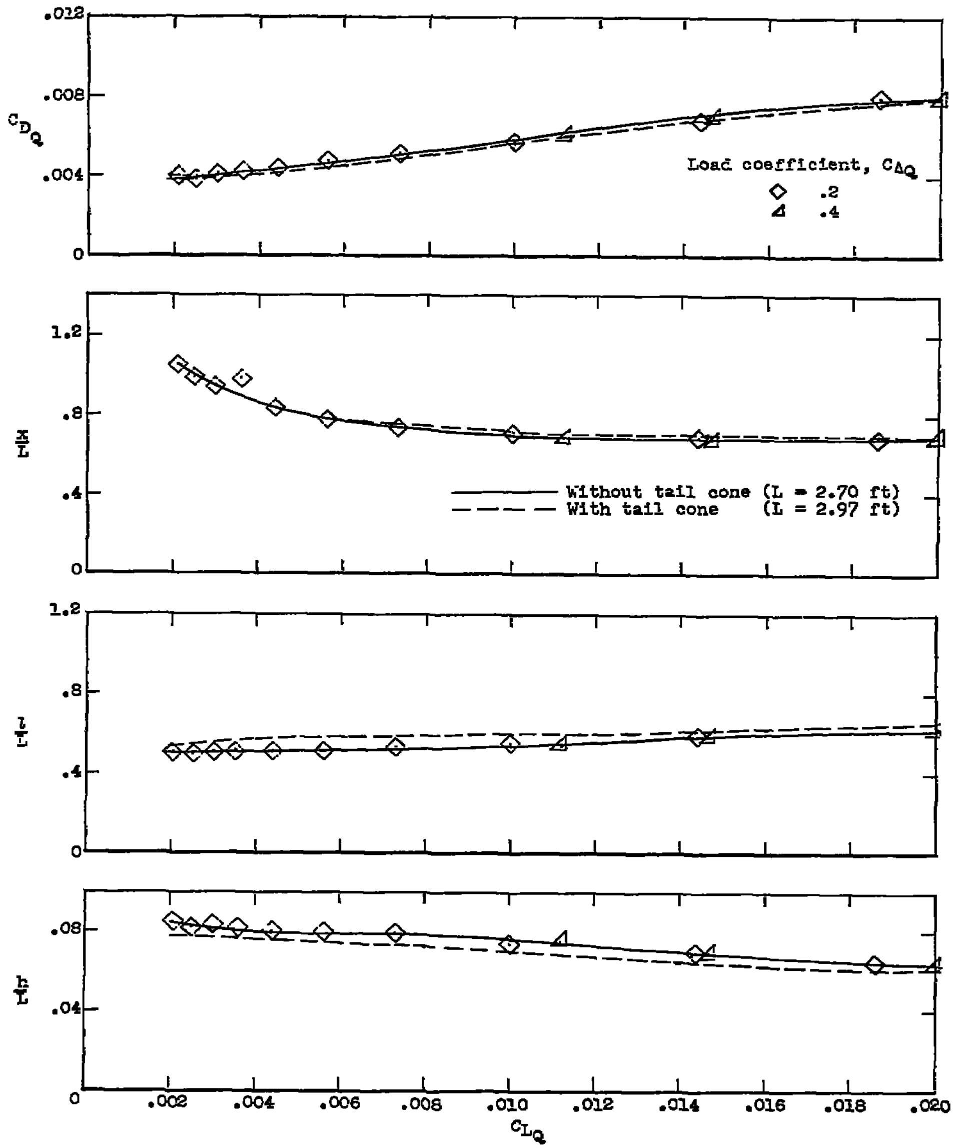
(c) Fineness ratio 12.

Figure 15.- Concluded.



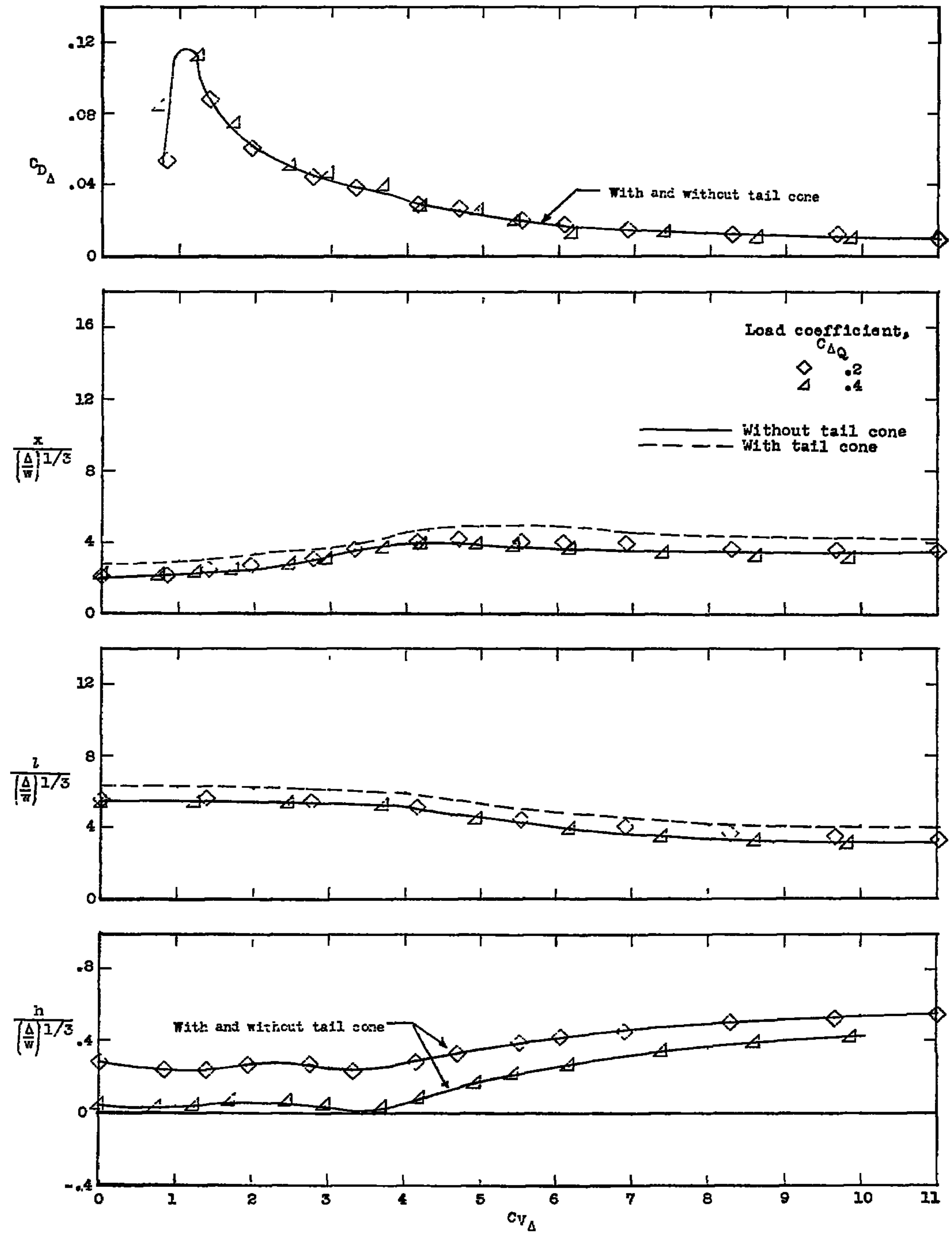

(a) Displacement condition.

Figure 16.- Hydrodynamic characteristics of models with chine strips but with the tail cones removed. Fineness ratio 6; trim, 8°.




(b) Planing condition.

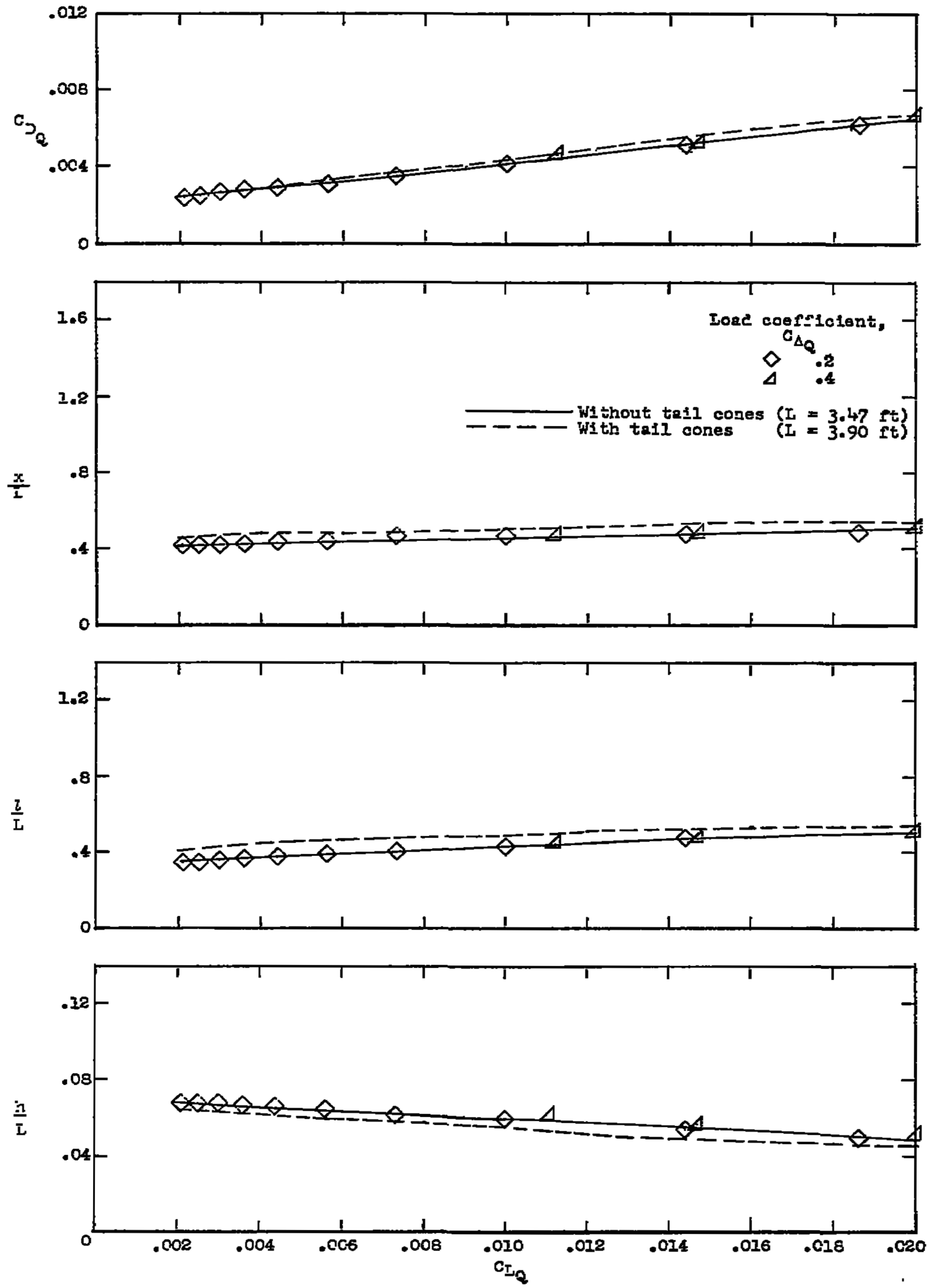
Figure 16.- Concluded.




(a) Displacement condition.

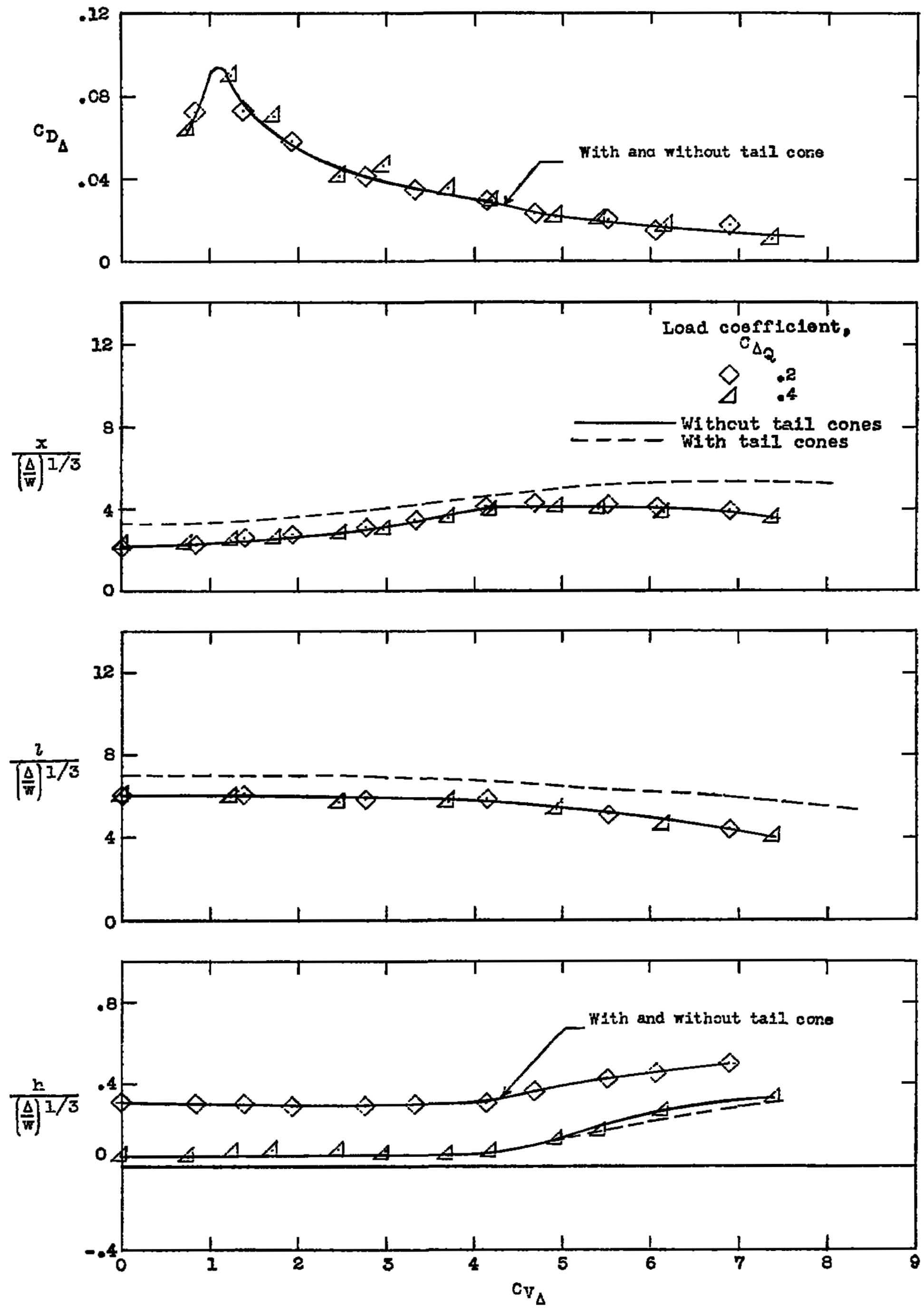
Figure 17.- Hydrodynamic characteristics of models with chine strips but with the tail cones removed. Fineness ratio 9; trim, 8°.

[redacted]



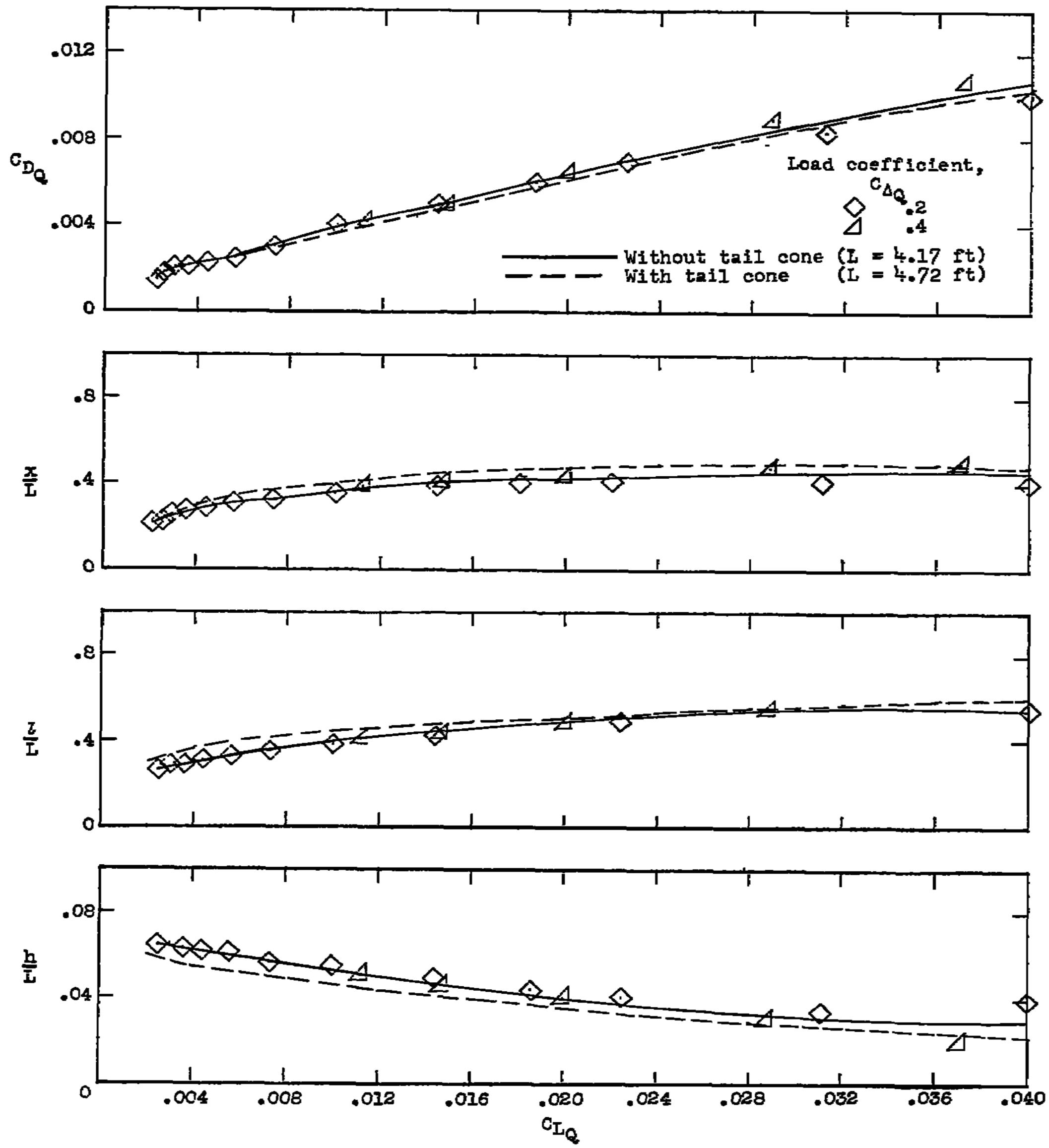

(b) Planing condition.

Figure 17.- Concluded.



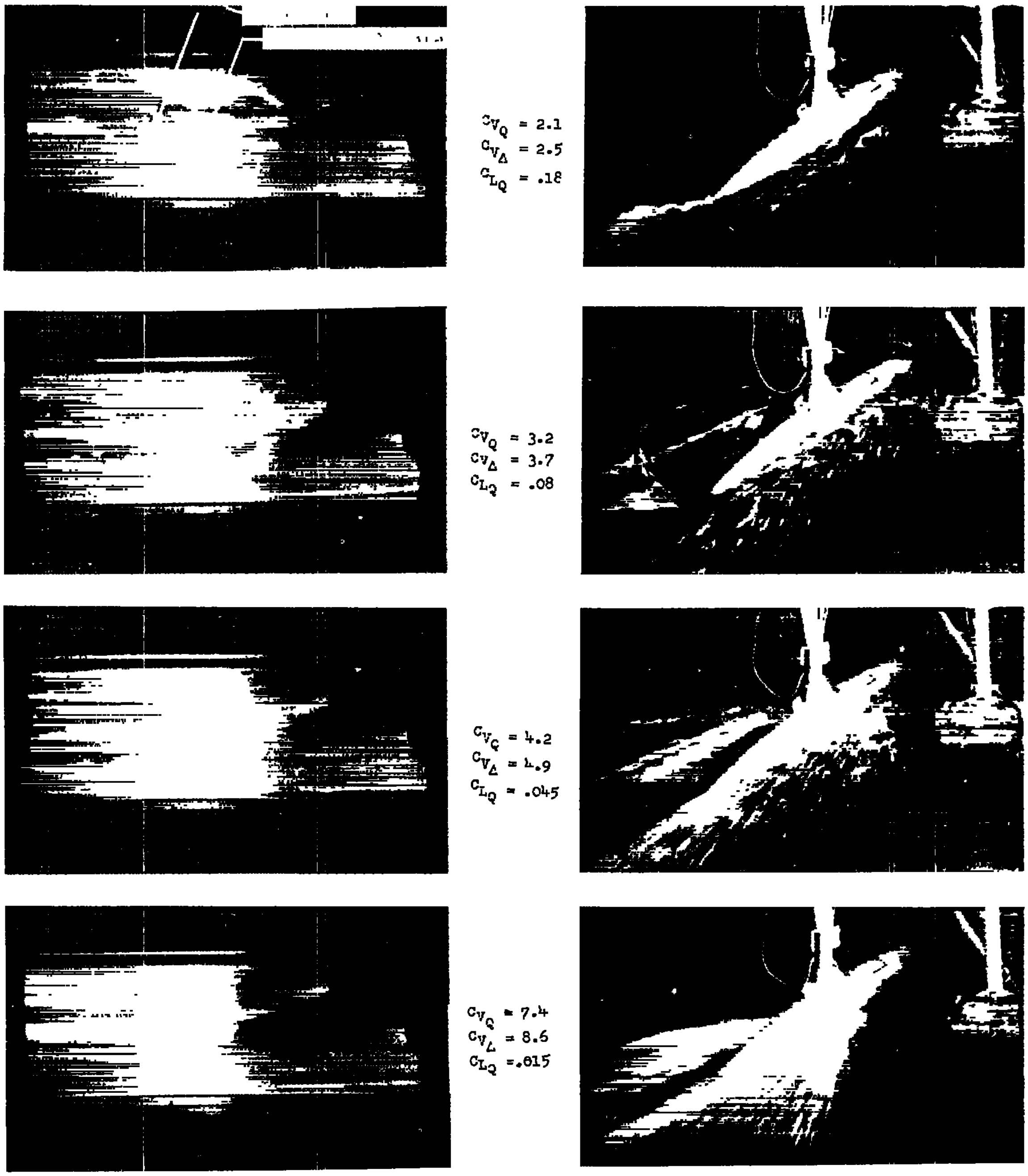

(a) Displacement condition.

Figure 18.- Hydrodynamic characteristics of models with chine strips but with the tail cone removed. Fineness ratio 12; trim, 8°.



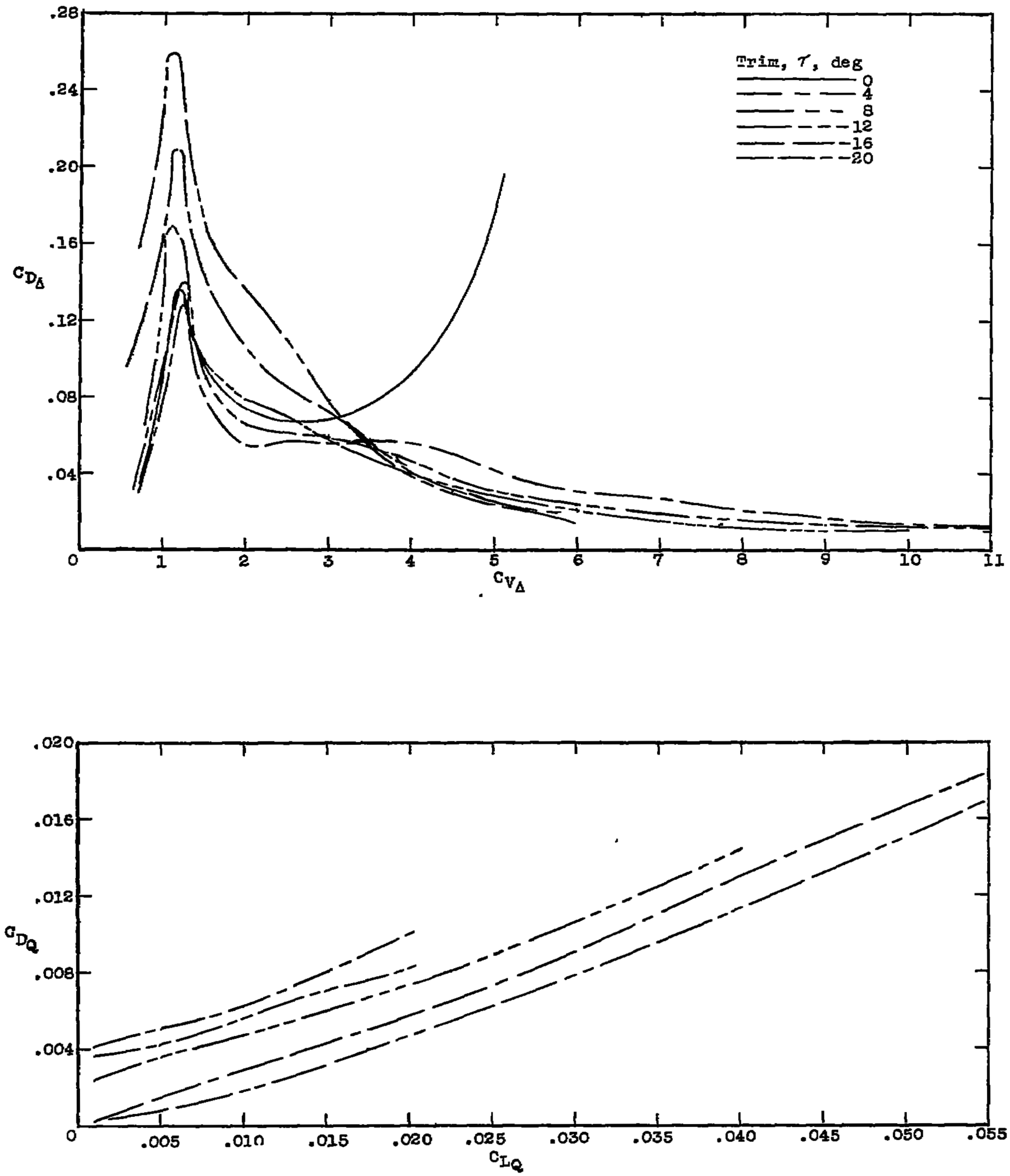

(b) Planing condition.

Figure 18.- Concluded.



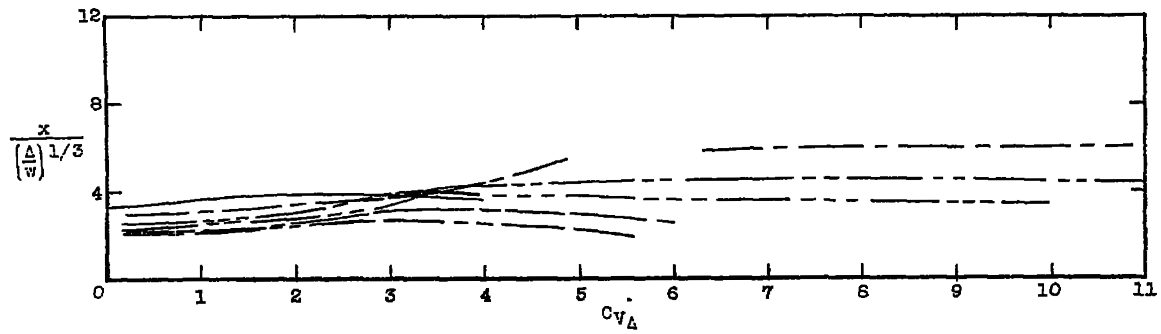

L-86481

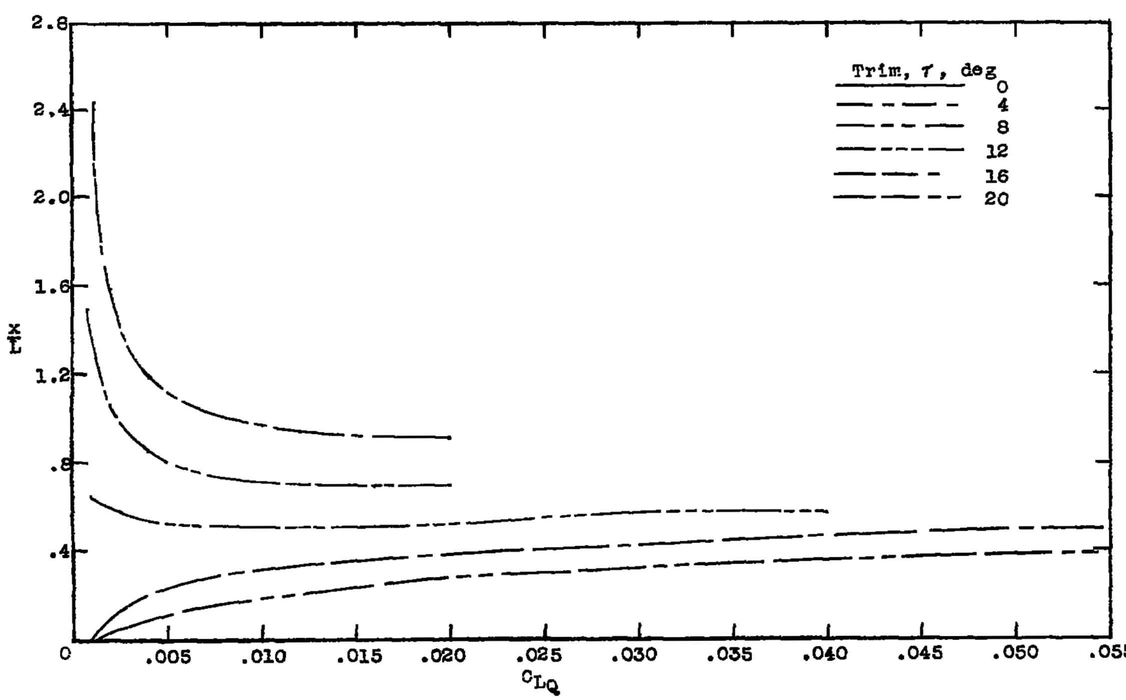
Figure 19.- Spray characteristics of model with chine strips but with the tail cone removed. Fineness ratio, 9; trim, 8°; load coefficient $C_{\Delta_Q} = 0.4$.




(a) Resistance.

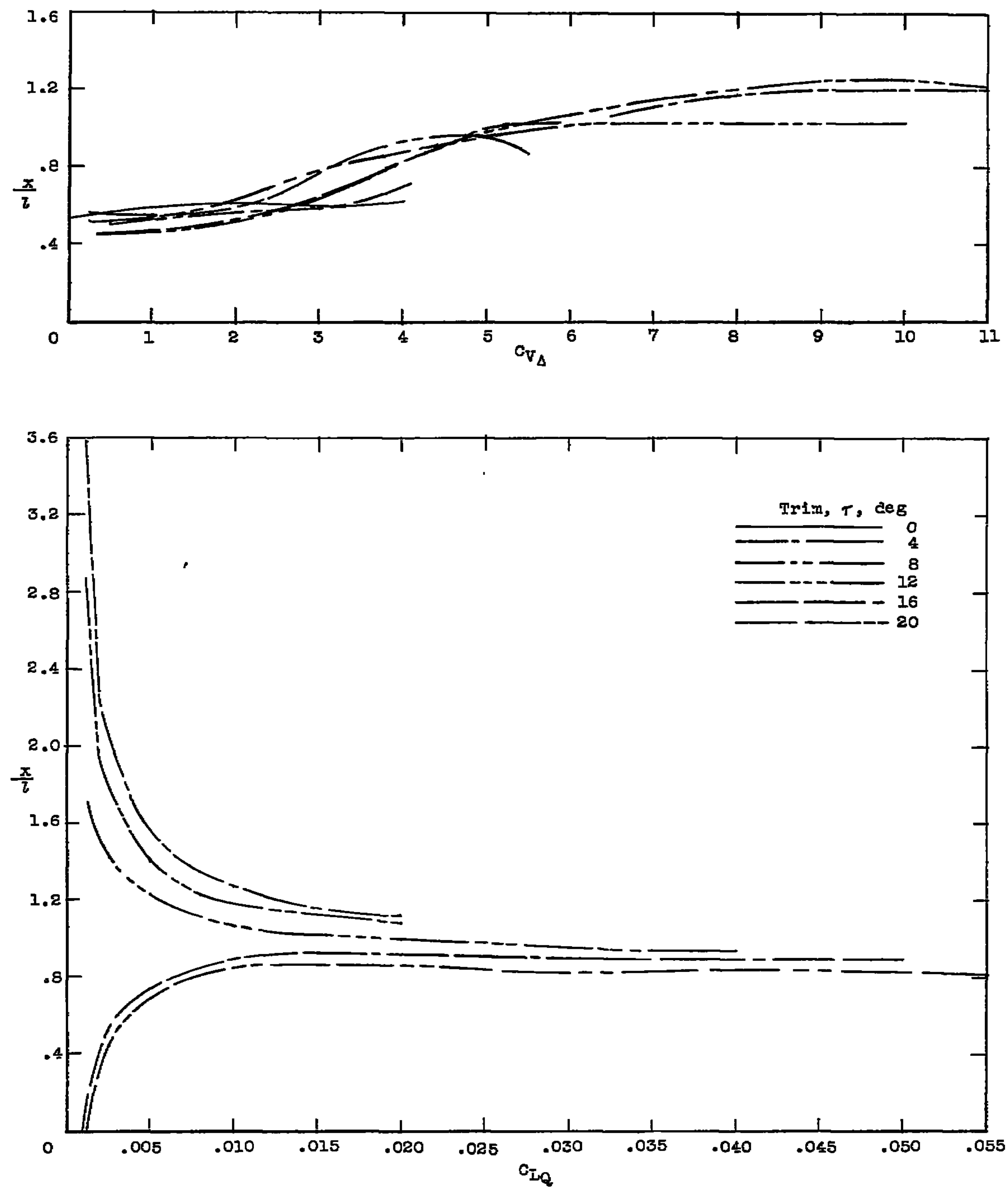
Figure 20.- Effect of trim on hydrodynamic characteristics of model with chine strips. Fineness ratio 6.



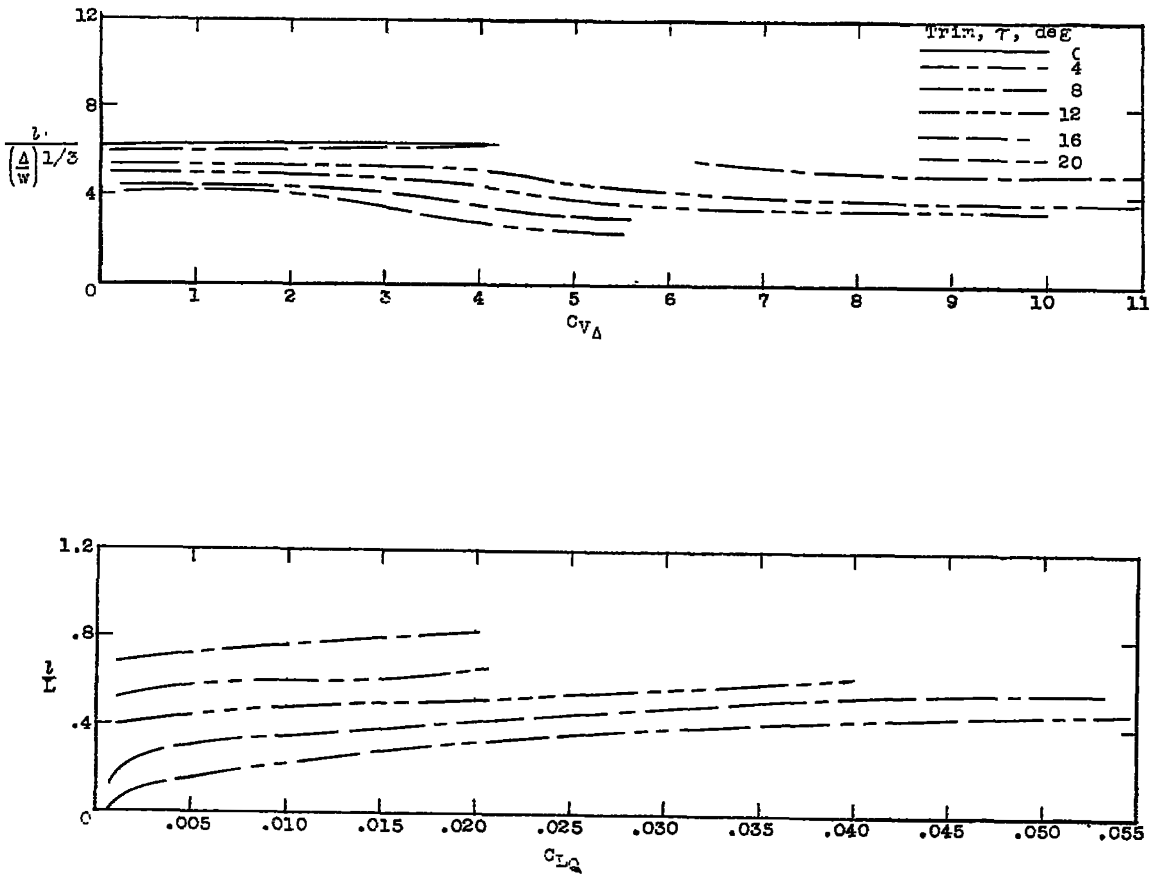

(b) Distance of center of pressure from rear end.

Figure 20.- Continued.



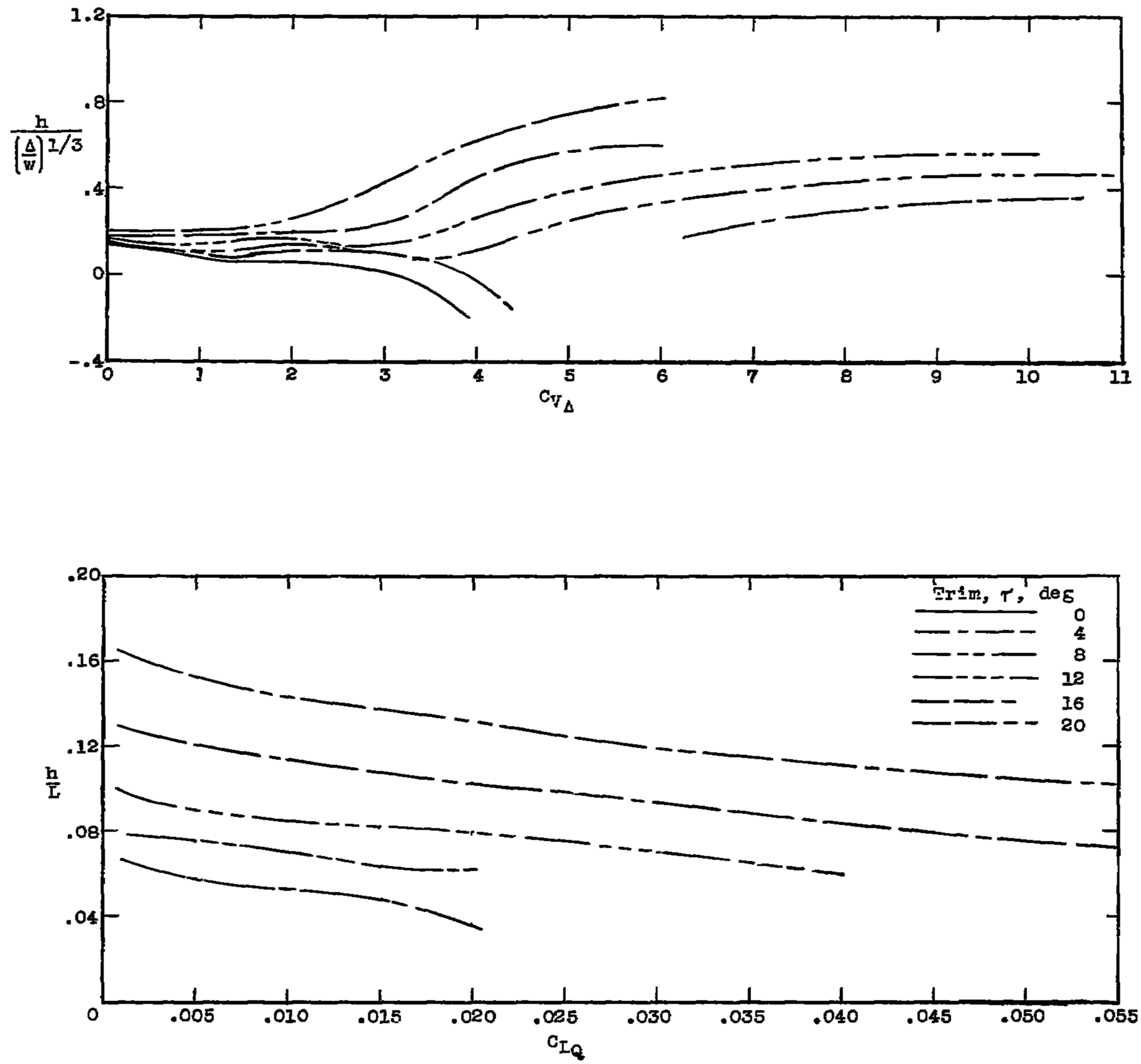

(c) Ratio of center of pressure to wetted length.

Figure 20.- Continued.



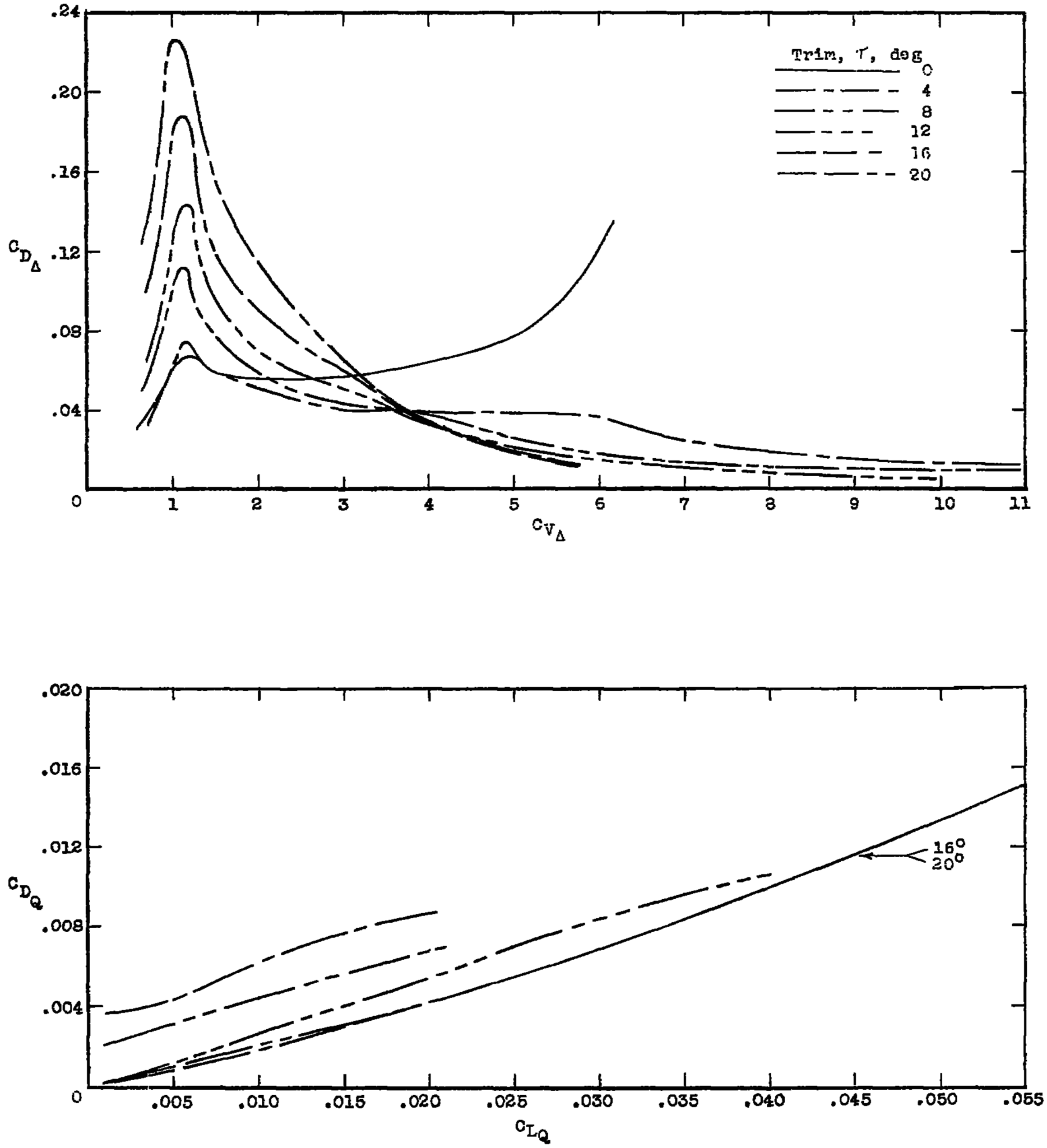

(d) Wetted length.

Figure 20.- Continued.



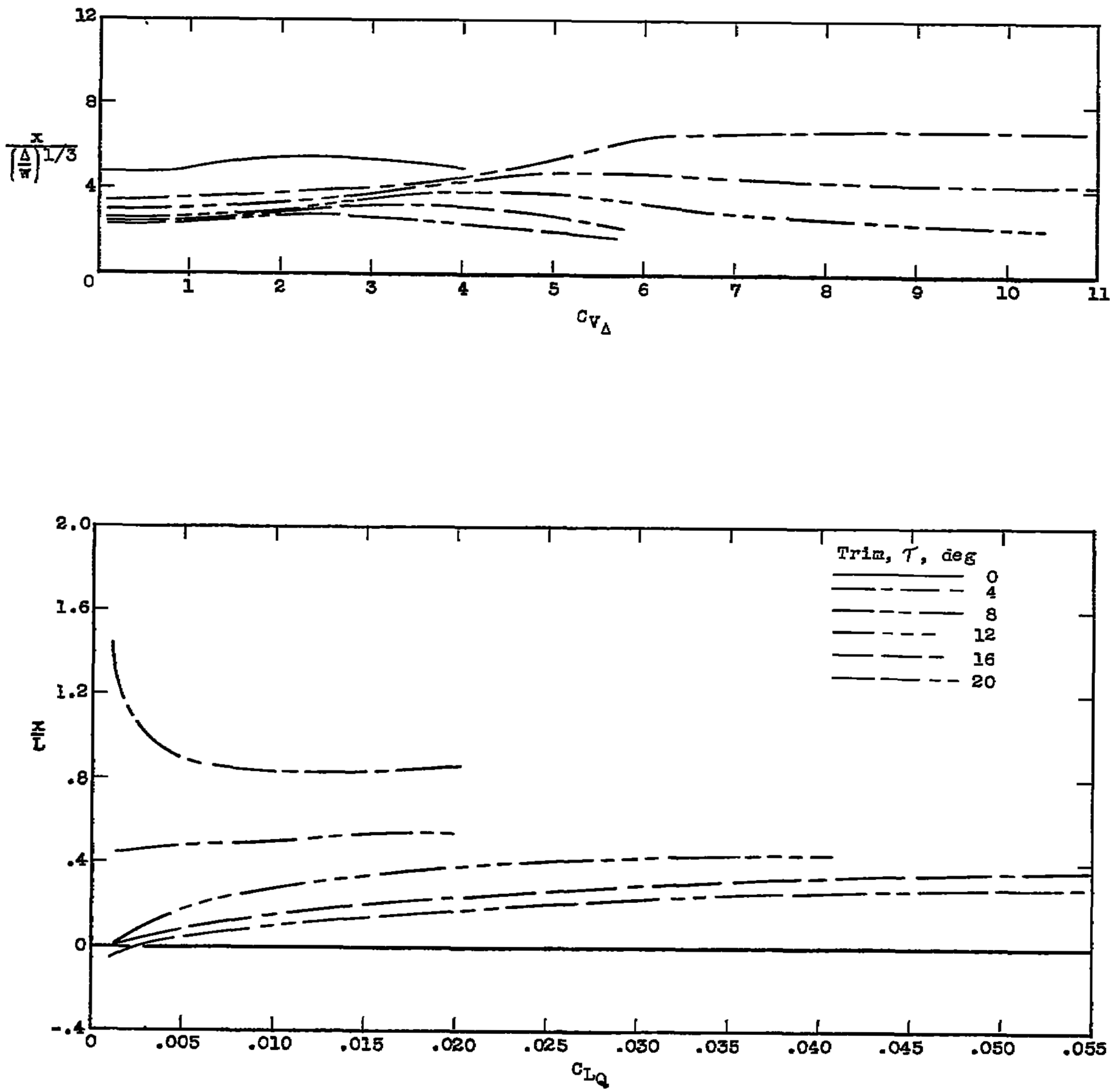

(e) Height of center-line midpoint.

Figure 20.- Concluded.



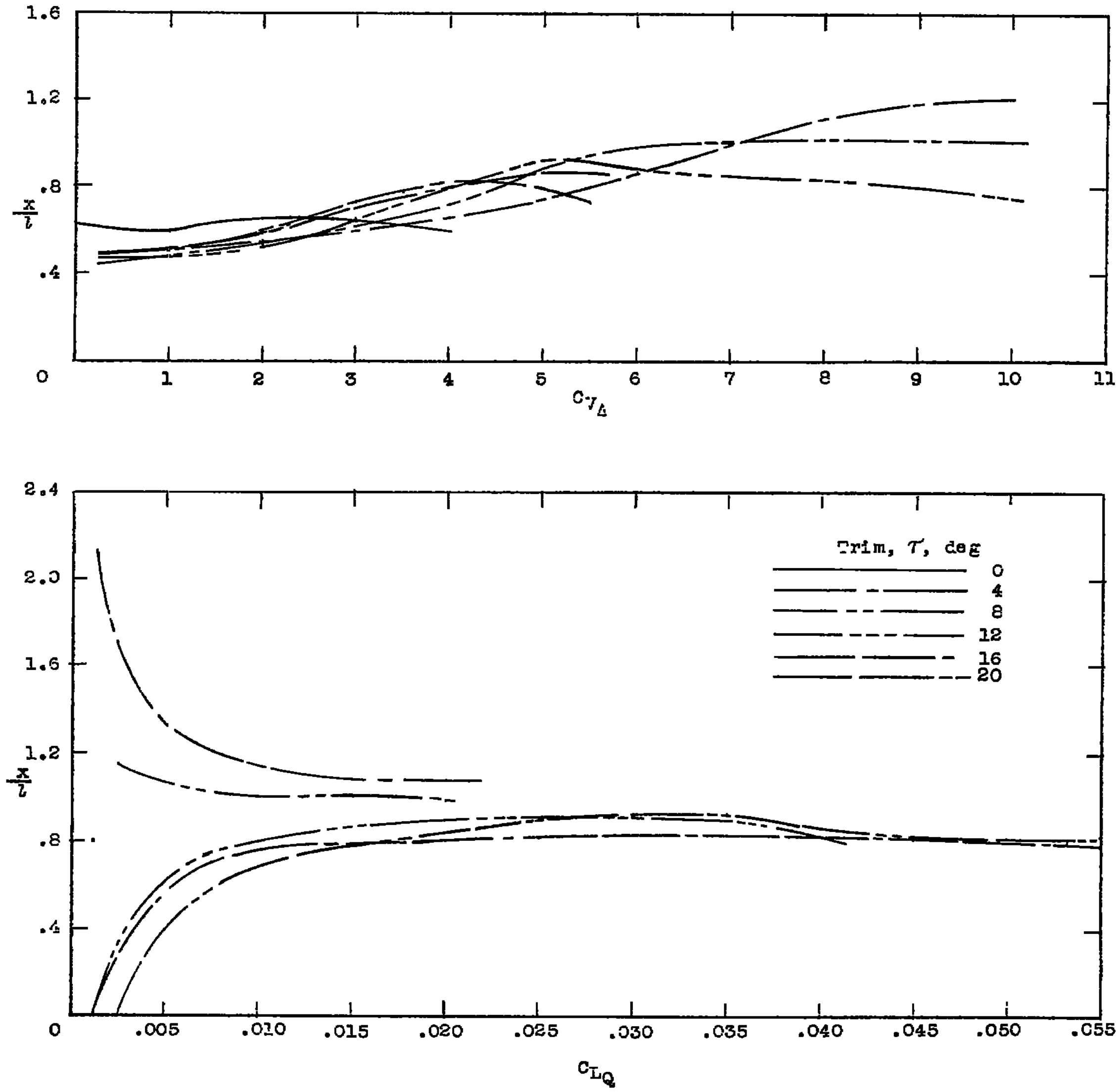

(a) Resistance.

Figure 21.- Effect of trim on hydrodynamic characteristics of model with chine strips. Fineness ratio 9.



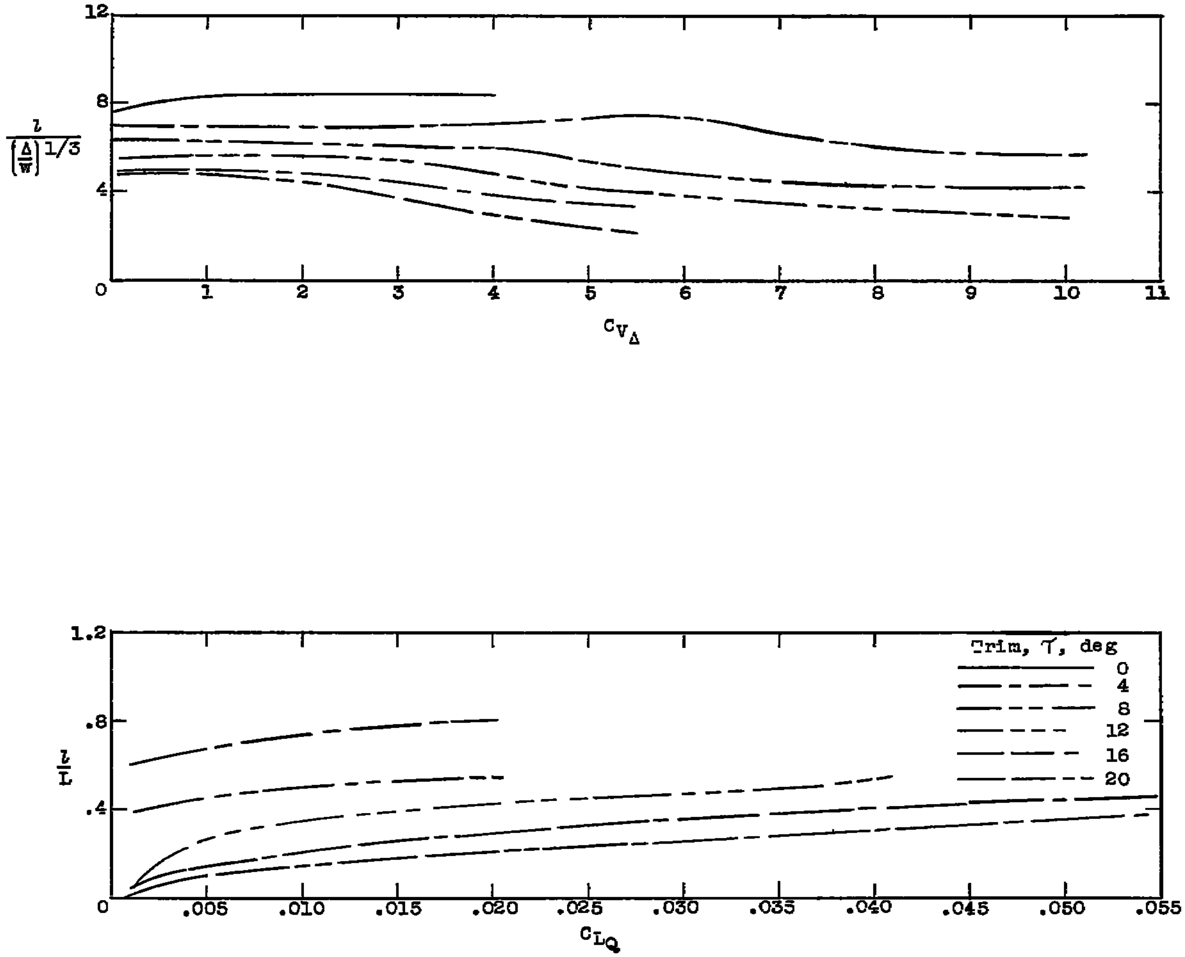

(b) Distance of center of pressure from rear end.

Figure 21.- Continued.



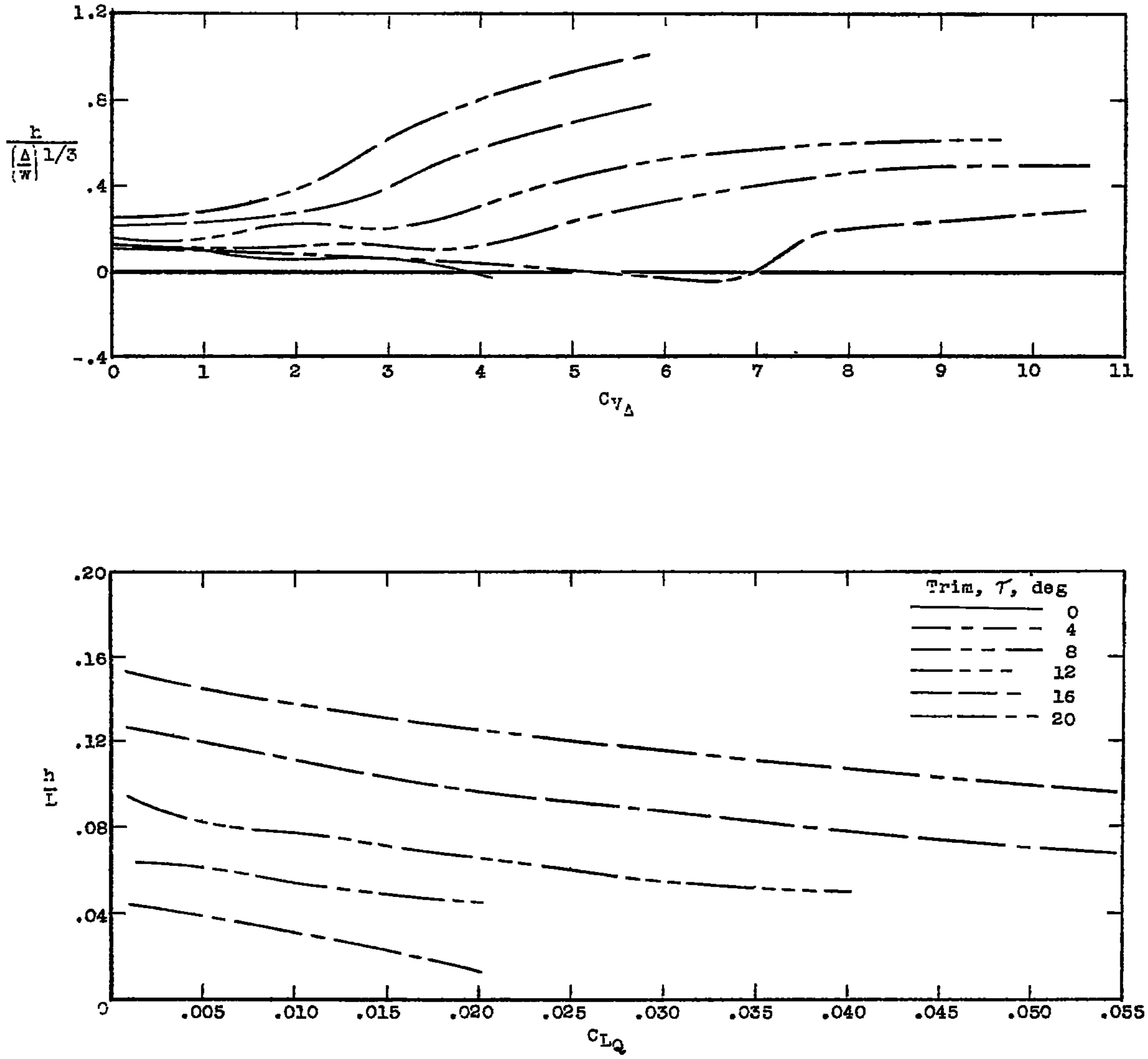

(c) Ratio of center of pressure to wetted length.

Figure 21.- Continued.



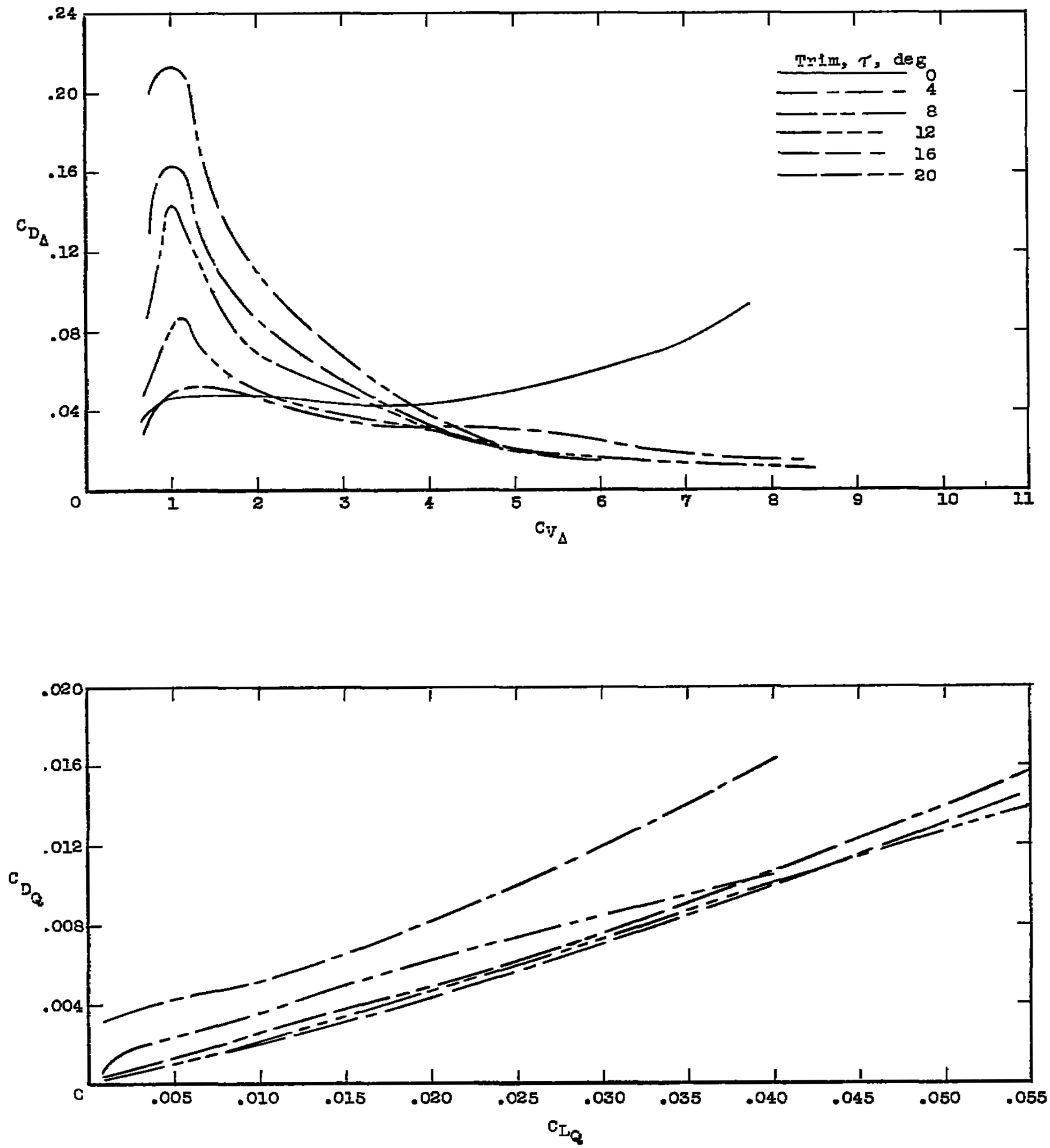

(d) Wetted length.

Figure 21.- Continued.




(e) Height of center-line midpoint.

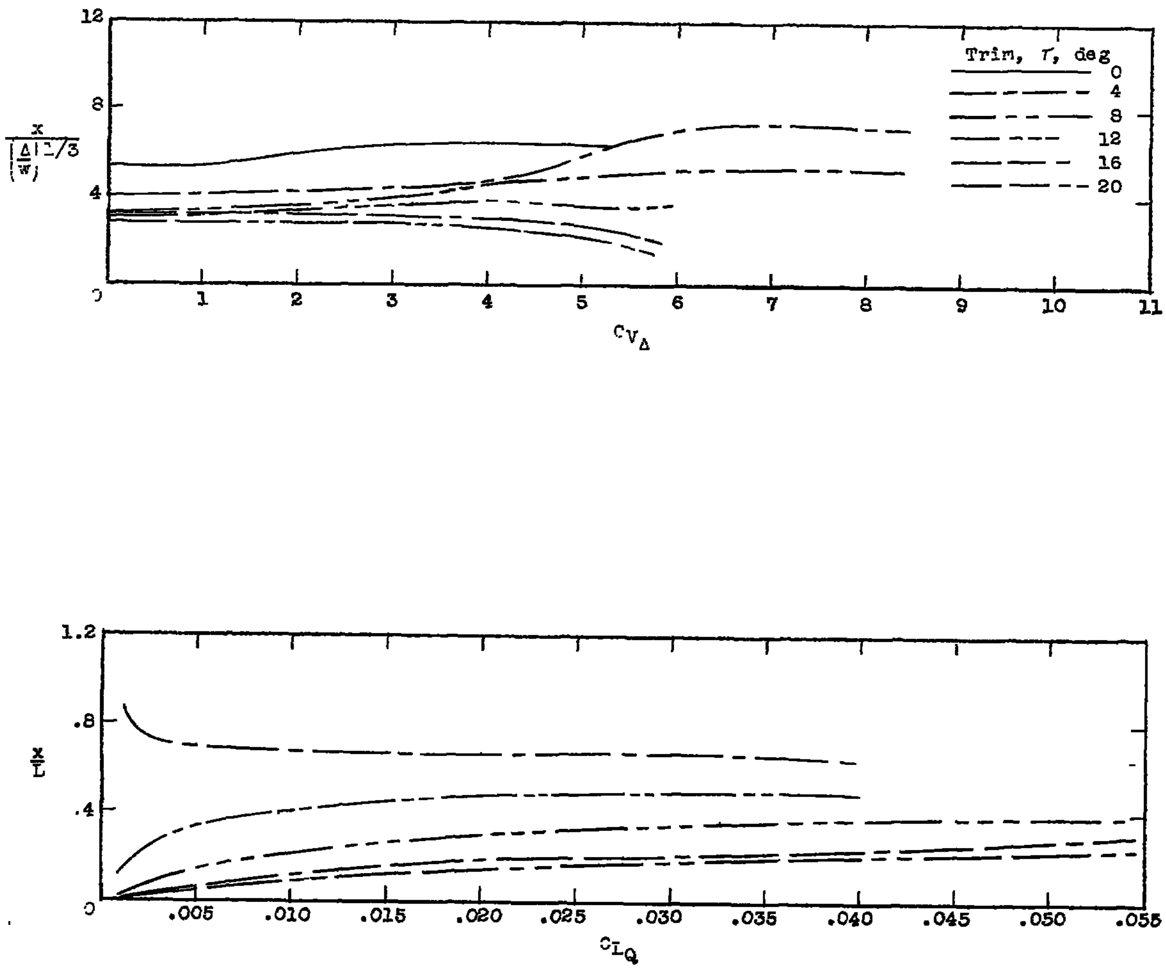
Figure 21.- Concluded.




(a) Resistance.

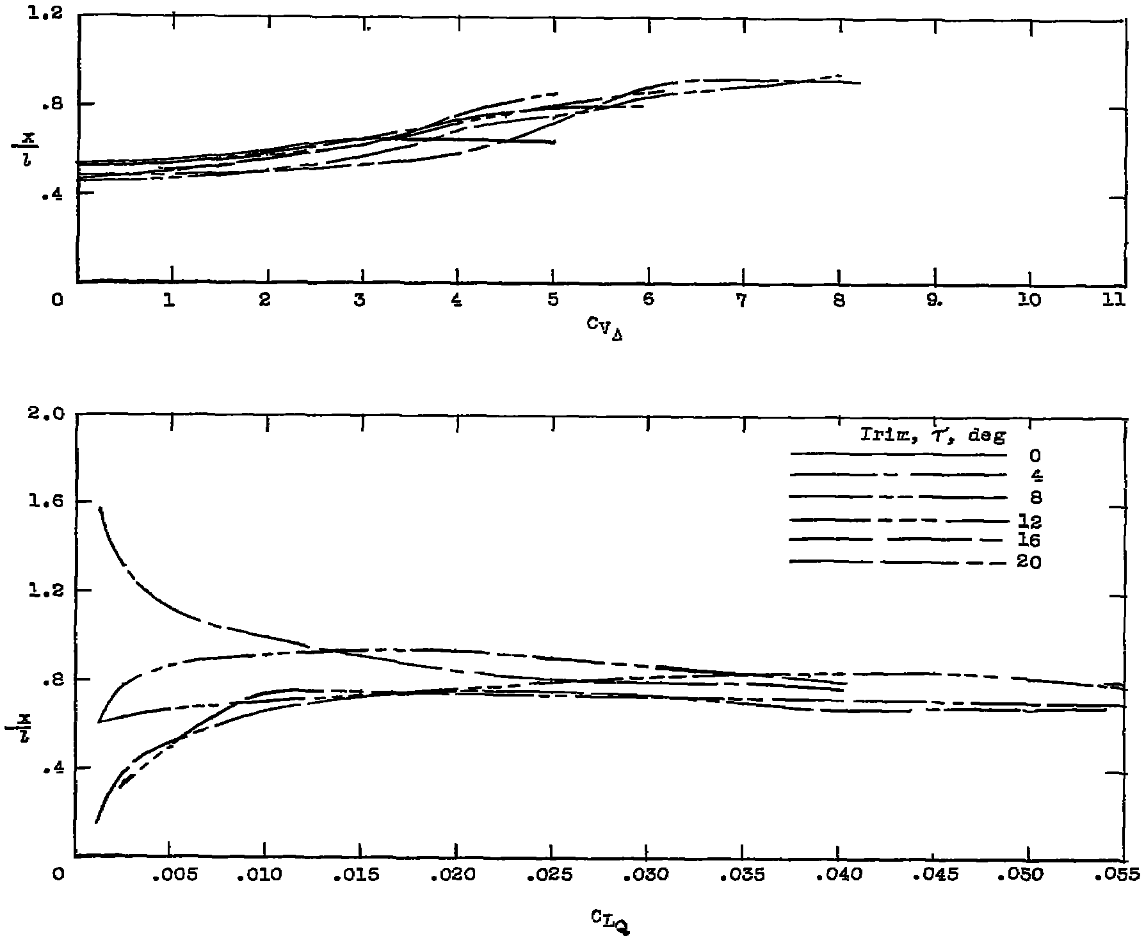
Figure 22.- Effect of trim on hydrodynamic characteristics of model with chine strips. Fineness ratio 12.

[redacted]



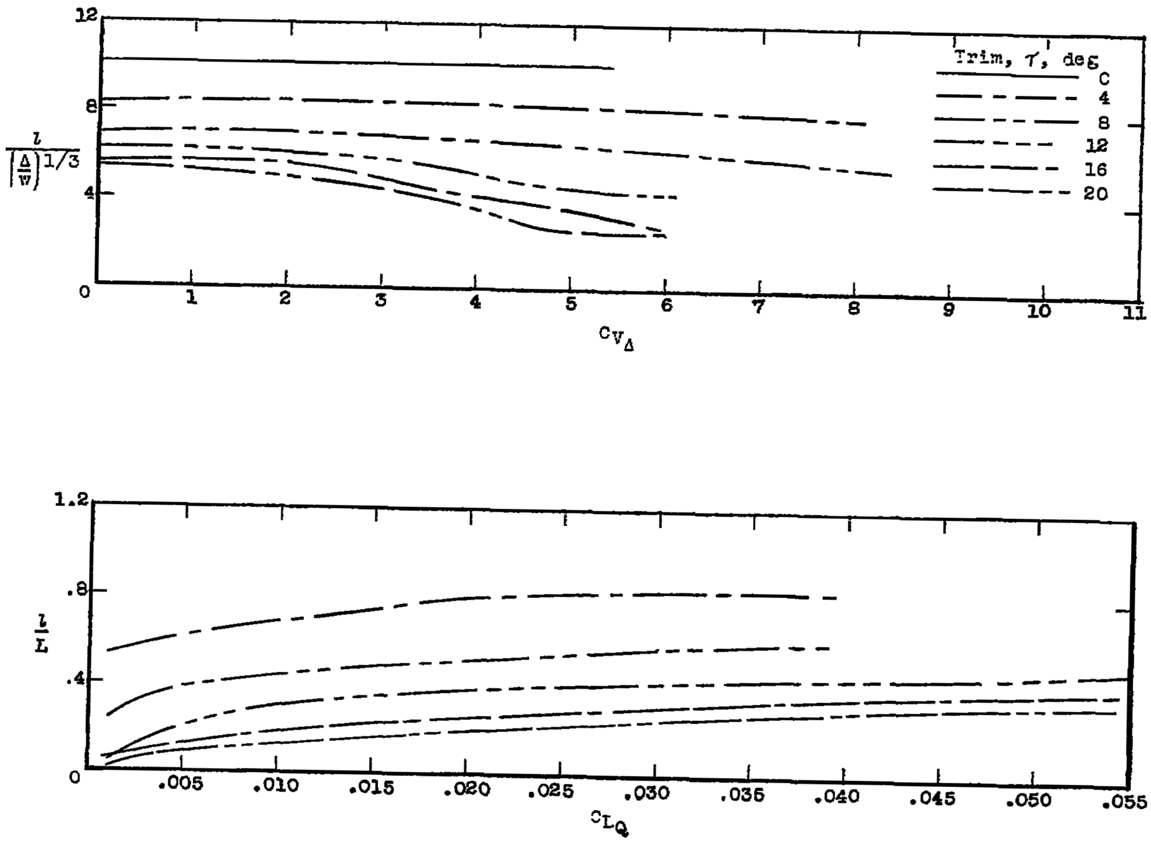

(b) Distance of center of pressure from rear end.

Figure 22.- Continued.



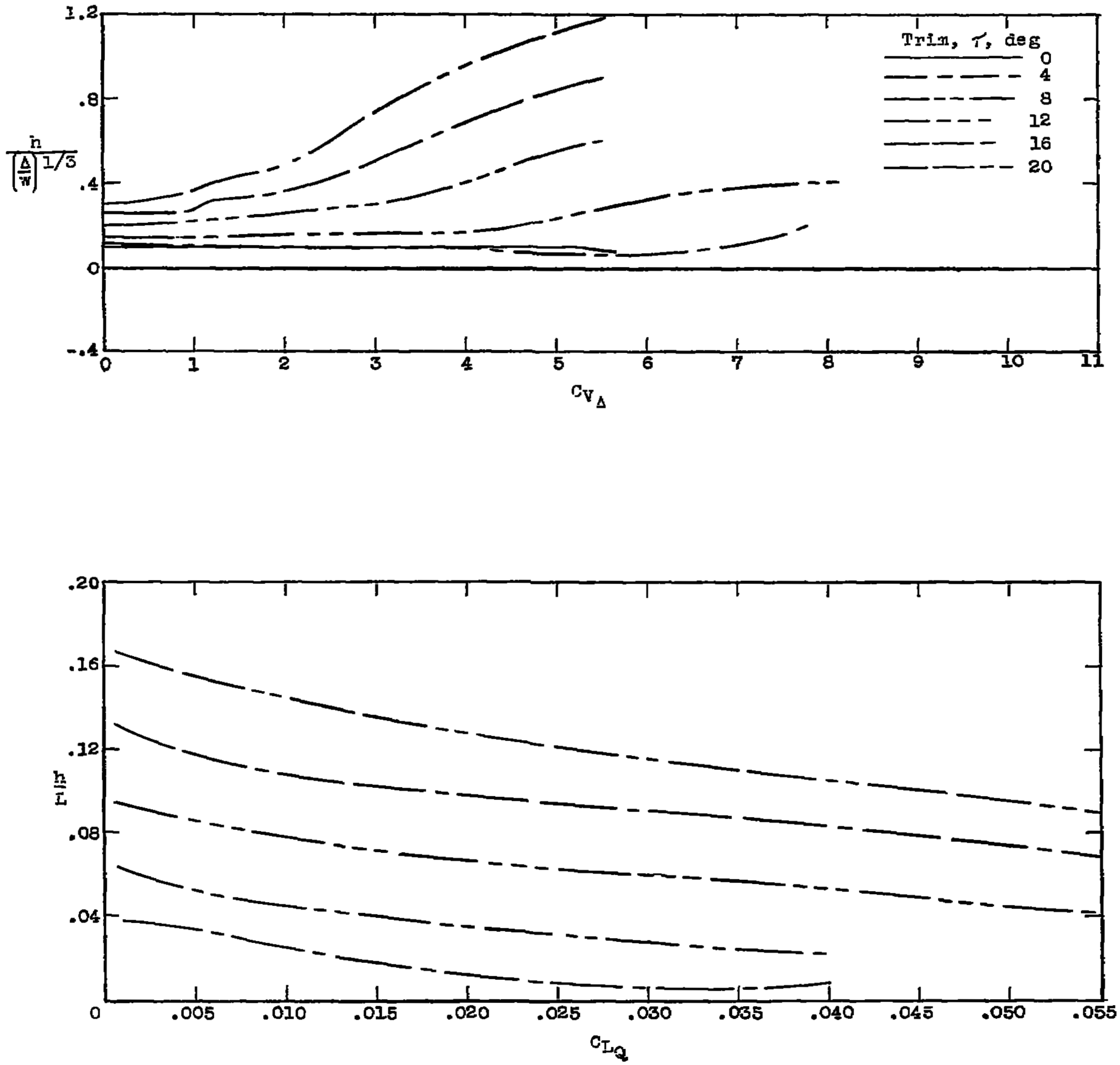

(c) Ratio of center of pressure to wetted length.

Figure 22.- Continued.




(d) Wetted length.

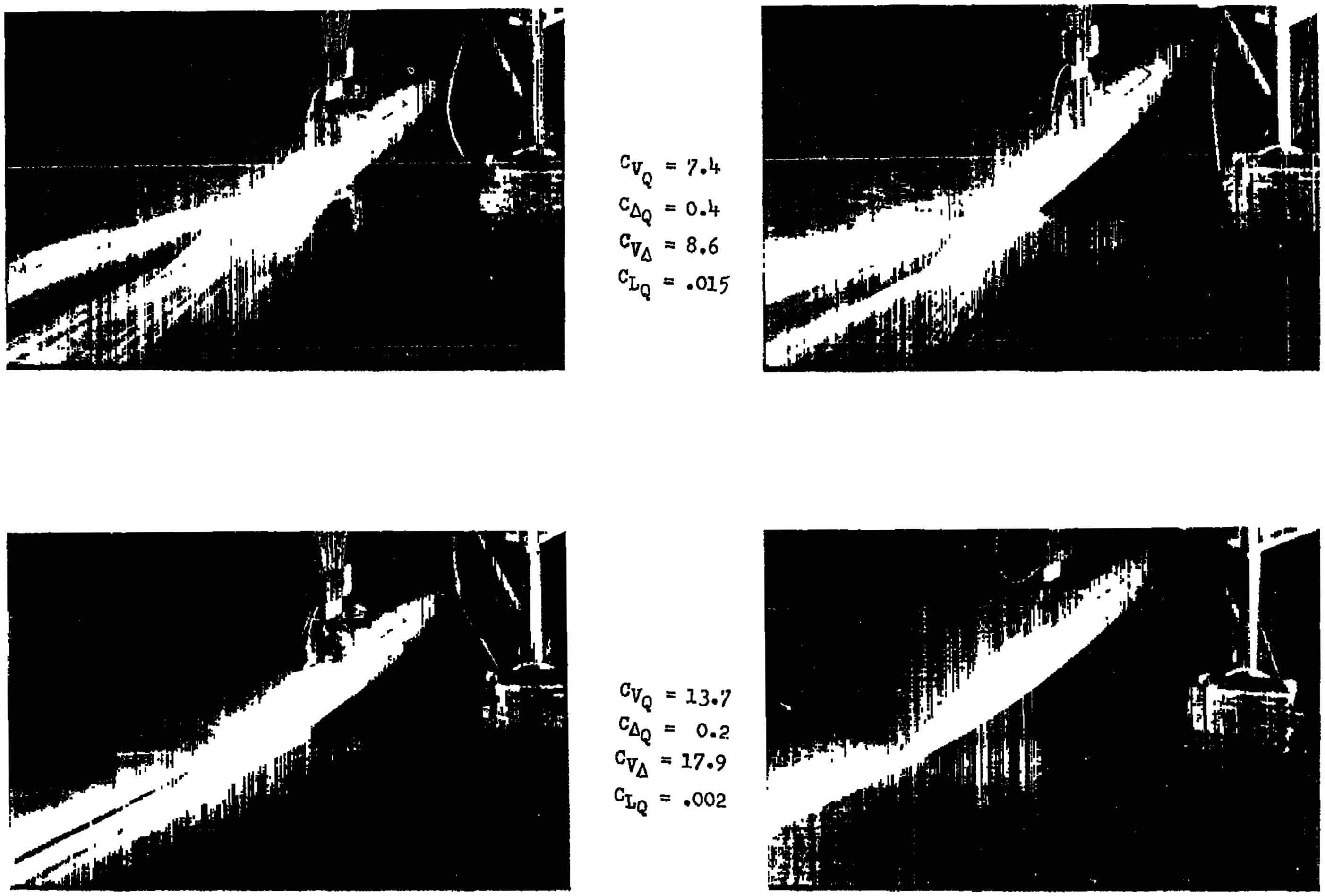
Figure 22.- Continued.




(e) Height of center-line midpoint.

Figure 22.- Concluded.

[redacted]




Trim, 8° Trim, 16°

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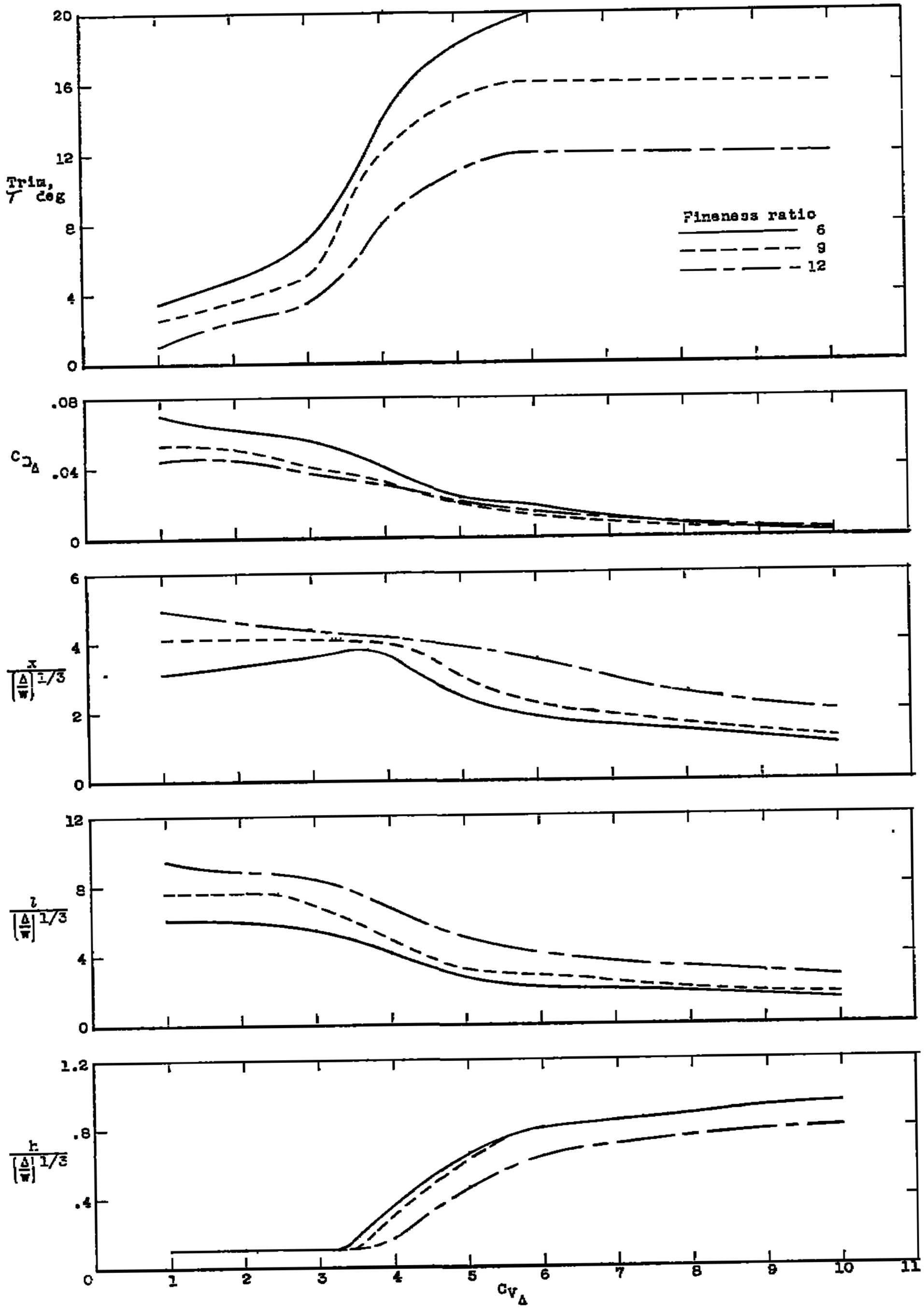
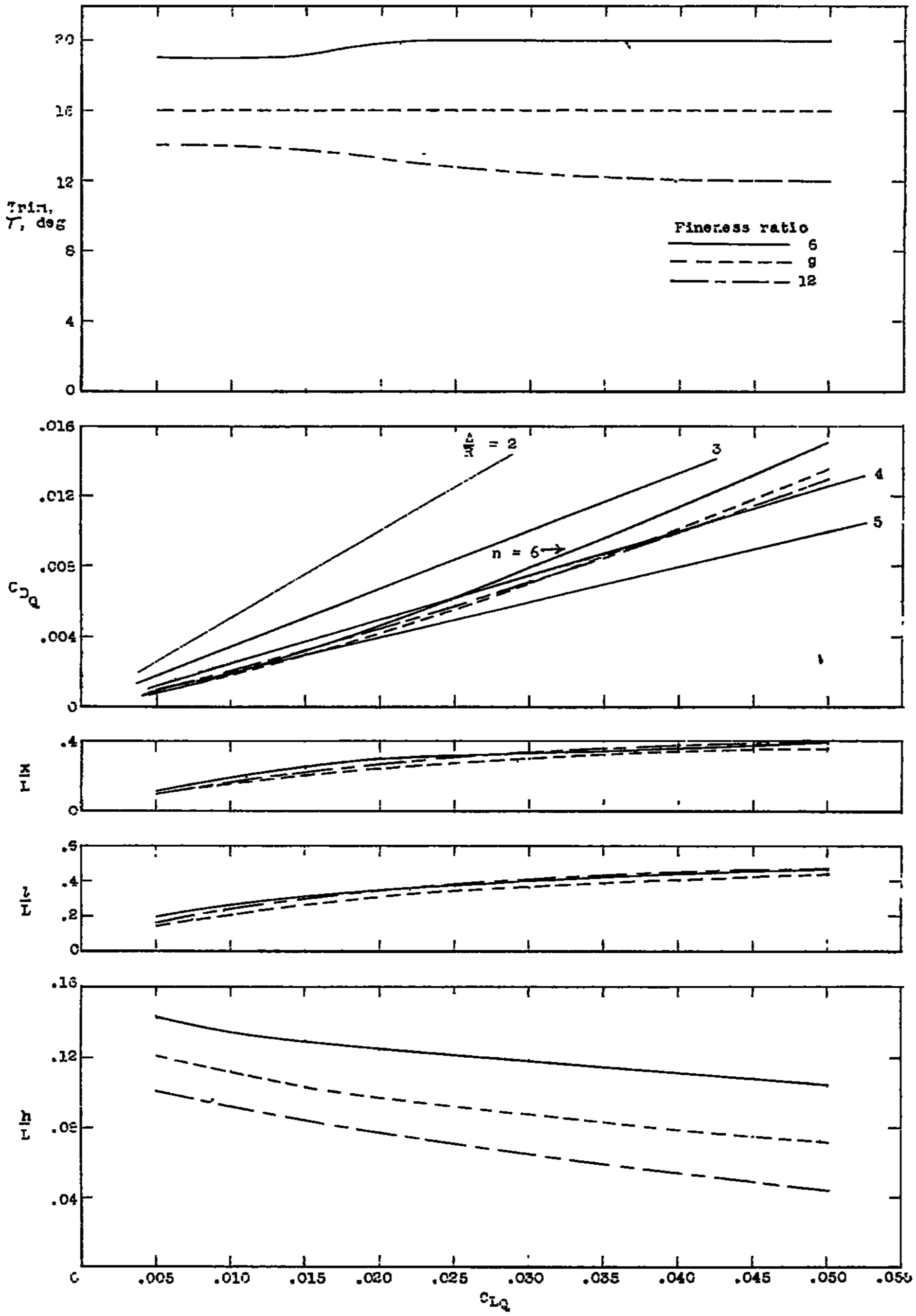
Figure 23.- Effect of trim on the spray characteristics of model with chine strips. Fineness ratio 9.




(a) Displacement speed range. $C_{\Delta_Q} = 0.3$.

Figure 24.- Effect of fineness ratio on the hydrodynamic characteristics of the models with chine strips at best trim (trim for minimum hydrodynamic resistance).

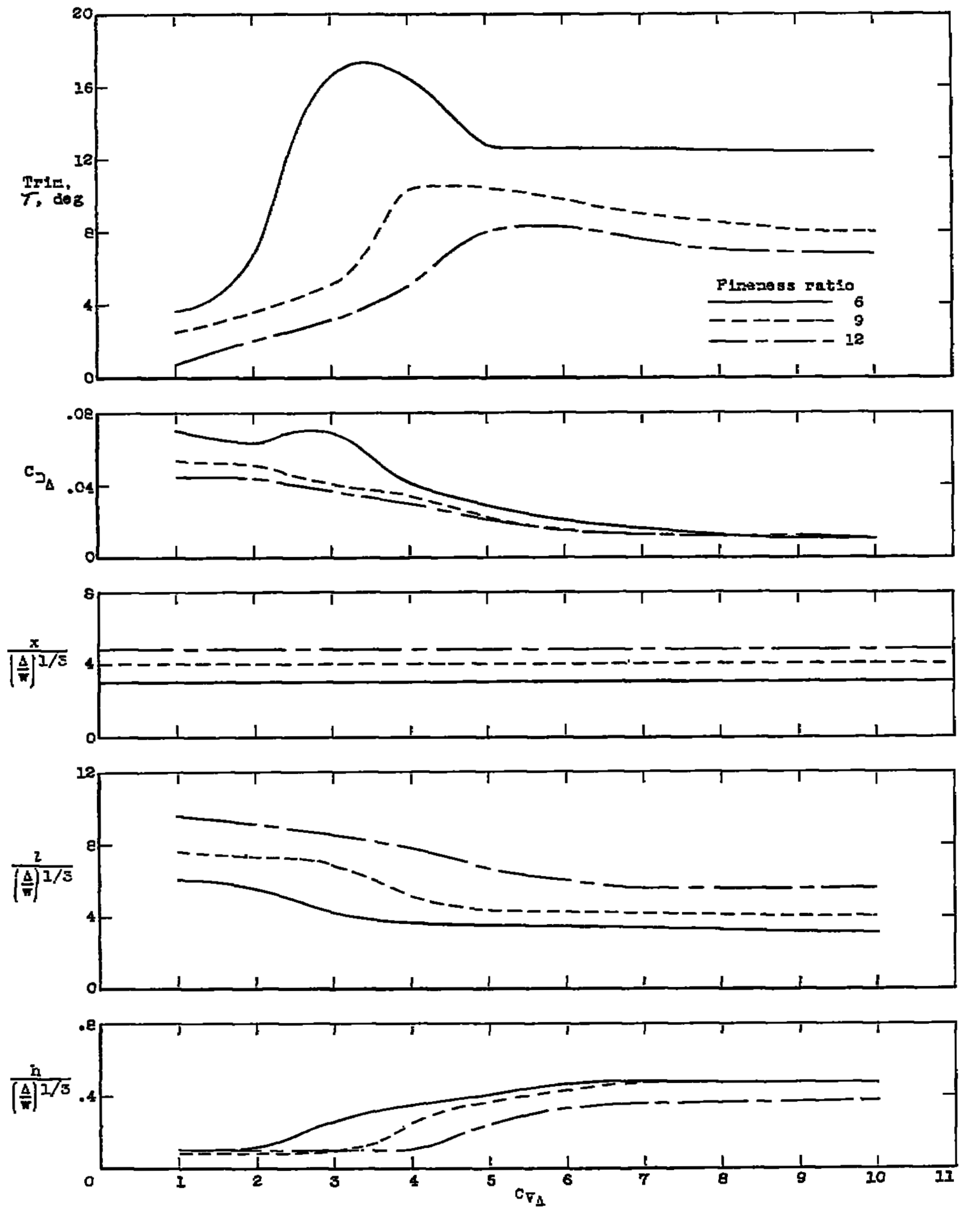
[redacted]




(b) Planing speed range.

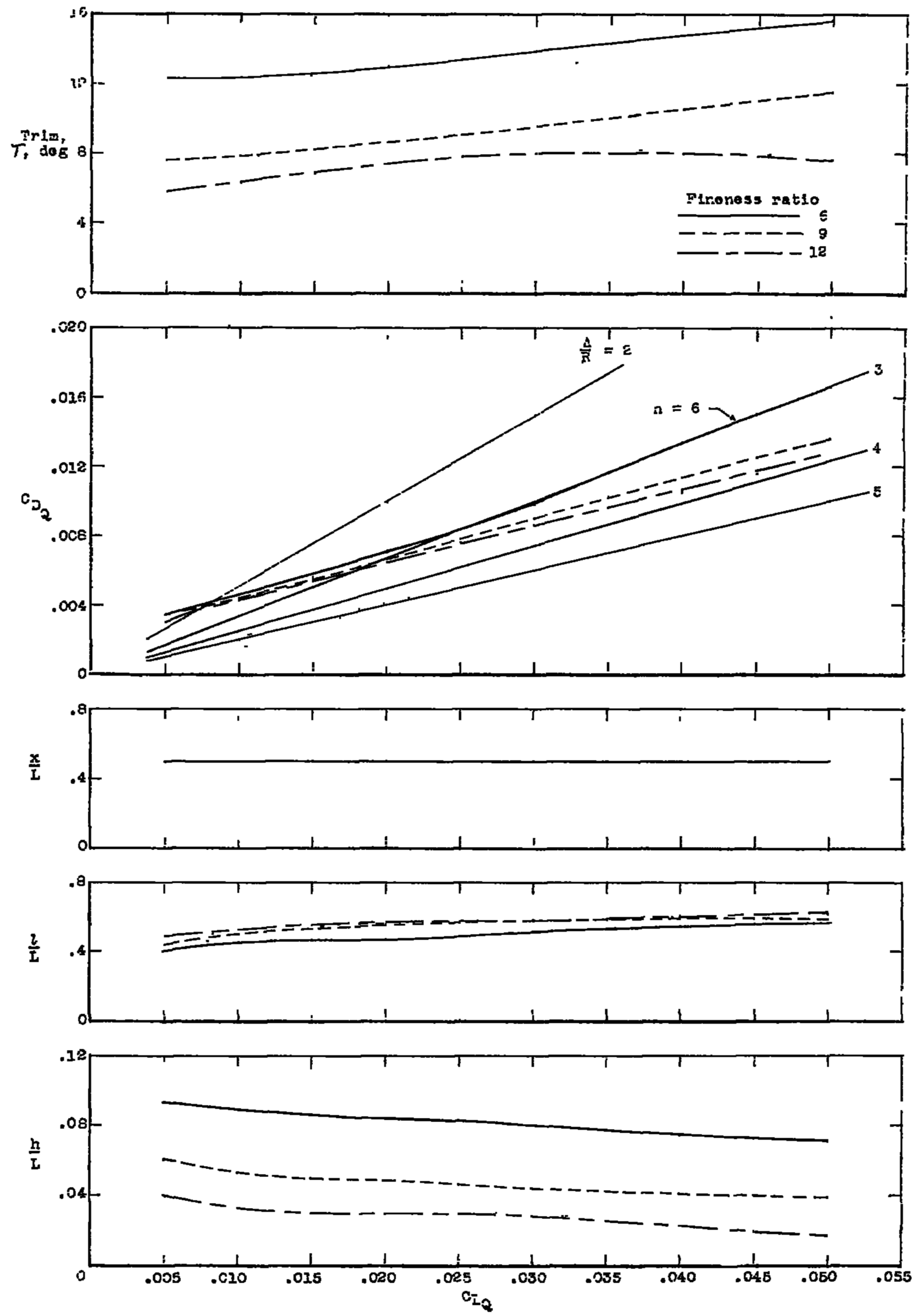
Figure 24.- Concluded.

[redacted]




(a) Displacement speed range. $C_{\Delta_Q} = 0.3$.

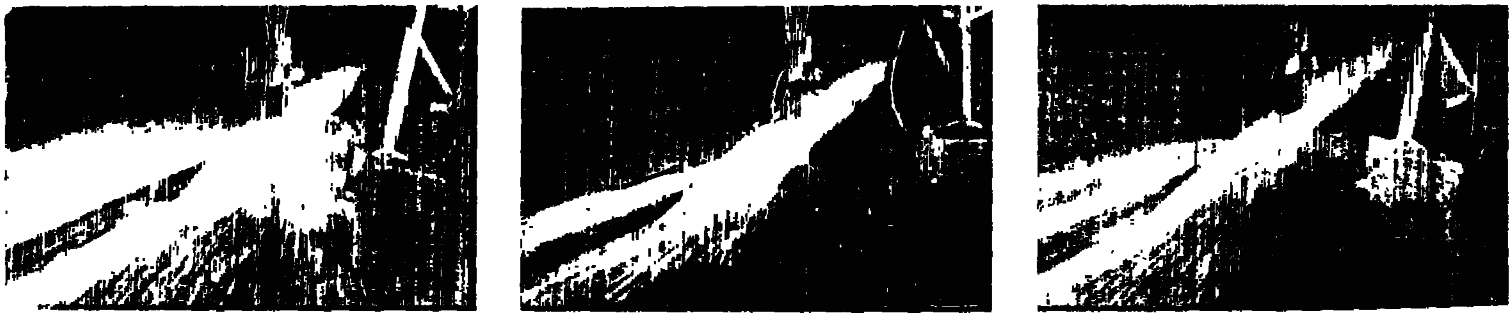
Figure 25.- Effect of fineness ratio on the hydrodynamic characteristics of the models with chine strips for $M = 0$ (hydrodynamic trimming moment about the midpoint of the center line equals zero).




(b) Planing speed range.

Figure 25.- Concluded.

Fineness ratio 6 | Fineness ratio 9 | Fineness ratio 12



$(C_{V_Q} = 7.4;\ C_{\Delta_Q} = .4;\ C_{V_\Delta} = 8.6;\ C_{L_Q} = .015)$

$(C_{V_Q} = 13.7;\ C_{\Delta_Q} = .2;\ C_{V_\Delta} = 17.9;\ C_{L_Q} = .002)$

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Figure 26.- Effect of fineness ratio on spray characteristics of models with chine strips. Trim, $8^{\circ}$.



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[redacted]



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