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AN EXPERIMENTAL DOCUMENTATION OF A HYPERSONIC SHOCK-WAVE TURBULENT BOUNDARY LAYER INTERACTION FLOW – WITH AND WITHOUT SEPARATION

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SUMMARY

An experiment, thoroughly documenting the flow field resulting from the interaction of a shock wave with a nonadiabatic hypersonic turbulent boundary layer, is described. Detailed mean flow and surface data are presented for two shock strengths resulting in attached and separated flows, respectively. The surface measurements include continuous pressure, shear and heat-flux distributions upstream, in, and downstream of the interaction regions. At closely spaced intervals along the surface, boundary-layer profiles of static and pitot pressure and total temperature were obtained from which velocity, density and static temperature profiles were derived. The data are presented in both graphical and tabular form. These data are of sufficient detail to validate advanced computer codes and their associated turbulence models.

INTRODUCTION

As a result of the recent rapid advance in computational fluid dynamics, it is now possible to obtain solutions to complex flow fields using the time averaged Navier-Stokes equations. However, the pacing item for successful solutions to strongly coupled viscous-inviscid turbulent flows is turbulence modeling. To validate or develop new turbulence models one must rely on thoroughly documentated experimental flow fields. To provide sufficient experimental detail for validating computer codes or turbulence models, the minimum requirements for an experiment must include surface measurements of pressure, shear and heat flux as well as mean flow profiles. Fluctuating measurements are necessary if higher order turbulence model closure schemes are to be evaluated. For high-speed compressible flow the zero pressure gradient case has been experimentally examined in great detail. However, for flows with pressure gradient or separation there are only a few examples of documented flow fields (refs. 1, 2, and 3). Until more experimental flows are documented over a wide range of test conditions, the development of generalized turbulence models for flows with severe viscous-inviscid interactions will remain unresolved.

This paper presents experimental data for two shock-wave turbulent boundary-layer interaction flows, one with separation and one without. The measurements include surface pressure, shear and heat flux, and detailed

profiles of pitot and static pressure and total temperature throughout the interaction region. The data should provide the detailed information necessary to validate many of the new computer codes and turbulence models currently being developed.

SYMBOLS

M	Mach number
p	pressure
P	static pressure
P INF	local free-stream static pressure ahead of interaction
q	heat flux
r	radial coordinate, distance from model centerline
RHO	density
RHO INF	local free-stream density ahead of interaction
RHOU	mass flux (ρu)
RHOU INF	local free-stream mass flux ahead of interaction
T	temperature
T INF	local free-stream static temperature ahead of interaction
TT	stagnation temperature
TT INF	local free-stream total temperature ahead of interaction
u, U	velocity component in axial direction
U INF	local free-stream velocity ahead of interaction
x	axial coordinate, distance from leading edge of shock-wave generator
y, Y	distance normal to model surface
α	wedge angle of shock-wave generator
δ	boundary-layer thickness

δ^* compressible displacement thickness,

$$\int_0^\delta \left(1 - \frac{\rho u}{\rho_e u_e}\right) \frac{r}{r_w} \, dy$$

δ_i^* kinematic displacement thickness,

$$\int_0^\delta \left(1 - \frac{u}{u_e}\right) \frac{r}{r_w} \, dy$$

θ compressible momentum thickness,

$$\int_0^\delta \frac{\rho u}{\rho_e u_e} \left(1 - \frac{u}{u_e}\right) \frac{r}{r_w} \, dy$$

θ_i kinematic momentum thickness,

$$\int_0^\delta \frac{u}{u_e} \left(1 - \frac{u}{u_e}\right) \frac{r}{r_w} \, dy$$

ρ density

τ shear stress

SUBSCRIPTS

c corrected

e edge of boundary layer

i initial value

m measured

o stagnation conditions

T wind-tunnel stagnation conditions

w wall

∞ local free-stream ahead of interaction

DESCRIPTION OF EXPERIMENT

Facility

The experiment was conducted in the Ames 3.5-Foot Hypersonic Wind Tunnel where heated high-pressure air flows through a 1.067-m diameter test section to low pressure spheres. The nominal free-stream test conditions were: total temperature = 695°K, total pressure = 34 atm, free-stream unit Reynolds number = 10.9×10^6 m^{-1}, free-stream Mach number = 7.2. The test core diameter was approximately 0.7 m with an axial Mach number gradient less than 0.12 m^{-1}. Useful test time was 3 min. Run to run variations in pressure and Mach number were less than 0.5 percent. However, the wind tunnel total temperature varied up to 50° K from run to run and also during a single run it varied about 50° K over the 3 min test time. These variations required special data reduction procedures which will be discussed later. Free-stream fluctuation measurements, reported in reference 4, have been made in this facility at the above nominal test conditions. The average total temperature and mass-flow fluctuations were 0.83 and 2.7 percent, respectively.

Model

The test model consisted of a cone-ogive cylinder, 3.3 m long and 0.203 m in diameter and an annular shock-wave generator, 0.51 m outside diameter, mounted concentric with the cylinder (fig. 1). The entire model was water-cooled maintaining a constant surface temperature at 300° ±5° K during a run. Interchangeable instrumentation ports, 12 cm in diameter and specially contoured to fit flush with the cylindrical surface, were located at 25 cm intervals along the cylinder in a single line and every 50 cm in another single line 180° away. Individual ports were instrumented with static pressure taps, thermocouples, or a skin friction balance. One port accommodated a survey mechanism to which static and total pressure and total temperature probes could be attached for flow field surveys. Additional static pressure taps and thermocouples were located every 5 cm along the entire model length in a single line 90° away from the instrumentation ports. At several stations static pressure taps were located every 90° around the model.

Two shock wave strengths were imposed by beveling the leading edge of the generator at either 7.5° or 15° resulting in unseparated and separated turbulent boundary layers, respectively. The details of the two generators are shown in figure 1. The leading edge of each generator was honed sharp before each test. The generator was movable in a direction parallel to the axis of the cylinder so that the entire interaction region could be passed over selected survey stations.

Instrumentation

Surface Pressure.— The model static pressure taps, located along the model surface as well as in several instrumentation ports, were 0.16 cm

inside diameter connected with short lengths of stainless steel tubing (10 to 15 cm long) to strain gauge absolute-pressure transducers. The transducers were calibrated prior to the test series with a dead weight tester and several in situ calibrations were made before selected runs by varying the wind-tunnel test section pressure using a manometer follower as a standard. All calibrations were linear and repeatable to within 1 percent. Prior to each run a transducer reading was obtained at the wind tunnel starting pressure (approx. 0.01 atm) to determine the zero offset of the gauges. All the transducers were located within the model and water cooled.

Surface Heat Transfer.— Surface heat transfer was measured by the transient thin-skin technique. Five instrumentation ports, using the same material and thickness (1.25 cm) as the model to avoid any temperature discontinuities along the model surface, were instrumented with chromel-alumel thermocouples spot welded to the interior surface. The thermocouples were spaced 2.5 cm apart in a line parallel to the model axis. One port, 0.625 cm thick, was also instrumented with thermocouples spaced 1.25 cm apart. Depending on the thermocouple location, the temperature rise (with the internal model water cooling disconnected) varied from 10° to 50° K during a typical 30-sec heat-transfer run. The data were reduced by obtaining a least squares linear fit of $\ln [(T_T - T_w)/(T_T - T_{w_i})]$ versus time. The variation of the wind-tunnel total temperature (T_T) with time was included. No discernible differences in the measured heat transfer were obtained by using the two different thickness ports. Calculations using the procedures outlined by reference 5 indicated for the present test conditions, the interior wall temperature follows the exterior wall temperature after 2 sec and that longitudinal conduction errors are less than 5 percent of the measured convective heat transfer. Therefore no corrections were applied to the data.

Surface Shear.— One instrumentation port was machined to accommodate a Kistler floating element skin friction balance. The sensitive portion of the gauge was 0.95 cm in diameter by 0.05 cm thick. The entire gauge was contoured to match the radius of the cylinder. Direct calibrations using weights hung from the sensing element were performed before and after each test series; they were repeatable and in agreement with the factory calibration to within 5 percent. In addition the gauge was equipped with a self-calibrate coil, providing an electrical calibration before and after each run. These calibrations were also within 5 percent of the factory calibration, and an average of the two electrical calibrations were used to reduce the data for each run. Since the floating element was relatively large, a buoyancy correction was necessary to account for the forces across the gauge element due to the longitudinal pressure gradients.

Survey Mechanism.— Flow field surveys were obtained with the survey mechanism sketched in figure 2. A precision power screw was driven by a stepping motor, whose shaft was capable of turning in controlled increments as small as 1.8° or any multiple of 1.8°. The vertical resolution of this mechanism is 0.0003 cm. The rotary motion of the motor shaft is coupled to the precision screw with antibacklash bevel gears and the vertical position was obtained from a three-turn precision potentiometer driven by an anti-backlash worm gear.

Pitot Pressure Probes.— Pitot pressures in the flow field were measured by stainless steel probes shown in figure 3. The larger probe was used at each survey station. Near the wall, a smaller probe (half size) was also used. The second probe (fig. 3), with the tip much closer to the supporting strut, was used in the separated region to ensure that both the probe and its strut were within the separated region. This probe was also used facing both upstream and downstream in the separated region. The probes were calibrated in a free-jet facility-matching Mach number, velocity and density with the present test conditions. These calibrations indicated that the errors due to rarefaction effects were less than 1 percent; therefore, no corrections were applied to the pitot data. These probes were attached to water-cooled pressure transducers located within the model with short lengths (5 to 10 cm) of stainless steel tubing. The pressure transducer calibration procedure was identical to the surface pressure procedure discussed previously.

Static Pressure Probes.— Static pressures in the flow field were measured by stainless steel probes shown in figure 4. The larger probe was used at each survey station while the smaller probe was used in the separated region facing both upstream and downstream similar to the pitot probe measurements. These probes are geometrically similar to those used in reference 6, i.e., a 10° cone-cylinder. Independent calibrations to account for viscous interaction effects agreed with the calibration of Bearens (ref. 6). The maximum viscous corrections applied to the data were 2 percent in and downstream of the interaction regions and 7 percent in the undisturbed region ahead of the incident shock wave. These probes were attached to water-cooled pressure transducers located within the model with short lengths (5 to 10 cm) of stainless steel tubing. The pressure transducer calibration procedure was identical to the surface pressure procedure discussed previously.

Total Temperature Probes.— Total temperatures in the flow field were measured with the probes shown in figure 5. The larger probe was used at each survey station while the smaller probe was used in the separated region. These probes were designed using a concept suggested by Vas (ref. 7). An unshielded, butt-welded chromed alumel thermocouple (0.3 cm long by 0.007 cm thick) is supported by tapered chromel and alumel posts. A second chromel-alumel thermocouple is formed at the end of the alumel support (see fig. 5). This provides a simultaneous measurement of the butt welded thermocouple junction and the probe support.

Corrections for radiation, conduction and recovery factor were made following the method of reference 7. To make these corrections the local Mach number and Reynolds number must be known, thus, requiring an iterative procedure using the pitot and static pressure data. For the present cases, radiation corrections were negligible. Independent calibrations of these probes in the wind-tunnel free stream indicated a maximum total temperature error of 1.5 percent.

Test Procedure.— The test data were obtained during a series of runs with the wind tunnel operating at the nominal conditions described above. Previous measurements (ref. 8), without the generator, established the

existence of a fully developed, self-similar turbulent boundary with negligible pressure gradient 100 to 300 cm from the model tip. Natural transition from laminar to turbulent flow occurred between 40 and 80 cm from the model tip.

For the surface pressure and shear measurements the shock-wave generator was moved axially during a run to obtain continuous data along the model. To accomplish this, the generator was held in a large frame which moved axially either upstream or downstream. See figure 6. Its speed was controlled by a variable speed motor and its position recorded by a potentiometer attached to the frame. The total travel was 25 cm varying from 140 to 165 cm from the model tip (see fig. 1). During a run the generator was occasionally stopped to insure that the measurements were not affected by instrumentation time lags. For the surface heat transfer and flow-field surveys the generator was prepositioned at a fixed axial position prior to a run. At all times the shock-wave generator was located several cm behind the intersection of the bow shock emanating from the model tip and the annular plane of the generator. For the separated flow case several pitot and static pressure runs were also made keeping the probes at fixed distances from the wall and moving the generator.

The undisturbed boundary-layer thickness at the incident shock-wave impingement point increased about 10 percent in a distance corresponding to the difference between the farthest upstream and downstream positioning of the shock-wave generator. However, this had little effect on the experimental results (including the flow field surveys) provided they were compared an equivalent distance from the generator leading edge.

Velocity, density, and pressure profiles were obtained from pitot and static pressure and total temperature surveys. Each survey was taken during a single test run. In traversing the flow field, the probe was stopped at each location for a few seconds to ensure no time lag in the pressure or temperature measurement. Survey data were obtained up to 3.5 cm from the model surface except at the initial survey stations where data were obtained up to 8 cm. The static pressure at the model surface was monitored continuously during all traverses to verify that the data were free from interference effects.

Axisymmetry.— Surface pressure measurements at selected axial positions were obtained at 90° intervals around the model and surface shear measurements at selected axial positions 180° apart. Variations in these data around the model were within the experimental accuracy of the measurements. Also, results from surface oil film studies showed symmetric separation and reattachment lines around the model for the separated case and a symmetric incident shock line for the attached case. From all these results it was concluded that the flow was axisymmetric.

EXPERIMENTAL RESULTS

Local Free-Stream Conditions

Surveys of pitot and static pressure and total temperature were obtained at several axial locations upstream of the interaction region for both cases to determine the local free-stream conditions ahead of the incident shock. Above the boundary layer the variation of the measurements with distance from the model surface (up to 8 cm) was negligible. The average local free-stream values are tabulated in tables 1 and 2 for the two test flows. Slight differences are noted between the two cases which are believed to be caused by small differences in wind-tunnel blockage.

Flow-Field Features

Sketches of the two flow fields constructed from survey data and shadowgraphs taken during the experiment are presented in figures 7 and 8. Several features of the flow fields are worth mentioning. Unlike most two-dimensional experiments that employ long wedge-shaped generators, the present flows are influenced by an expansion fan generated by the corner of the shock-wave generator. Both flows indicate an induced shock wave caused by a lifting of the boundary layer although the strength of this shock wave is significantly less for the attached case ($\alpha = 7.5°$) and eventually coalesces with the recompression shock far downstream. For the separated case ($\alpha = 15°$) the location of the induced shock wave was unsteady due to the unsteady nature of the unseparated flow. The unsteady aspects of this flow will be discussed later.

Surface Measurements

Variations in surface pressure, shear and heat transfer with distances from the leading edge of the shock generator are shown in figures 9 and 10 and tabulated in tables 3 and 4 for both test flows. These data are average values obtained from many runs. Scatter bars indicating the maximum data scatter from run-to-run are shown for several locations along the cylinder. In tables 3 and 4 both the measured and corrected (for longitudinal pressure gradient) values of the surface shear are presented. In figures 9 and 10 the corrected values are plotted. The surface heat-transfer data were not corrected for the small longitudinal conduction errors (less than 5 percent) but were corrected for run-to-run variations in wind-tunnel total temperature. This was done by assuming that the heat flux divided by the driving potential $(T_{T_i} - T_{w_i})$ is invariant for small changes in total temperature. Therefore;

$$q_{corrected} = q_{measured}\left[(T_{T_i} - T_{w_i})_{nominal} / (T_{T_i} - T_{w_i})_{measured}\right]$$

The surface measurements for both the attached and separated flow cases show the major features associated with a shock-wave boundary-layer interaction; a steep increase of pressure (with an intermediate plateau for the

separated case); a decrease in skin friction (leading to negative values for the separated case) followed by a rapid increase; and a corresponding increase in heat flux. An exception from the usual two-dimensional experimental results for this type of flow is the rapid decrease in pressure, shear and heat flux downstream of the peak values which is a result of the expansion fan emanating from the corner formed by the leading edge and the body of the shock generator.

Separation and Reattachment

One of the more difficult aspects of the experiment was precise determination of separation and reattachment point locations and of values for skin friction in the neighborhood of these points. One reason for this was the unsteadiness of the separated region. The unsteady features were examined with a new diagnostic technique that measured the fluctuating voltage from thin platinum films deposited on the outer surface of one of the instrumentation ports. Results for the present flow have been reported previously (ref. 9). Briefly, those results showed that separation and reattachment points experienced large excursions, indicating a maximum separation zone from $x = 28$ to 39 cm. The frequency of the unsteadiness was confined to a narrow band around 15 kHz. Assuming a convection velocity equivalent to the average boundary-layer velocity ahead of separation, the scale of the unsteady motion was estimated to be approximately equal to the length of the separation as determined from the skin-friction measurements which showed separation at $x = 31.5$ cm and reattachment at $x = 34.0$ cm. (Direct skin friction measurements, not corrected for buoyancy effects, show this same extent of separation.) The separation appears to be similar to that found in incompressible flow (ref. 10) wherein onset and reattachment locations are intermittent and only when the flow is reversed 50 percent of the time or more will time-averaged measurements like pitot pressure and skin friction indicate separated flow. Additional data defining the length of separation were obtained from forward and backward facing pitot probes. These data, obtained at fixed values of y and varying x by moving the shock generator, indicate a slightly larger separated region than the skin-friction measurements extending from $x = 30.5$ to 34.5 cm. The authors feel that the best estimates of the time-averaged separation points are given by the pitot probe technique. Furthermore, the accuracy of the skin-friction data in the vicinity of these points is uncertain due to the unknown influence of unsteadiness on the floating element balance. No satisfactory explanation has been found for the odd behavior in the skin-friction data just ahead of separation.

Flow Field Measurements

Velocity, density, and pressure profiles normal to the cylinder surface were obtained from pitot and static pressure and total temperature surveys. In most cases, more than one survey of each type measurement was obtained at each data station. The data presented were obtained from average values of the measured pressure and temperature interpolated at selected y locations. The run-to-run variations were less than 5 percent. To account for

the run-to-run variation in wind tunnel total temperature, the measured values of total temperature were corrected assuming that the ratio $(T_o - T_w)/(T_{o_e} - T_w)$ was invariant. Therefore,

$$T_{o_{corrected}} = (T_{o_e} - T_w)_{nominal}\left[\frac{(T_o - T_w)}{(T_{o_e} - T_w)}\right]_{measured} + T_w$$

The flow quantities, Mach number, velocity, static temperature, and density, were calculated assuming a calorically imperfect, thermally perfect gas.

Normalized profiles of static pressure, velocity, and density are presented in figures 11 and 12 for the attached ($\alpha = 7.5°$) and separated ($\alpha = 15°$) flow cases, respectively. These data along with additional flow-field quantities are tabulated in tables 5 and 6. To illustrate the details of the interaction regions, the profile data have been used to construct static pressure, velocity, and density contours and are shown in figures 13 and 14. The locations of the incident, induced and recompression shock waves are easily recognized. Further details of the interaction regions are shown in figures 15 and 16 where streamline contours, deduced from the velocity and density profiles, are given.

The integrated values of incompressible and compressible displacement and momentum thicknesses, δ_i^*, δ^* and θ_i and θ, are given for the two cases in tables 7 and 8. Also included is the boundary-layer thickness, δ, used for the upper limit of integration. The choice of a boundary-layer thickness for these types of interaction flows is rather arbitrary. For the present case, δ was chosen as the height at which the pitot pressure was a maximum in the interaction region; and downstream, where the pitot pressure continuously increased, δ was chosen where the local Mach number profile no longer had curvature and varied linearly with distance from the wall.

Experimental Uncertainties

The uncertainties in the surface pressure, shear and heat flux measurements were estimated to be ±10 percent except for the shear measurements near separation for the separated case and near the minimum shear value for the attached case. Here, because of the large buoyancy corrections, the uncertainty is extremely high (up to 50 percent of the upstream undisturbed value). In addition, the unsteady aspects of the turbulent separation may cause additional unknown errors in the skin-friction balance measurements near separation. For the flow-field quantities, the estimated uncertainties are ±1.5 percent for the total temperature, ±10 percent for the static pressure, ±6 percent for the static temperature, ±12 percent for the density, and ±3 percent for the velocity. For the separated case near the wall ($y < 1.0$ cm) in the interaction region ($x = 30$ to 36 cm), the uncertainty in velocity is ±8 percent; in the reversed flow region, it is ±35 percent. The uncertainty in y is ±0.02 cm. However, these uncertainties in the flow-field variables are due principally to zero offsets in the pressure measurements. Since each survey was obtained with a single probe, the uncertainty of the vertical variation in these flow-field quantities is significantly less than the numbers quoted above.

CONCLUDING REMARKS

Two cases of a shock-wave, hypersonic turbulent-boundary-layer, interaction flow over a cone-ogive-cylinder were experimentally investigated. For one case the boundary layer was attached and in the other the shock wave was of sufficient strength to separate the boundary layer. The mean flow field measurements of surface pressure, shear and heat flux, pitot and static pressure and total temperature profiles were completely documented. The tabulated results presented in this report provide, in sufficient detail, experimental data for validating present or future computer codes and/or turbulence models.

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TABLE 1

7.5° SHOCK WAVE GENERATOR

$M_\infty = 6.71$	$\rho_\infty = 0.0300$ kg/m^3
$P_\infty = 607$ N/m^2	$U_\infty = 1129$ m/s
$T_\infty = 70.6°$ K	$T_{O_\infty} = 695°$ K
$T_W = 300°$ K	

TABLE 2

15° SHOCK WAVE GENERATOR

$M_\infty = 6.86$	$\rho_\infty = 0.0312$ kg/m^3
$P_\infty = 607$ N/m^2	$U_\infty = 1132$ m/s
$T_\infty = 67.8°$ K	$T_{O_\infty} = 695°$ K
$T_W = 300°$ K	

TABLE 3

7.5 DEGREE SHOCK WAVE GENERATOR

x	p_w	τ_{w_m}	τ_{w_c}	q_w
(cm)	(N/m^2)	(N/m^2)	(N/m^2)	(W/m^2)
42.0	607.	16.7	16.7	6240.
42.5	607.	16.7	16.7	6240.
43.0	607.	16.7	16.7	6240.
43.5	607.	16.7	16.7	6240.
44.0	607.	16.7	16.7	6360.
44.5	607.	16.7	16.7	6470.
45.0	607.	16.7	17.1	6580.
45.5	614.	16.7	17.4	6810.
46.0	621.	16.7	17.8	7040.
46.5	634.	16.7	18.5	7380.
47.0	655.	16.7	19.5	7720.
47.5	683.	10.8	15.0	8280.
48.0	759.	4.1	9.2	9080.
48.5	862.	1.0	7.4	10800.
49.0	1020.	0.1	7.9	12500.
49.5	1240.	1.6	11.4	14400.
50.0	1520.	5.4	17.2	16500.
50.5	1790.	11.3	25.2	19300.
51.0	2070.	18.8	34.0	22100.
51.5	2480.	26.5	42.2	24400.
52.0	2830.	33.0	48.9	27000.
52.5	3170.	39.2	55.0	28900.
53.0	3520.	44.6	60.3	31200.
53.5	3790.	49.5	64.0	32900.
54.0	4030.	53.5	66.3	34800.
54.5	4270.	57.3	68.3	36500.
55.0	4450.	60.2	69.6	37800.
55.5	4620.	62.8	70.5	38800.
56.0	4740.	64.9	71.0	39500.
56.5	4830.	66.7	71.1	40100.
57.0	4860.	68.1	71.1	40300.
57.5	4900.	69.1	70.7	40300.
58.0	4870.	70.1	70.5	40300.
58.5	4810.	70.7	70.0	40200.
59.0	4750.	71.4	69.7	39900.
59.5	4650.	71.8	69.3	39500.
60.0	4550.	72.1	68.9	38900.
60.5	4420.	72.3	68.8	38500.
61.0	4320.	72.6	68.6	37900.
61.5	4190.	72.3	68.5	37300.
62.0	4070.	72.2	68.3	36800.
62.5	3960.	72.1	68.1	36200.

x	p_w	τ_{w_m}	τ_{w_c}	q_w
(cm)	(N/m^2)	(N/m^2)	(N/m^2)	(W/m^2)
63.0	3860.	71.8	67.8	35500.
63.5	3740.	71.6	67.6	34800.
64.0	3640.	71.1	67.1	34200.
64.5	3560.	70.6	66.7	33500.
65.0	3450.	70.1	66.3	32900.
65.5	3360.	69.6	65.9	32400.
66.0	3280.	69.0	65.3	31800.
66.5	3190.	68.4	64.7	31200.
67.0	3100.	67.7	64.1	30600.
67.5	3030.	67.1	63.6	30100.
68.0	2980.	66.3	63.0	29500.
68.5	2900.	65.7	62.4	29100.
69.0	2830.	64.8	61.6	28600.
69.5	2760.	64.1	60.9	28100.
70.0	2700.	63.4	60.2	27600.
71.0	2610.	61.8	58.7	26400.
72.0	2490.	59.8	56.9	25400.
73.0	2410.	58.1	55.3	24300.
74.0	2310.	56.4	53.7	23400.
75.0	2210.	54.4	52.0	22500.
76.0	2100.	52.5	50.1	21800.
77.0	2030.	50.5	48.2	21000.
78.0	1940.	48.8	46.7	20200.
79.0	1900.	47.6	45.5	19400.
80.0	1810.	45.8	43.8	18700.
81.0	1720.			18000.
82.0	1660.			17600.
83.0	1590.			16900.
84.0	1520.			16200.
85.0	1460.			15700.
86.0	1390.			15100.
87.0	1330.			14600.
88.0	1270.			14100.
89.0	1250.			13500.
90.0	1230.			13100.
91.0	1210.			12700.
92.0	1180.			12400.
93.0	1160.			11900.
94.0	1130.			11600.
95.0	1100.			11200.

TABLE 4

15 DEGREE SHOCK WAVE GENERATOR

x	p_w	τ_{w_m}	τ_{w_c}	q_w
(cm)	(N/m^2)	(N/m^2)	(N/m^2)	(W/m^2)
20.0	607.	16.7	16.7	6240.
21.0	607.	16.7	16.7	6240.
22.0	607.	16.7	16.7	6240.
23.0	607.	16.7	16.7	6360.
24.0	607.	16.7	16.7	6580.
25.0	607.	16.7	16.9	6810.
25.5	621.	16.3	17.4	7040.
26.0	689.	15.2	17.4	7260.
26.5	758.	12.3	15.8	7600.
27.0	841.	9.3	14.3	7940.
27.5	951.	5.4	11.6	8400.
28.0	1050.	3.9	11.6	9080.
28.5	1230.	4.5	15.4	9650.
29.0	1420.	8.3	18.1	10200.
29.5	1640.	9.3	18.3	11000.
30.0	1810.	7.8	15.8	11900.
30.5	1940.	5.4	12.2	12900.
31.0	2050.	2.9	8.2	14400.
31.5	2150.	0.5	4.7	15900.
32.0	2210.	- 2.0	1.4	17700.
32.5	2280.	- 4.4	- 1.8	21000.
33.0	2330.	- 4.9	- 3.7	24400.
33.5	2360.	- 2.4	- 0.5	28100.
34.0	2400.	1.0	2.8	31200.
34.5	2430.	5.4	8.9	34300.
35.0	2540.	9.8	18.1	37500.
35.5	2760.	14.7	27.5	39900.
36.0	3030.	20.1	34.3	42700.
36.5	3310.	25.5	39.7	45100.
37.0	3590.	31.9	46.1	47200.
37.5	3860.	38.2	52.5	49100.
38.0	4140.	44.1	58.3	50800.
38.5	4410.	50.0	64.2	52200.
39.0	4690.	54.9	68.9	53300.
39.5	4940.	59.3	72.5	54000.
40.0	5120.	64.2	75.2	54400.
40.5	5300.	68.6	77.9	54600.
41.0	5460.	72.1	79.5	54700.
41.5	5600.	75.5	81.7	54700.

x	p_w	τ_{w_m}	τ_{w_c}	q_w
(cm)	(N/m^2)	(N/m^2)	(N/m^2)	(W/m^2)
42.0	5690.	78.9	82.2	54600.
42.5	5720.	81.9	82.6	54500.
43.0	5720.	84.3	83.3	54400.
43.5	5680.	86.3	83.7	54100.
44.0	5620.	88.3	84.7	53700.
44.5	5540.	89.7	85.3	53200.
45.0	5450.	90.7	85.4	52700.
45.5	5350.	91.7	86.1	52200.
46.0	5240.	92.2	86.3	51500.
46.5	5130.	92.7	86.5	50900.
47.0	5010.	92.2	85.8	50200.
47.5	4890.	91.9	85.3	49500.
48.0	4770.	91.4	84.6	48800.
48.5	4650.	90.7	83.9	47900.
49.0	4520.	90.0	83.5	47200.
49.5	4430.	89.2	82.7	46300.
50.0	4300.	88.3	81.9	45400.
50.5	4190.	87.3	80.9	44500.
51.0	4070.	86.1	79.9	43600.
51.5	3960.	84.8	78.7	42600.
52.0	3850.	83.6	77.7	41700.
52.5	3740.	82.4	76.7	40700.
53.0	3640.	80.9	75.4	39700.
53.5	3540.	79.4	74.1	38800.
54.0	3450.	77.8	72.7	37900.
54.5	3340.	76.0	71.0	37000.
55.0	3250.	74.5	69.7	36100.
55.5	3160.	73.1	68.3	35200.
56.0	3090.	71.1	66.5	34300.
56.5	3000.	69.1	64.7	33500.
57.0	2910.	67.2	63.0	32700.
57.5	2830.	65.7	61.6	31800.
58.0	2760.	63.7	59.8	30900.
58.5	2690.	62.3	58.3	30100.
59.0	2620.	60.8	57.1	29300.
59.5	2550.	59.3	55.8	28500.
60.0	2480.	57.9	54.3	27800.
60.5	2410.	56.9	53.5	27100.
61.0	2340.	55.4	52.2	26400.

TABLE 4 — CONCLUDED

15 DEGREE SHOCK WAVE GENERATOR

x	p_w	τ_{w_m}	τ_{w_c}	q_w
(cm)	(N/m^2)	(N/M^2)	(N/m^2)	(W/m^2)
61.5	2280.	54.4	51.2	25800.
62.0	2210.	53.4	50.4	25200.
62.5	2140.	52.5	49.5	24600.
63.0	2080.	51.5	48.6	24100.
63.5	2010.	50.5	47.8	23500.
64.0	1960.	49.5	46.9	22900.
64.5	1910.	48.5	46.0	22500.
65.0	1850.	47.6	45.1	21900.
66.0	1777.	46.1	43.7	21000.
67.0	1690.	44.3	42.3	20100.
68.0	1610.	43.0	41.2	19300.
69.0	1550.	41.2	39.6	18600.
70.0	1490.	40.2	38.6	17900.
71.0	1430.	38.9	37.4	17300.
72.0	1380.	37.8	36.2	16700.
73.0	1320.	36.8	35.3	16000.
74.0	1260.	35.8	34.3	15500.
75.0	1210.	35.1	33.7	15100.
76.0	1160.	34.3	33.0	14600.
77.0	1100.	33.3	32.0	14200.
78.0	1060.	32.6	31.3	13700.
79.0	1010.	31.9	30.7	13300.
80.0	979.	31.1	30.0	12800.
81.0	938.	30.4	29.4	12400.
82.0	910.	29.7	28.8	11900.
83.0	883.	29.1	28.3	11500.
84.0	855.	28.4	27.8	11000.
85.0	834.	27.9	27.4	10600.
86.0	814.	27.5	27.0	10200.
87.0	800.	27.0	26.5	9870.
88.0	786.	26.5	26.0	9530.
89.0	772.	26.0	25.5	9310.
90.0	758.	25.5	25.0	9080.
91.0	745.	25.0	24.5	8970.
92.0	731.	24.5	24.1	8850.
93.0	717.	24.3	23.9	8740.
94.0	703.	24.1	23.7	8630.
95.0	689.	24.0	23.6	8510.

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 42.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.000	0.235	4.252	0.000	0.000	0.432
0.050	1.027	1.000	0.204	4.896	0.339	0.069	0.602
0.075	1.313	1.000	0.212	4.712	0.444	0.094	0.659
0.100	1.655	1.000	0.225	4.444	0.520	0.117	0.699
0.125	1.917	1.000	0.237	4.228	0.588	0.139	0.744
0.150	2.057	1.000	0.241	4.142	0.622	0.150	0.773
0.175	2.167	1.000	0.250	3.994	0.646	0.162	0.784
0.200	2.248	1.000	0.257	3.897	0.662	0.170	0.793
0.250	2.348	1.000	0.263	3.796	0.682	0.180	0.807
0.300	2.409	1.000	0.267	3.740	0.695	0.186	0.817
0.350	2.491	1.000	0.275	3.641	0.708	0.195	0.824
0.400	2.552	1.000	0.280	3.568	0.719	0.201	0.830
0.450	2.620	1.000	0.287	3.490	0.730	0.209	0.836
0.500	2.671	1.000	0.291	3.437	0.738	0.215	0.842
0.600	2.816	1.000	0.306	3.269	0.759	0.232	0.852
0.700	2.908	1.000	0.314	3.184	0.774	0.243	0.864
0.800	3.056	1.000	0.331	3.021	0.792	0.262	0.873
0.900	3.212	1.000	0.349	2.862	0.810	0.283	0.882
1.000	3.346	1.000	0.366	2.735	0.825	0.302	0.892
1.100	3.476	1.000	0.381	2.622	0.839	0.320	0.901
1.200	3.637	1.000	0.403	2.481	0.854	0.344	0.909
1.300	3.756	1.000	0.419	2.387	0.865	0.362	0.917
1.400	3.872	1.000	0.434	2.303	0.876	0.380	0.925
1.500	4.061	1.000	0.463	2.159	0.890	0.412	0.932
1.600	4.263	1.000	0.495	2.020	0.903	0.447	0.939
1.700	4.426	1.000	0.521	1.918	0.914	0.476	0.946
1.800	4.640	1.000	0.558	1.792	0.926	0.517	0.953
1.900	4.762	1.000	0.578	1.731	0.934	0.540	0.960
2.000	4.979	1.000	0.617	1.620	0.945	0.583	0.967
2.100	5.153	1.000	0.649	1.540	0.953	0.615	0.973
2.200	5.372	1.000	0.692	1.444	0.962	0.666	0.979
2.300	5.565	1.000	0.731	1.367	0.970	0.709	0.985
2.400	5.760	1.000	0.772	1.295	0.977	0.754	0.990
2.500	5.986	1.000	0.821	1.217	0.985	0.809	0.994
2.600	6.174	1.000	0.866	1.155	0.989	0.856	0.997
2.700	6.274	1.000	0.889	1.125	0.992	0.882	0.998
2.800	6.481	1.000	0.941	1.063	0.996	0.937	0.999
2.900	6.582	1.000	0.967	1.035	0.998	0.965	1.000
3.000	6.629	1.000	0.979	1.021	0.999	0.978	1.000
3.100	6.682	1.000	0.993	1.007	1.000	0.992	1.000
3.200	6.695	1.000	0.997	1.003	1.000	0.996	1.000
3.300	6.702	1.000	0.998	1.002	1.000	0.998	1.000
3.400	6.708	1.000	1.000	1.000	1.000	1.000	1.000
3.500	6.722	1.000	1.004	0.996	1.000	1.004	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 44.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.000	0.235	4.252	0.000	0.000	0.432
0.050	1.079	1.000	0.208	4.810	0.353	0.073	0.607
0.075	1.304	1.000	0.207	4.841	0.428	0.088	0.659
0.100	1.620	1.000	0.222	4.511	0.513	0.114	0.699
0.125	1.911	1.000	0.236	4.241	0.586	0.138	0.744
0.150	2.084	1.000	0.245	4.083	0.628	0.154	0.773
0.175	2.184	1.000	0.252	3.964	0.648	0.163	0.784
0.200	2.300	1.000	0.263	3.806	0.669	0.176	0.793
0.250	2.411	1.000	0.271	3.690	0.691	0.187	0.807
0.300	2.483	1.000	0.276	3.618	0.704	0.195	0.817
0.350	2.569	1.000	0.284	3.516	0.718	0.204	0.824
0.400	2.671	1.000	0.295	3.386	0.733	0.216	0.830
0.450	2.752	1.000	0.304	3.293	0.745	0.226	0.836
0.500	2.831	1.000	0.312	3.204	0.756	0.236	0.842
0.600	2.908	1.000	0.318	3.140	0.768	0.245	0.852
0.700	3.028	1.000	0.331	3.025	0.785	0.259	0.864
0.800	3.128	1.000	0.341	2.931	0.798	0.272	0.873
0.900	3.333	1.000	0.367	2.721	0.820	0.301	0.882
1.000	3.463	1.000	0.384	2.601	0.834	0.320	0.892
1.100	3.563	1.000	0.395	2.530	0.845	0.334	0.901
1.200	3.697	1.000	0.413	2.422	0.858	0.354	0.909
1.300	3.815	1.000	0.429	2.333	0.869	0.372	0.917
1.400	3.962	1.000	0.449	2.225	0.881	0.396	0.925
1.500	4.115	1.000	0.473	2.116	0.892	0.422	0.932
1.600	4.273	1.000	0.497	2.012	0.903	0.449	0.939
1.700	4.465	1.000	0.529	1.891	0.915	0.484	0.946
1.800	4.640	1.000	0.558	1.792	0.926	0.517	0.953
1.900	4.799	1.000	0.585	1.709	0.935	0.547	0.960
2.000	5.023	1.000	0.626	1.596	0.946	0.593	0.967
2.100	5.196	1.000	0.659	1.518	0.955	0.629	0.973
2.200	5.363	1.000	0.691	1.448	0.962	0.664	0.979
2.300	5.533	1.000	0.724	1.381	0.969	0.702	0.985
2.400	5.691	1.000	0.756	1.323	0.976	0.738	0.990
2.500	5.948	1.000	0.813	1.231	0.984	0.799	0.994
2.600	6.044	1.000	0.834	1.200	0.987	0.823	0.997
2.700	6.238	1.000	0.880	1.136	0.991	0.872	0.998
2.800	6.343	1.000	0.905	1.105	0.994	0.900	0.999
2.900	6.481	1.000	0.940	1.064	0.997	0.937	1.000
3.000	6.582	1.000	0.967	1.035	0.998	0.965	1.000
3.100	6.616	1.000	0.975	1.025	0.999	0.974	1.000
3.200	6.715	1.000	1.002	0.998	1.000	1.002	1.000
3.300	6.740	1.511	1.524	0.991	1.001	1.525	1.000
3.400	6.757	2.455	2.487	0.987	1.001	2.485	1.000
3.500	6.107	3.011	2.548	1.182	0.990	2.522	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 46.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.023	0.241	4.252	0.000	0.000	0.432
0.050	0.993	1.023	0.208	4.906	0.328	0.068	0.597
0.075	1.205	1.023	0.207	4.941	0.399	0.083	0.648
0.100	1.537	1.023	0.221	4.634	0.493	0.109	0.693
0.125	1.750	1.023	0.227	4.514	0.554	0.126	0.739
0.150	1.983	1.023	0.243	4.205	0.606	0.147	0.761
0.175	2.050	1.023	0.246	4.161	0.623	0.153	0.776
0.200	2.115	1.023	0.249	4.104	0.639	0.159	0.787
0.250	2.269	1.023	0.262	3.909	0.669	0.175	0.802
0.300	2.346	1.023	0.267	3.836	0.685	0.183	0.814
0.350	2.417	1.023	0.272	3.763	0.699	0.190	0.824
0.400	2.496	1.023	0.279	3.671	0.713	0.199	0.832
0.450	2.556	1.023	0.284	3.600	0.723	0.205	0.838
0.500	2.656	1.023	0.295	3.467	0.737	0.217	0.843
0.600	2.736	1.023	0.302	3.385	0.750	0.227	0.852
0.700	2.874	1.023	0.317	3.224	0.769	0.244	0.862
0.800	3.021	1.023	0.334	3.061	0.788	0.263	0.871
0.900	3.133	1.023	0.347	2.950	0.802	0.278	0.880
1.000	3.206	1.011	0.350	2.886	0.812	0.285	0.888
1.100	3.417	1.011	0.378	2.672	0.833	0.315	0.897
1.200	3.505	1.011	0.389	2.599	0.842	0.328	0.903
1.300	3.628	1.011	0.405	2.498	0.855	0.346	0.912
1.400	3.804	1.011	0.430	2.351	0.870	0.374	0.920
1.500	3.983	1.011	0.457	2.213	0.883	0.404	0.927
1.600	4.134	1.011	0.480	2.109	0.895	0.425	0.935
1.700	4.335	1.000	0.506	1.976	0.908	0.460	0.943
1.800	4.488	1.011	0.537	1.882	0.918	0.493	0.949
1.900	4.679	1.011	0.571	1.771	0.928	0.530	0.955
2.000	4.826	1.011	0.597	1.693	0.936	0.559	0.960
2.100	5.038	1.011	0.639	1.584	0.945	0.604	0.964
2.200	5.179	1.023	0.674	1.517	0.951	0.641	0.967
2.300	5.383	1.023	0.715	1.430	0.960	0.686	0.973
2.400	5.603	1.023	0.759	1.349	0.970	0.736	0.982
2.500	5.675	1.057	0.796	1.327	0.975	0.776	0.989
2.600	5.738	1.114	0.849	1.312	0.980	0.832	0.995
2.700	5.805	1.477	1.143	1.292	0.984	1.125	1.000
2.800	5.803	2.852	2.206	1.293	0.984	2.170	1.000
2.900	5.795	3.250	2.508	1.296	0.983	2.467	1.000
3.000	5.774	3.318	2.544	1.304	0.983	2.501	1.000
3.100	5.723	3.375	2.548	1.324	0.982	2.502	1.000
3.200	5.689	3.398	2.539	1.338	0.981	2.491	1.000
3.300	5.659	3.420	2.533	1.350	0.980	2.483	1.000
3.400	5.641	3.409	2.511	1.358	0.980	2.460	1.000
3.500	5.592	3.432	2.490	1.378	0.979	2.437	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 48.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.250	0.294	4.252	0.000	0.000	0.432
0.050	0.591	1.364	0.212	6.430	0.223	0.047	0.699
0.075	0.612	1.420	0.215	6.608	0.234	0.050	0.722
0.100	0.672	1.477	0.220	6.729	0.259	0.057	0.744
0.125	0.771	1.534	0.227	6.766	0.298	0.068	0.767
0.150	0.893	1.591	0.238	6.681	0.343	0.082	0.784
0.175	0.917	1.636	0.243	6.732	0.353	0.086	0.796
0.200	0.976	1.648	0.247	6.669	0.374	0.093	0.803
0.250	1.221	1.648	0.265	6.207	0.452	0.120	0.814
0.300	1.402	1.636	0.279	5.856	0.505	0.141	0.824
0.350	1.600	1.614	0.296	5.447	0.556	0.165	0.831
0.400	1.693	1.580	0.299	5.274	0.579	0.173	0.838
0.450	1.855	1.534	0.311	4.940	0.614	0.191	0.842
0.500	1.993	1.500	0.321	4.677	0.642	0.206	0.847
0.600	2.264	1.443	0.346	4.173	0.689	0.238	0.852
0.700	2.468	1.420	0.370	3.843	0.721	0.267	0.859
0.800	2.708	1.386	0.397	3.496	0.755	0.299	0.869
0.900	2.931	1.330	0.414	3.211	0.783	0.324	0.879
1.000	3.139	1.295	0.435	2.979	0.808	0.351	0.890
1.100	3.322	1.239	0.442	2.800	0.829	0.367	0.903
1.200	3.635	1.170	0.467	2.509	0.858	0.401	0.917
1.300	3.865	1.125	0.484	2.326	0.879	0.425	0.931
1.400	4.049	1.080	0.489	2.207	0.897	0.439	0.947
1.500	4.144	1.057	0.488	2.161	0.910	0.444	0.963
1.600	4.218	1.045	0.485	2.153	0.923	0.448	0.982
1.700	4.311	1.034	0.492	2.103	0.932	0.458	0.993
1.800	4.389	1.057	0.513	2.059	0.939	0.482	0.999
1.900	4.559	1.148	0.592	1.939	0.946	0.560	1.000
2.000	5.033	1.511	0.917	1.648	0.963	0.883	1.000
2.100	5.389	2.011	1.369	1.469	0.974	1.333	1.000
2.200	5.535	2.420	1.725	1.403	0.977	1.686	1.000
2.300	5.659	2.670	1.978	1.350	0.980	1.939	1.000
2.400	5.729	2.966	2.244	1.322	0.982	2.203	1.000
2.500	5.774	3.091	2.370	1.304	0.983	2.330	1.000
2.600	5.800	3.102	2.397	1.294	0.984	2.358	1.000
2.700	5.780	3.136	2.409	1.302	0.983	2.369	1.000
2.800	5.805	3.136	2.427	1.292	0.984	2.388	1.000
2.900	5.803	3.125	2.417	1.293	0.984	2.377	1.000
3.000	5.801	3.114	2.407	1.293	0.984	2.366	1.000
3.100	5.807	3.102	2.403	1.291	0.984	2.363	1.000
3.200	5.803	3.068	2.373	1.293	0.984	2.334	1.000
3.300	5.793	3.068	2.359	1.301	0.983	2.319	1.000
3.400	5.765	3.068	2.347	1.307	0.983	2.306	1.000
3.500	5.744	3.057	2.323	1.316	0.982	2.282	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 50.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	2.500	0.588	4.252	0.000	0.000	0.432
0.050	0.445	2.500	0.381	6.564	0.169	0.064	0.693
0.075	0.500	2.500	0.378	6.605	0.191	0.072	0.705
0.100	0.528	2.500	0.375	6.659	0.202	0.076	0.714
0.125	0.564	2.500	0.374	6.679	0.217	0.081	0.722
0.150	0.620	2.500	0.376	6.657	0.237	0.089	0.728
0.175	0.714	2.500	0.381	6.558	0.272	0.104	0.734
0.200	0.745	2.500	0.382	6.551	0.283	0.108	0.739
0.250	0.828	2.500	0.386	6.472	0.313	0.121	0.747
0.300	0.914	2.500	0.392	6.381	0.343	0.135	0.755
0.350	1.035	2.500	0.404	6.191	0.383	0.155	0.762
0.400	1.130	2.511	0.415	6.053	0.414	0.172	0.770
0.450	1.148	2.523	0.415	6.079	0.421	0.175	0.778
0.500	1.293	2.534	0.436	5.814	0.464	0.202	0.785
0.600	1.525	2.591	0.478	5.423	0.529	0.253	0.803
0.700	1.711	2.659	0.517	5.144	0.578	0.299	0.824
0.800	1.900	2.761	0.567	4.866	0.625	0.354	0.846
0.900	2.298	2.966	0.707	4.194	0.701	0.496	0.869
1.000	2.520	3.255	0.843	3.911	0.743	0.626	0.893
1.100	2.728	3.784	1.028	3.682	0.780	0.802	0.920
1.200	2.910	4.295	1.231	3.491	0.810	0.997	0.943
1.300	3.223	4.432	1.423	3.113	0.848	1.267	0.960
1.400	3.552	4.250	1.537	2.765	0.881	1.353	0.976
1.500	3.898	4.000	1.639	2.441	0.908	1.488	0.986
1.600	4.294	3.568	1.682	2.122	0.932	1.568	0.995
1.700	4.630	3.341	1.768	1.889	0.949	1.676	0.999
1.800	5.173	2.977	1.891	1.574	0.968	1.830	1.000
1.900	5.608	2.841	2.071	1.372	0.979	2.028	1.000
2.000	5.791	2.773	2.137	1.297	0.983	2.102	1.000
2.100	5.832	2.773	2.164	1.281	0.984	2.130	1.000
2.200	5.835	2.795	2.183	1.280	0.984	2.149	1.000
2.300	5.851	2.807	2.202	1.274	0.985	2.169	1.000
2.400	5.819	2.852	2.217	1.286	0.984	2.182	1.000
2.500	5.830	2.852	2.224	1.282	0.984	2.189	1.000
2.600	5.814	2.875	2.231	1.288	0.984	2.195	1.000
2.700	5.801	2.875	2.223	1.293	0.984	2.186	1.000
2.800	5.807	2.864	2.218	1.291	0.984	2.182	1.000
2.900	5.816	2.852	2.215	1.288	0.984	2.180	1.000
3.000	5.806	2.852	2.208	1.292	0.984	2.172	1.000
3.100	5.798	2.852	2.203	1.295	0.984	2.166	1.000
3.200	5.782	2.852	2.192	1.301	0.983	2.156	1.000
3.300	5.760	2.852	2.178	1.309	0.983	2.140	1.000
3.400	5.734	2.841	2.152	1.320	0.982	2.114	1.000
3.500	5.719	2.830	2.134	1.326	0.982	2.095	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 52.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	4.659	1.096	4.252	0.000	0.000	0.432
0.050	0.671	4.648	0.703	6.608	0.256	0.180	0.731
0.075	0.676	4.636	0.697	6.648	0.259	0.181	0.736
0.100	0.694	4.614	0.692	6.666	0.266	0.184	0.742
0.125	0.717	4.591	0.687	6.679	0.275	0.189	0.747
0.150	0.761	4.568	0.687	6.654	0.292	0.200	0.753
0.175	0.785	4.545	0.682	6.661	0.301	0.205	0.759
0.200	0.831	4.523	0.683	6.626	0.319	0.217	0.764
0.250	0.888	4.500	0.679	6.631	0.340	0.230	0.777
0.300	1.035	4.455	0.692	6.433	0.390	0.270	0.790
0.350	1.165	4.432	0.707	6.267	0.434	0.307	0.806
0.400	1.286	4.386	0.717	6.117	0.473	0.339	0.822
0.450	1.462	4.341	0.745	5.826	0.525	0.391	0.839
0.500	1.579	4.307	0.760	5.668	0.559	0.425	0.856
0.600	1.870	4.205	0.817	5.147	0.632	0.516	0.881
0.700	2.173	4.170	0.904	4.614	0.696	0.629	0.902
0.800	2.505	3.864	0.950	4.066	0.753	0.715	0.921
0.900	2.839	3.614	1.010	3.579	0.801	0.808	0.938
1.000	3.160	3.409	1.073	3.176	0.840	0.901	0.955
1.100	3.425	3.284	1.135	2.892	0.868	0.986	0.969
1.200	3.735	3.261	1.261	2.586	0.895	1.129	0.981
1.300	4.096	3.398	1.496	2.271	0.920	1.377	0.990
1.400	4.351	3.659	1.759	2.080	0.936	1.646	0.996
1.500	4.828	3.989	2.259	1.766	0.957	2.161	1.000
1.600	5.019	4.352	2.628	1.656	0.963	2.530	1.000
1.700	5.247	4.557	2.965	1.537	0.970	2.875	1.000
1.800	5.368	4.205	2.844	1.478	0.973	2.767	1.000
1.900	5.502	3.443	2.429	1.418	0.977	2.372	1.000
2.000	5.588	3.045	2.207	1.380	0.979	2.160	1.000
2.100	5.760	2.750	2.100	1.310	0.983	2.063	1.000
2.200	5.770	2.727	2.089	1.306	0.983	2.053	1.000
2.300	5.760	2.750	2.100	1.310	0.983	2.063	1.000
2.400	5.738	2.784	2.112	1.318	0.982	2.074	1.000
2.500	5.738	2.784	2.112	1.318	0.982	2.074	1.000
2.600	5.726	2.795	2.113	1.323	0.982	2.075	1.000
2.700	5.738	2.784	2.112	1.318	0.982	2.074	1.000
2.800	5.715	2.807	2.114	1.328	0.982	2.075	1.000
2.900	5.728	2.807	2.123	1.322	0.982	2.085	1.000
3.000	5.694	2.830	2.118	1.336	0.981	2.078	1.000
3.100	5.677	2.830	2.107	1.343	0.981	2.067	1.000
3.200	5.689	2.818	2.106	1.338	0.981	2.066	1.000
3.300	5.701	2.807	2.105	1.333	0.981	2.066	1.000
3.400	5.648	2.795	2.063	1.355	0.980	2.022	1.000
3.500	5.638	2.773	2.040	1.359	0.980	1.999	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 54.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	6.648	1.563	4.252	0.000	0.000	0.432
0.050	1.127	6.545	1.056	6.200	0.417	0.441	0.787
0.075	1.177	6.500	1.056	6.156	0.434	0.459	0.796
0.100	1.223	6.477	1.060	6.112	0.450	0.476	0.803
0.125	1.246	6.432	1.051	6.122	0.458	0.482	0.811
0.150	1.268	6.375	1.040	6.128	0.467	0.486	0.818
0.175	1.303	6.341	1.041	6.094	0.478	0.498	0.824
0.200	1.350	6.318	1.048	6.026	0.493	0.517	0.830
0.250	1.400	6.295	1.048	6.008	0.511	0.535	0.844
0.300	1.550	6.239	1.086	5.744	0.553	0.601	0.857
0.350	1.647	6.227	1.112	5.599	0.580	0.645	0.870
0.400	1.778	6.216	1.156	5.377	0.614	0.710	0.884
0.450	1.918	6.193	1.205	5.139	0.648	0.780	0.897
0.500	2.040	6.182	1.251	4.940	0.675	0.845	0.910
0.600	2.331	6.080	1.359	4.474	0.735	0.998	0.937
0.700	2.762	5.795	1.522	3.808	0.803	1.223	0.964
0.800	3.205	5.477	1.698	3.225	0.858	1.457	0.986
0.900	3.735	5.057	1.924	2.628	0.903	1.737	0.996
1.000	4.237	4.602	2.113	2.178	0.932	1.970	1.000
1.100	4.828	4.034	2.284	1.766	0.957	2.185	1.000
1.200	5.247	3.477	2.262	1.537	0.970	2.194	1.000
1.300	5.419	3.239	2.226	1.455	0.974	2.169	1.000
1.400	5.572	3.091	2.229	1.387	0.978	2.180	1.000
1.500	5.673	3.125	2.324	1.345	0.981	2.275	1.000
1.600	5.689	3.250	2.429	1.338	0.981	2.383	1.000
1.700	5.688	3.386	2.530	1.339	0.981	2.482	1.000
1.800	5.706	3.580	2.689	1.331	0.981	2.639	1.000
1.900	5.749	3.625	2.758	1.314	0.982	2.710	1.000
2.000	5.794	3.511	2.709	1.296	0.983	2.664	1.000
2.100	5.992	3.091	2.529	1.222	0.988	2.497	1.000
2.200	6.036	2.591	2.147	1.207	0.988	2.122	1.000
2.300	5.971	2.500	2.033	1.230	0.987	2.007	1.000
2.400	5.869	2.523	1.990	1.267	0.985	1.961	1.000
2.500	5.833	2.580	2.013	1.281	0.984	1.982	1.000
2.600	5.833	2.580	2.013	1.281	0.984	1.982	1.000
2.700	5.808	2.591	2.007	1.291	0.984	1.975	1.000
2.800	5.767	2.625	2.009	1.307	0.983	1.974	1.000
2.900	5.767	2.625	2.009	1.307	0.983	1.974	1.000
3.000	5.730	2.659	2.012	1.322	0.982	1.976	1.000
3.100	5.715	2.659	2.003	1.327	0.982	1.966	1.000
3.200	5.728	2.648	2.002	1.322	0.982	1.966	1.000
3.300	5.736	2.614	1.981	1.319	0.982	1.946	1.000
3.400	5.851	2.500	1.962	1.274	0.985	1.932	1.000
3.500	5.755	2.557	1.950	1.311	0.983	1.916	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 56.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	7.818	1.839	4.252	0.000	0.000	0.432
0.050	1.259	7.818	1.300	6.015	0.459	0.597	0.801
0.075	1.333	7.818	1.318	5.933	0.483	0.636	0.813
0.100	1.371	7.818	1.313	5.954	0.498	0.654	0.827
0.125	1.395	7.795	1.307	5.965	0.507	0.662	0.836
0.150	1.425	7.784	1.306	5.960	0.518	0.676	0.846
0.175	1.455	7.773	1.309	5.939	0.527	0.690	0.852
0.200	1.480	7.761	1.311	5.919	0.536	0.702	0.858
0.250	1.555	7.739	1.332	5.812	0.558	0.743	0.869
0.300	1.636	7.705	1.355	5.687	0.581	0.787	0.879
0.350	1.718	7.659	1.378	5.560	0.603	0.831	0.890
0.400	1.858	7.614	1.440	5.287	0.636	0.916	0.899
0.450	2.001	7.545	1.503	5.021	0.668	1.004	0.909
0.500	2.142	7.466	1.562	4.779	0.698	1.090	0.920
0.600	2.486	7.273	1.733	4.196	0.759	1.316	0.941
0.700	2.922	7.034	1.981	3.551	0.821	1.626	0.964
0.800	3.276	6.841	2.176	3.144	0.866	1.884	0.990
0.900	3.819	6.614	2.604	2.539	0.907	2.363	0.995
1.000	4.349	6.364	3.044	2.091	0.937	2.853	1.000
1.100	4.713	6.080	3.309	1.837	0.952	3.152	1.000
1.200	5.019	5.523	3.335	1.656	0.963	3.211	1.000
1.300	5.170	4.886	3.101	1.575	0.968	3.001	1.000
1.400	5.200	4.091	2.621	1.560	0.968	2.539	1.000
1.500	5.232	3.500	2.266	1.544	0.969	2.197	1.000
1.600	5.341	3.239	2.172	1.491	0.972	2.111	1.000
1.700	5.408	3.205	2.195	1.460	0.974	2.138	1.000
1.800	5.388	3.318	2.258	1.469	0.974	2.199	1.000
1.900	5.340	3.500	2.346	1.492	0.972	2.281	1.000
2.000	5.297	3.693	2.442	1.513	0.971	2.371	1.000
2.100	5.284	3.807	2.507	1.518	0.971	2.434	1.000
2.200	5.310	3.864	2.565	1.506	0.972	2.492	1.000
2.300	5.310	3.864	2.565	1.506	0.972	2.492	1.000
2.400	5.346	3.659	2.458	1.489	0.973	2.390	1.000
2.500	5.315	3.239	2.154	1.504	0.972	2.093	1.000
2.600	5.349	2.955	1.986	1.487	0.973	1.932	1.000
2.700	5.414	2.795	1.919	1.457	0.974	1.865	1.000
2.800	5.408	2.773	1.899	1.460	0.974	1.850	1.000
2.900	5.404	2.761	1.889	1.462	0.974	1.840	1.000
3.000	5.427	2.739	1.887	1.451	0.975	1.839	1.000
3.100	5.427	2.739	1.887	1.451	0.975	1.839	1.000
3.200	5.412	2.739	1.878	1.458	0.974	1.830	1.000
3.300	5.408	2.727	1.868	1.460	0.974	1.820	1.000
3.400	5.399	2.727	1.863	1.464	0.974	1.814	1.000
3.500	5.379	2.727	1.851	1.474	0.973	1.801	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 58.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	8.023	1.887	4.252	0.000	0.000	0.432
0.050	1.213	7.989	1.300	6.143	0.447	0.582	0.804
0.075	1.342	7.966	1.343	5.931	0.486	0.653	0.815
0.100	1.426	7.955	1.362	5.840	0.513	0.699	0.830
0.125	1.507	7.932	1.384	5.732	0.537	0.743	0.841
0.150	1.568	7.898	1.392	5.674	0.549	0.764	0.847
0.175	1.607	7.852	1.409	5.573	0.565	0.796	0.852
0.200	1.628	7.830	1.407	5.563	0.572	0.805	0.858
0.250	1.685	7.784	1.405	5.541	0.591	0.830	0.875
0.300	1.749	7.682	1.410	5.446	0.608	0.857	0.884
0.350	1.839	7.614	1.441	5.282	0.629	0.907	0.891
0.400	1.945	7.523	1.474	5.105	0.655	0.965	0.902
0.450	2.082	7.398	1.520	4.867	0.684	1.040	0.913
0.500	2.213	7.364	1.585	4.644	0.711	1.127	0.923
0.600	2.578	7.170	1.776	4.037	0.772	1.371	0.943
0.700	2.948	7.114	2.025	3.513	0.824	1.668	0.964
0.800	3.348	7.091	2.342	3.027	0.868	2.034	0.982
0.900	3.795	7.045	2.754	2.558	0.905	2.493	0.993
1.000	4.254	6.886	3.187	2.161	0.932	2.971	0.998
1.100	4.593	6.705	3.499	1.916	0.948	3.317	1.000
1.200	4.791	6.477	3.621	1.789	0.955	3.459	1.000
1.300	5.009	5.966	3.590	1.662	0.963	3.456	1.000
1.400	5.199	5.364	3.437	1.561	0.968	3.328	1.000
1.500	5.258	4.727	3.087	1.531	0.970	2.994	1.000
1.600	5.349	3.580	2.406	1.487	0.973	2.341	1.000
1.700	5.430	3.091	2.132	1.450	0.975	2.078	1.000
1.800	5.514	2.898	2.052	1.412	0.977	2.004	1.000
1.900	5.454	2.943	2.045	1.439	0.975	1.995	1.000
2.000	5.373	3.068	2.078	1.476	0.973	2.023	1.000
2.100	5.372	3.148	2.131	1.477	0.973	2.074	1.000
2.200	5.363	3.273	2.210	1.481	0.973	2.150	1.000
2.300	5.335	3.352	2.244	1.494	0.972	2.181	1.000
2.400	5.374	3.375	2.287	1.476	0.973	2.226	1.000
2.500	5.403	3.432	2.347	1.462	0.974	2.286	1.000
2.600	5.423	3.455	2.377	1.453	0.975	2.317	1.000
2.700	5.455	3.443	2.394	1.438	0.975	2.335	1.000
2.800	5.448	3.284	2.278	1.441	0.975	2.222	1.000
2.900	5.492	2.920	2.054	1.422	0.976	2.005	1.000
3.000	5.506	2.705	1.910	1.416	0.977	1.866	1.000
3.100	5.510	2.557	1.808	1.414	0.977	1.766	1.000
3.200	5.557	2.500	1.794	1.393	0.978	1.755	1.000
3.300	5.525	2.489	1.768	1.407	0.977	1.728	1.000
3.400	5.510	2.500	1.768	1.414	0.977	1.727	1.000
3.500	5.493	2.500	1.759	1.421	0.976	1.717	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 60.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	7.500	1.764	4.252	0.000	0.000	0.432
0.050	1.269	7.386	1.228	6.015	0.463	0.568	0.804
0.075	1.496	7.352	1.314	5.593	0.527	0.692	0.818
0.100	1.579	7.330	1.327	5.522	0.552	0.733	0.835
0.125	1.625	7.273	1.328	5.477	0.566	0.752	0.844
0.150	1.670	7.216	1.330	5.426	0.579	0.770	0.852
0.175	1.707	7.159	1.331	5.377	0.589	0.785	0.858
0.200	1.733	7.102	1.326	5.354	0.597	0.792	0.864
0.250	1.812	7.045	1.343	5.245	0.618	0.830	0.875
0.300	1.903	6.989	1.368	5.108	0.641	0.876	0.886
0.350	2.003	6.932	1.405	4.933	0.663	0.931	0.894
0.400	2.121	6.875	1.452	4.735	0.688	0.999	0.905
0.450	2.250	6.818	1.507	4.524	0.713	1.075	0.915
0.500	2.378	6.761	1.567	4.313	0.736	1.154	0.923
0.600	2.678	6.670	1.731	3.854	0.784	1.356	0.941
0.700	3.001	6.591	1.942	3.394	0.824	1.600	0.953
0.800	3.373	6.477	2.192	2.955	0.865	1.895	0.970
0.900	3.777	6.364	2.514	2.531	0.898	2.258	0.980
1.000	4.262	6.193	2.883	2.148	0.931	2.685	0.995
1.100	4.557	6.057	3.121	1.940	0.946	2.954	1.000
1.200	4.741	5.875	3.228	1.820	0.953	3.078	1.000
1.300	4.838	5.682	3.228	1.760	0.957	3.089	1.000
1.400	4.947	5.420	3.195	1.696	0.961	3.065	1.000
1.500	5.061	5.114	3.131	1.633	0.964	3.019	1.000
1.600	5.193	4.716	3.015	1.564	0.968	2.919	1.000
1.700	5.225	4.148	2.680	1.548	0.969	2.597	1.000
1.800	5.215	3.523	2.269	1.553	0.969	2.198	1.000
1.900	5.514	2.898	2.052	1.412	0.977	2.004	1.000
2.000	5.732	2.670	2.022	1.321	0.982	1.986	1.000
2.100	5.848	2.500	1.960	1.275	0.985	1.930	1.000
2.200	5.699	2.500	1.874	1.334	0.981	1.835	1.000
2.300	5.445	2.500	1.732	1.443	0.975	1.689	1.000
2.400	5.280	2.500	1.644	1.520	0.971	1.596	1.000
2.500	5.041	2.670	1.625	1.644	0.964	1.565	1.000
2.600	4.805	2.955	1.660	1.780	0.956	1.586	1.000
2.700	4.465	3.409	1.700	2.005	0.943	1.602	1.000
2.800	4.379	3.523	1.704	2.068	0.939	1.599	1.000
2.900	4.379	3.523	1.704	2.068	0.939	1.599	1.000
3.000	4.439	3.409	1.684	2.024	0.941	1.586	1.000
3.100	4.640	3.125	1.658	1.885	0.950	1.574	1.000
3.200	4.870	2.841	1.632	1.741	0.958	1.563	1.000
3.300	4.870	2.841	1.632	1.741	0.958	1.563	1.000
3.400	4.870	2.841	1.632	1.741	0.958	1.563	1.000
3.500	4.870	2.841	1.632	1.741	0.958	1.563	1.000

TABLE 5
7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 62.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	6.705	1.577	4.252	0.000	0.000	0.432
0.050	1.329	6.682	1.120	5.964	0.483	0.541	0.815
0.075	1.632	6.636	1.235	5.371	0.563	0.696	0.831
0.100	1.746	6.625	1.275	5.196	0.593	0.756	0.844
0.125	1.778	6.591	1.271	5.185	0.603	0.767	0.853
0.150	1.813	6.580	1.277	5.152	0.613	0.783	0.861
0.175	1.867	6.545	1.292	5.067	0.626	0.805	0.867
0.200	1.883	6.523	1.287	5.066	0.631	0.813	0.872
0.250	1.986	6.466	1.321	4.893	0.655	0.865	0.881
0.300	2.032	6.409	1.322	4.849	0.667	0.881	0.891
0.350	2.180	6.284	1.372	4.580	0.695	0.954	0.898
0.400	2.262	6.159	1.381	4.460	0.712	0.983	0.907
0.450	2.369	6.049	1.408	4.295	0.732	1.030	0.916
0.500	2.510	5.955	1.463	4.071	0.755	1.104	0.924
0.600	2.829	5.852	1.624	3.604	0.801	1.300	0.940
0.700	3.145	5.852	1.830	3.197	0.838	1.534	0.955
0.800	3.431	5.818	2.014	2.888	0.869	1.751	0.970
0.900	3.741	5.841	2.259	2.585	0.897	2.026	0.983
1.000	4.086	5.795	2.528	2.292	0.922	2.332	0.995
1.100	4.431	5.739	2.827	2.030	0.941	2.661	1.000
1.200	4.715	5.625	3.064	1.836	0.952	2.918	1.000
1.300	4.893	5.557	3.216	1.728	0.959	3.084	1.000
1.400	4.975	5.466	3.252	1.681	0.961	3.127	1.000
1.500	5.034	5.341	3.241	1.648	0.963	3.122	1.000
1.600	5.092	5.170	3.198	1.616	0.965	3.087	1.000
1.700	5.137	4.943	3.103	1.593	0.967	2.995	1.000
1.800	5.154	4.705	2.970	1.584	0.967	2.872	1.000
1.900	5.169	3.977	2.523	1.576	0.967	2.441	1.000
2.000	5.249	3.193	2.079	1.536	0.970	2.017	1.000
2.100	5.399	2.841	1.940	1.464	0.974	1.890	1.000
2.200	5.572	2.614	1.884	1.387	0.979	1.843	1.000
2.300	5.673	2.455	1.825	1.345	0.981	1.790	1.000
2.400	5.685	2.295	1.713	1.340	0.981	1.681	1.000
2.500	5.556	2.205	1.581	1.394	0.978	1.546	1.000
2.600	5.598	2.102	1.528	1.376	0.979	1.496	1.000
2.700	5.587	2.091	1.514	1.381	0.979	1.482	1.000
2.800	5.638	2.034	1.497	1.359	0.980	1.467	1.000
2.900	5.291	2.307	1.522	1.515	0.971	1.478	1.000
3.000	4.454	3.182	1.693	1.984	0.944	1.513	1.000
3.100	4.236	3.568	1.637	2.179	0.932	1.526	1.000
3.200	4.367	3.523	1.635	2.155	0.934	1.526	1.000
3.300	4.331	3.420	1.625	2.105	0.937	1.522	1.000
3.400	4.383	3.295	1.596	2.065	0.939	1.499	1.000
3.500	4.546	3.068	1.575	1.948	0.946	1.490	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 64.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	6.000	1.411	4.252	0.000	0.000	0.432
0.050	1.480	5.955	1.035	5.754	0.528	0.547	0.835
0.075	1.785	5.932	1.157	5.127	0.602	0.696	0.847
0.100	1.969	5.909	1.232	4.795	0.642	0.791	0.858
0.125	1.999	5.886	1.232	4.779	0.651	0.802	0.867
0.150	2.037	5.864	1.236	4.744	0.661	0.817	0.874
0.175	2.062	5.830	1.233	4.727	0.668	0.824	0.881
0.200	2.095	5.795	1.235	4.691	0.676	0.835	0.886
0.250	2.208	5.750	1.274	4.514	0.699	0.890	0.897
0.300	2.265	5.705	1.284	4.443	0.712	0.914	0.905
0.350	2.390	5.659	1.331	4.250	0.734	0.978	0.915
0.400	2.432	5.614	1.335	4.205	0.743	0.992	0.922
0.450	2.567	5.580	1.396	3.997	0.765	1.068	0.930
0.500	2.699	5.534	1.456	3.802	0.785	1.142	0.938
0.600	2.908	5.500	1.560	3.526	0.814	1.270	0.952
0.700	3.172	5.500	1.719	3.200	0.846	1.454	0.966
0.800	3.416	5.500	1.876	2.931	0.872	1.636	0.978
0.900	3.725	5.455	2.079	2.623	0.899	1.870	0.991
1.000	4.039	5.398	2.305	2.341	0.921	2.124	0.998
1.100	4.399	5.284	2.573	2.053	0.940	2.418	1.000
1.200	4.608	5.273	2.776	1.906	0.949	2.623	1.000
1.300	4.821	5.273	2.9[illegible]	1.770	0.956	2.848	1.000
1.400	4.958	5.273	3.[illegible]	1.690	0.961	2.997	1.000
1.500	5.064	5.227	3.203	1.632	0.964	3.085	1.000
1.600	5.109	5.170	3.216	1.608	0.966	3.106	1.000
1.700	5.132	5.091	3.191	1.595	0.966	3.084	1.000
1.800	5.169	4.955	3.143	1.576	0.967	3.040	1.000
1.900	5.215	4.773	3.073	1.553	0.969	2.977	1.000
2.000	5.281	4.545	2.990	1.520	0.971	2.903	1.000
2.100	5.354	4.318	2.907	1.485	0.973	2.828	1.000
2.200	5.503	3.773	2.663	1.417	0.977	2.600	1.000
2.300	5.650	2.898	2.140	1.354	0.980	2.098	1.000
2.400	5.906	2.330	1.858	1.254	0.986	1.832	1.000
2.500	5.995	2.091	1.712	1.221	0.988	1.691	1.000
2.600	6.084	1.932	1.623	1.190	0.989	1.606	1.000
2.700	6.089	1.773	1.492	1.188	0.990	1.476	1.000
2.800	5.845	1.841	1.442	1.277	0.985	1.420	1.000
2.900	5.837	1.807	1.412	1.279	0.984	1.390	1.000
3.000	5.784	1.830	1.407	1.300	0.983	1.384	1.000
3.100	4.628	2.841	1.501	1.893	0.949	1.425	1.000
3.200	4.168	3.485	1.561	2.235	0.929	1.450	1.000
3.300	4.132	3.523	1.555	2.265	0.927	1.442	1.000
3.400	4.202	3.405	1.545	2.207	0.931	1.437	1.000
3.500	4.268	3.307	1.535	2.154	0.934	1.433	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 66.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	5.398	1.269	4.252	0.000	0.000	0.432
0.050	1.596	5.398	1.006	5.365	0.551	0.554	0.818
0.075	1.925	5.398	1.140	4.736	0.624	0.711	0.832
0.100	2.128	5.398	1.226	4.401	0.665	0.816	0.846
0.125	2.149	5.398	1.224	4.410	0.672	0.823	0.855
0.150	2.151	5.398	1.212	4.452	0.676	0.820	0.864
0.175	2.208	5.386	1.231	4.374	0.688	0.848	0.870
0.200	2.241	5.341	1.228	4.349	0.697	0.856	0.878
0.250	2.332	5.284	1.248	4.233	0.715	0.893	0.889
0.300	2.406	5.227	1.268	4.122	0.728	0.923	0.895
0.350	2.496	5.148	1.287	3.998	0.744	0.958	0.903
0.400	2.585	5.068	1.309	3.871	0.758	0.993	0.909
0.450	2.707	4.989	1.351	3.693	0.775	1.047	0.915
0.500	2.843	4.909	1.402	3.502	0.793	1.112	0.920
0.600	3.049	4.886	1.505	3.246	0.819	1.233	0.932
0.700	3.246	4.898	1.619	3.026	0.842	1.362	0.943
0.800	3.546	4.898	1.808	2.708	0.870	1.573	0.955
0.900	3.808	4.875	1.971	2.473	0.893	1.760	0.966
1.000	4.056	4.830	2.123	2.275	0.912	1.936	0.977
1.100	4.323	4.818	2.323	2.074	0.928	2.156	0.984
1.200	4.572	4.807	2.498	1.924	0.946	2.362	0.997
1.300	4.832	4.761	2.700	1.764	0.957	2.583	1.000
1.400	5.043	4.739	2.885	1.643	0.964	2.780	1.000
1.500	5.159	4.727	2.989	1.581	0.967	2.891	1.000
1.600	5.228	4.716	3.050	1.546	0.969	2.956	1.000
1.700	5.289	4.659	3.073	1.516	0.971	2.984	1.000
1.800	5.319	4.614	3.072	1.502	0.972	2.985	1.000
1.900	5.336	4.545	3.043	1.494	0.972	2.958	1.000
2.000	5.361	4.455	3.006	1.482	0.973	2.925	1.000
2.100	5.386	4.330	2.945	1.470	0.974	2.868	1.000
2.200	5.427	4.205	2.897	1.451	0.975	2.823	1.000
2.300	5.463	4.091	2.851	1.435	0.976	2.781	1.000
2.400	5.566	3.864	2.780	1.390	0.978	2.720	1.000
2.500	5.659	3.625	2.684	1.350	0.980	2.631	1.000
2.600	5.783	3.068	2.359	1.301	0.983	2.319	1.000
2.700	5.817	2.477	1.924	1.287	0.984	1.894	1.000
2.800	5.951	2.023	1.635	1.237	0.987	1.614	1.000
2.900	5.930	1.864	1.497	1.245	0.986	1.477	1.000
3.000	6.055	1.705	1.420	1.200	0.989	1.404	1.000
3.100	6.072	1.648	1.380	1.194	0.989	1.365	1.000
3.200	6.226	1.523	1.333	1.142	0.992	1.322	1.000
3.300	6.259	1.500	1.325	1.132	0.993	1.316	1.000
3.400	5.319	2.045	1.362	1.502	0.972	1.323	1.000
3.500	4.413	2.555	1.446	2.043	0.940	1.360	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 68.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	4.909	1.154	4.252	0.000	0.000	0.432
0.050	1.841	4.909	1.010	4.861	0.605	0.611	0.824
0.075	2.144	4.898	1.128	4.343	0.666	0.751	0.841
0.100	2.282	4.886	1.180	4.141	0.692	0.817	0.852
0.125	2.328	4.875	1.189	4.099	0.702	0.835	0.861
0.150	2.347	4.875	1.189	4.100	0.708	0.842	0.868
0.175	2.404	4.864	1.207	4.031	0.719	0.868	0.875
0.200	2.445	4.864	1.221	3.984	0.727	0.888	.881
0.250	2.509	4.852	1.236	3.924	0.741	0.916	.892
0.300	2.543	4.841	1.242	3.898	0.748	0.929	0.899
0.350	2.596	4.841	1.262	3.837	0.758	0.957	0.906
0.400	2.696	4.830	1.305	3.700	0.773	1.009	0.913
0.450	2.758	4.830	1.355	3.565	0.788	1.067	0.919
0.500	2.867	4.830	1.386	3.484	0.798	1.106	0.925
0.600	3.082	4.830	1.500	3.219	0.824	1.237	0.937
0.700	3.269	4.830	1.603	3.013	0.846	1.356	0.948
0.800	3.455	4.807	1.701	2.826	0.866	1.473	0.960
0.900	3.680	4.761	1.825	2.609	0.886	1.617	0.969
1.000	3.938	4.670	1.959	2.384	0.906	1.774	0.979
1.100	4.164	4.636	2.099	2.209	0.923	1.937	0.988
1.200	4.381	4.625	2.254	2.051	0.936	2.109	0.993
1.300	4.584	4.625	2.416	1.914	0.945	2.284	0.996
1.400	4.807	4.625	2.603	1.776	0.955	2.487	0.999
1.500	4.992	4.625	2.768	1.671	0.962	2.663	1.000
1.600	5.070	4.625	2.840	1.628	0.965	2.739	1.000
1.700	5.140	4.614	2.899	1.591	0.967	2.803	1.000
1.800	5.177	4.614	2.935	1.572	0.968	2.840	1.000
1.900	5.186	4.602	2.936	1.568	0.968	2.842	1.000
2.000	5.219	4.534	2.924	1.551	0.969	2.833	1.000
2.100	5.245	4.466	2.903	1.538	0.970	2.815	1.000
2.200	5.272	4.386	2.877	1.525	0.970	2.792	1.000
2.300	5.274	4.330	2.841	1.524	0.971	2.757	1.000
2.400	5.300	4.250	2.813	1.511	0.971	2.732	1.000
2.500	5.261	4.284	2.800	1.530	0.970	2.716	1.000
2.600	5.335	4.091	2.738	1.494	0.972	2.662	1.000
2.700	5.373	3.989	2.702	1.476	0.973	2.630	1.000
2.800	5.433	3.841	2.651	1.449	0.975	2.584	1.000
2.900	5.509	3.636	2.571	1.415	0.977	2.511	1.000
3.000	5.501	3.341	2.356	1.418	0.977	2.301	1.000
3.100	5.542	2.284	1.642	1.391	0.978	1.606	1.000
3.200	5.719	1.989	1.500	1.326	0.982	1.472	1.000
3.300	5.758	1.761	1.360	1.295	0.984	1.338	1.000
3.400	5.893	1.648	1.309	1.259	0.986	1.290	1.000
3.500	5.923	1.614	1.294	1.247	0.986	1.276	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 70.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	4.443	1.045	4.252	0.000	0.000	0.432
0.050	1.868	4.443	0.921	4.822	0.611	0.563	0.827
0.075	2.233	4.443	1.057	4.202	0.682	0.721	0.847
0.100	2.405	4.443	1.126	3.946	0.712	0.802	0.858
0.125	2.418	4.443	1.121	3.965	0.718	0.804	0.867
0.150	2.426	4.443	1.113	3.991	0.722	0.804	0.875
0.175	2.454	4.443	1.118	3.973	0.729	0.816	0.882
0.200	2.498	4.432	1.130	3.920	0.737	0.834	0.887
0.250	2.596	4.432	1.166	3.800	0.754	0.880	0.897
0.300	2.645	4.432	1.183	3.747	0.763	0.903	0.904
0.350	2.738	4.432	1.221	3.628	0.778	0.950	0.911
0.400	2.774	4.432	1.234	3.592	0.784	0.967	0.917
0.450	2.880	4.432	1.284	3.451	0.798	1.024	0.922
0.500	967	4.426	1.324	3.343	0.809	1.071	0.927
0.600	3.101	4.420	1.383	3.195	0.826	1.143	0.938
0.700	3.282	4.398	1.469	2.993	0.847	1.244	0.947
0.800	3.479	4.375	1.569	2.788	0.866	1.359	0.956
0.900	3.660	4.330	1.652	2.620	0.883	1.459	0.966
1.000	3.852	4.295	1.753	2.450	0.899	1.576	0.974
1.100	4.015	4.284	1.843	2.325	0.913	1.682	0.983
1.200	4.239	4.261	1.979	2.153	0.927	1.835	0.990
1.300	4.430	4.261	2.110	2.019	0.939	1.980	0.995
1.400	4.618	4.273	2.254	1.896	0.948	2.136	0.998
1.500	4.815	4.273	2.410	1.773	0.956	2.304	0.999
1.600	4.942	4.273	2.515	1.699	0.960	2.415	1.000
1.700	5.066	4.273	2.620	1.630	0.964	2.527	1.000
1.800	5.132	4.261	2.671	1.596	0.966	2.581	1.000
1.900	5.200	4.239	2.716	1.560	0.968	2.630	1.000
2.000	5.240	4.205	2.729	1.540	0.970	2.646	1.000
2.100	5.273	4.170	2.736	1.524	0.970	2.656	1.000
2.200	5.280	4.125	2.713	1.520	0.971	2.633	1.000
2.300	5.320	4.080	2.717	1.501	0.972	2.641	1.000
2.400	5.344	4.023	2.700	1.490	0.972	2.625	1.000
2.500	5.358	3.977	2.681	1.483	0.973	2.609	1.000
2.600	5.379	3.932	2.669	1.473	0.973	2.598	1.000
2.700	5.400	3.886	2.655	1.463	0.974	2.586	1.000
2.800	5.428	3.818	2.632	1.451	0.975	2.565	1.000
2.900	5.469	3.750	2.618	1.432	0.976	2.555	1.000
3.000	5.481	3.705	2.598	1.426	0.976	2.536	1.000
3.100	5.480	3.636	2.547	1.427	0.976	2.486	1.000
3.200	5.523	3.545	2.518	1.408	0.977	2.460	1.000
3.300	5.626	3.375	2.474	1.364	0.980	2.424	1.000
3.400	5.726	3.182	2.405	1.323	0.982	2.361	1.000
3.500	6.122	2.682	2.274	1.171	0.990	2.256	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 74.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	3.807	0.895	4.252	0.000	0.000	0.432
0.050	1.886	3.807	0.861	4.423	0.591	0.509	0.767
0.075	2.328	3.807	1.024	3.717	0.669	0.685	0.784
0.100	2.473	3.807	1.068	3.563	0.696	0.744	0.801
0.125	2.529	3.807	1.071	3.553	0.711	0.762	0.818
0.150	2.552	3.807	1.063	3.580	0.720	0.766	0.832
0.175	2.598	3.807	1.066	3.572	0.732	0.780	0.847
0.200	2.646	3.807	1.074	3.546	0.743	0.798	0.858
0.250	2.719	3.798	1.091	3.482	0.756	0.825	0.869
0.300	2.792	3.784	1.107	3.418	0.770	0.852	0.881
0.350	2.861	3.767	1.125	3.349	0.780	0.878	0.889
0.400	2.949	3.750	1.153	3.252	0.793	0.914	0.896
0.450	3.048	3.739	1.190	3.142	0.805	0.958	0.903
0.500	3.055	3.727	1.201	3.102	0.813	0.976	0.909
0.600	3.231	3.716	1.253	2.965	0.830	1.039	0.920
0.700	3.375	3.716	1.316	2.822	0.845	1.113	0.929
0.800	3.456	3.716	1.370	2.712	0.858	1.176	0.938
0.900	3.641	3.693	1.431	2.581	0.872	1.248	0.945
1.000	3.788	3.648	1.485	2.456	0.885	1.314	0.953
1.100	3.948	3.625	1.559	2.326	0.898	1.395	0.960
1.200	4.091	3.614	1.629	2.218	0.909	1.480	0.966
1.300	4.274	3.648	1.749	2.086	0.920	1.605	0.972
1.400	4.434	3.659	1.848	1.980	0.930	1.719	0.978
1.500	4.580	3.682	1.946	1.891	0.939	1.828	0.984
1.600	4.729	3.670	2.033	1.805	0.947	1.926	0.989
1.700	4.867	3.670	2.120	1.731	0.955	2.024	0.994
1.800	5.016	3.659	2.214	1.653	0.961	2.129	0.997
1.900	5.136	3.648	2.292	1.592	0.966	2.214	0.999
2.000	5.222	3.642	2.352	1.549	0.969	2.278	0.999
2.100	5.272	3.636	2.385	1.524	0.970	2.315	1.000
2.200	5.357	3.614	2.436	1.483	0.973	2.370	1.000
2.300	5.378	3.602	2.444	1.474	0.973	2.379	1.000
2.400	5.395	3.580	2.442	1.466	0.974	2.378	1.000
2.500	5.415	3.568	2.449	1.457	0.974	2.386	1.000
2.600	5.433	3.545	2.447	1.449	0.975	2.386	1.000
2.700	5.450	3.523	2.445	1.441	0.975	2.385	1.000
2.800	5.457	3.500	2.434	1.438	0.975	2.374	1.000
2.900	5.475	3.477	2.432	1.430	0.976	2.374	1.000
3.000	5.481	3.455	2.421	1.427	0.976	2.363	1.000
3.100	5.488	3.443	2.418	1.424	0.976	2.361	1.000
3.200	5.497	3.420	2.409	1.420	0.976	2.352	1.000
3.300	5.518	3.386	2.401	1.410	0.977	2.346	1.000
3.400	5.522	3.375	2.396	1.408	0.977	2.341	1.000
3.500	5.527	3.364	2.392	1.406	0.977	2.337	1.000

TABLE 5

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 78.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	3.205	0.754	4.252	0.000	0.000	0.432
0.050	1.624	3.205	0.654	4.900	0.535	0.350	0.759
0.075	2.172	3.205	0.815	3.934	0.642	0.523	0.775
0.100	2.552	3.205	0.946	3.389	0.701	0.662	0.790
0.125	2.632	3.205	0.961	3.333	0.716	0.689	0.804
0.150	2.699	3.205	0.972	3.296	0.731	0.710	0.818
0.175	2.710	3.205	0.959	3.341	0.738	0.708	0.832
0.200	2.760	3.205	0.963	3.326	0.750	0.723	0.847
0.250	2.854	3.193	0.977	3.267	0.769	0.752	0.865
0.300	2.926	3.193	0.995	3.208	0.781	0.778	0.876
0.350	3.011	3.182	1.017	3.129	0.794	0.807	0.886
0.400	3.088	3.182	1.042	3.052	0.804	0.838	0.893
0.450	3.134	3.170	1.051	3.017	0.812	0.853	0.899
0.500	3.217	3.170	1.080	2.936	0.822	0.887	0.906
0.600	3.372	3.159	1.134	2.787	0.839	0.951	0.917
0.700	3.475	3.136	1.161	2.701	0.851	0.988	0.926
0.800	3.599	3.102	1.197	2.592	0.864	1.034	0.934
0.900	3.684	3.091	1.222	2.528	0.873	1.067	0.942
1.000	3.794	3.080	1.263	2.439	0.883	1.115	0.949
1.100	3.939	3.045	1.310	2.324	0.895	1.173	0.956
1.200	4.058	3.068	1.371	2.237	0.905	1.241	0.963
1.300	4.172	3.080	1.427	2.158	0.914	1.304	0.969
1.400	4.316	3.091	1.501	2.059	0.923	1.386	0.974
1.500	4.456	3.091	1.571	1.967	0.932	1.464	0.979
1.600	4.579	3.091	1.633	1.893	0.939	1.534	0.984
1.700	4.711	3.091	1.702	1.816	0.947	1.611	0.989
1.800	4.846	3.091	1.774	1.742	0.953	1.692	0.993
1.900	4.948	3.091	1.831	1.688	0.958	1.755	0.995
2.000	5.056	3.091	1.894	1.632	0.963	1.824	0.998
2.100	5.165	3.091	1.960	1.577	0.967	1.895	0.999
2.200	5.256	3.091	2.017	1.532	0.970	1.956	1.000
2.300	5.321	3.091	2.059	1.501	0.972	2.001	1.000
2.400	5.384	3.091	2.101	1.471	0.974	2.046	1.000
2.500	5.429	3.080	2.123	1.450	0.975	2.070	1.000
2.600	5.476	3.068	2.147	1.429	0.976	2.095	1.000
2.700	5.502	3.057	2.157	1.417	0.977	2.106	1.000
2.800	5.531	3.057	2.176	1.405	0.977	2.126	1.000
2.900	5.557	3.057	2.194	1.393	0.978	2.145	1.000
3.000	5.567	3.045	2.193	1.389	0.978	2.145	1.000
3.100	5.575	3.045	2.198	1.386	0.978	2.150	1.000
3.200	5.575	3.045	2.198	1.386	0.978	2.150	1.000
3.300	5.589	3.034	2.199	1.380	0.979	2.152	1.000
3.400	5.610	3.011	2.196	1.371	0.979	2.151	1.000
3.500	5.620	3.000	2.195	1.366	0.979	2.150	1.000

7.5 DEGREE SHOCK WAVE GENERATOR, X = 82.0

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	2.739	0.644	4.252	0.000	0.000	0.432
0.050	1.909	2.739	0.656	4.176	0.582	0.381	0.733
0.075	2.330	2.739	0.769	3.560	0.655	0.504	0.753
0.100	2.592	2.739	0.841	3.255	0.697	0.587	0.773
0.125	2.654	2.739	0.839	3.265	0.715	0.600	0.796
0.150	2.702	2.739	0.832	3.292	0.731	0.608	0.818
0.175	2.749	2.739	0.825	3.318	0.747	0.616	0.841
0.200	2.812	2.739	0.831	3.297	0.761	0.632	0.858
0.250	2.903	2.739	0.845	3.239	0.779	0.659	0.876
0.300	3.007	2.739	0.873	3.135	0.794	0.693	0.886
0.350	3.081	2.739	0.891	3.073	0.805	0.718	0.896
0.400	3.205	2.739	0.931	2.942	0.819	0.763	0.903
0.450	3.225	2.739	0.932	2.939	0.824	0.768	0.910
0.500	3.311	2.727	0.956	2.854	0.834	0.797	0.915
0.600	3.424	2.716	0.985	2.757	0.848	0.835	0.926
0.700	3.488	2.705	0.998	2.711	0.856	0.854	0.934
0.800	3.629	2.687	1.040	2.584	0.870	0.904	0.942
0.900	3.724	2.648	1.056	2.507	0.879	0.928	0.949
1.000	3.869	2.602	1.091	2.384	0.891	0.972	0.955
1.100	3.951	2.602	1.120	2.324	0.898	1.005	0.960
1.200	4.023	2.614	1.149	2.275	0.905	1.039	0.966
1.300	4.129	2.636	1.198	2.200	0.913	1.094	0.972
1.400	4.223	2.648	1.241	2.134	0.920	1.141	0.976
1.500	4.340	2.648	1.289	2.055	0.927	1.195	0.981
1.600	4.452	2.642	1.333	1.982	0.934	1.245	0.985
1.700	4.547	2.648	1.376	1.924	0.940	1.294	0.989
1.800	4.638	2.659	1.421	1.871	0.946	1.344	0.993
1.900	4.758	2.648	1.471	1.800	0.952	1.400	0.995
2.000	4.883	2.625	1.519	1.728	0.957	1.454	0.997
2.100	4.969	2.625	1.561	1.682	0.961	1.499	0.999
2.200	5.114	2.614	1.629	1.604	0.966	1.573	0.999
2.300	5.168	2.625	1.664	1.577	0.967	1.610	1.000
2.400	5.249	2.625	1.709	1.536	0.970	1.657	1.000
2.500	5.328	2.625	1.753	1.497	0.972	1.704	1.000
2.600	5.400	2.625	1.794	1.463	0.974	1.747	1.000
2.700	5.480	2.614	[illegible]	.427	0.976	1.787	1.000
2.800	5.535	2.625	[illegible]	.403	0.977	1.829	1.000
2.900	5.575	2.625	[illegible]	1.386	0.978	1.853	1.000
3.000	5.617	2.614	[illegible]	1.368	0.979	1.871	1.000
3.100	5.647	2.614	1.928	1.355	0.980	1.890	1.000
3.200	5.670	2.602	1.933	1.346	0.981	1.896	1.000
3.300	5.683	2.602	1.941	1.340	0.981	1.904	1.000
3.400	5.705	2.591	1.946	1.332	0.981	1.910	1.000
3.500	5.733	2.568	1.945	1.320	0.982	1.910	1.000

TABLE 5 — CONCLUDED

7.5 DEGREE SHOCK WAVE GENERATOR

7.5 DEGREE SHOCK WAVE GENERATOR, X = 86.0

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	2.284	0.537	4.252	0.000	0.000	0.432
0.050	1.582	2.284	0.475	4.812	0.517	0.245	0.733
0.075	2.200	2.284	0.603	3.787	0.638	0.385	0.756
0.100	2.566	2.284	0.688	3.319	0.697	0.480	0.778
0.125	2.712	2.284	0.710	3.217	0.725	0.515	0.804
0.150	2.811	2.284	0.717	3.185	0.748	0.536	0.830
0.175	2.859	2.284	0.717	3.186	0.761	0.545	0.847
0.200	2.905	2.284	0.721	3.166	0.771	0.556	0.858
0.250	2.997	2.284	0.738	3.096	0.786	0.580	0.872
0.300	3.061	2.284	0.745	3.065	0.799	0.595	0.886
0.350	3.160	2.284	0.769	2.971	0.812	0.624	0.896
0.400	3.263	2.284	0.796	2.871	0.824	0.656	0.903
0.450	3.350	2.284	0.818	2.791	0.834	0.683	0.910
0.500	3.436	2.284	0.842	2.712	0.844	0.711	0.916
0.600	3.574	2.284	0.880	2.594	0.858	0.756	0.926
0.700	3.660	2.284	0.902	2.531	0.868	0.783	0.935
0.800	3.738	2.284	0.924	2.473	0.876	0.805	0.941
0.900	3.834	2.250	0.938	2.398	0.885	0.830	0.948
1.000	3.915	2.227	0.952	2.339	0.893	0.850	0.953
1.100	4.032	2.205	0.981	2.247	0.901	0.884	0.957
1.200	4.108	2.227	1.015	2.194	0.907	0.921	0.962
1.300	4.188	2.239	1.047	2.139	0.913	0.956	0.966
1.400	4.308	2.239	1.090	2.055	0.921	1.003	0.970
1.500	4.377	2.239	1.112	2.013	0.926	1.029	0.974
1.600	4.453	2.239	1.139	1.966	0.931	1.060	0.977
1.700	4.549	2.239	1.175	1.905	0.936	1.100	0.980
1.800	4.639	2.239	1.209	1.851	0.941	1.138	0.983
1.900	4.723	2.239	1.241	1.803	0.946	1.174	0.986
2.000	4.823	2.227	1.274	1.748	0.951	1.211	0.989
2.100	4.925	2.216	1.308	1.694	0.956	1.250	0.991
2.200	5.042	2.205	1.350	1.633	0.960	1.297	0.994
2.300	5.113	2.205	1.379	1.599	0.964	1.329	0.996
2.400	5.206	2.205	1.419	1.554	0.967	1.373	0.998
2.500	5.282	2.205	1.453	1.518	0.970	1.405	0.999
2.600	5.313	2.205	1.494	1.475	0.973	1.454	0.999
2.700	5.432	2.205	1.521	1.449	0.975	1.483	1.000
2.800	5.516	2.193	1.554	1.411	0.977	1.518	1.000
2.900	5.589	2.193	1.589	1.380	0.979	1.555	1.000
3.000	5.643	2.182	1.608	1.357	0.980	1.575	1.000
3.100	5.693	2.182	1.632	1.337	0.981	1.602	1.000
3.200	5.727	2.193	1.658	1.323	0.982	1.628	1.000
3.300	5.747	2.205	1.677	1.315	0.982	1.647	1.000
3.400	5.787	2.216	1.706	1.299	0.983	1.678	1.000
3.500	5.822	2.216	1.724	1.285	0.984	1.696	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 20.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.000	0.226	4.430	0.000	0.000	0.432
0.050	1.503	1.000	0.219	4.576	0.468	0.102	0.608
0.075	1.777	1.000	0.230	4.357	0.540	0.124	0.693
0.100	2.013	1.000	0.241	4.155	0.598	0.144	0.733
0.125	2.142	1.000	0.239	4.177	0.638	0.153	0.778
0.150	2.263	1.000	0.247	4.047	0.663	0.164	0.796
0.175	2.340	1.000	0.252	3.968	0.679	0.171	0.807
0.200	2.434	1.000	0.261	3.834	0.694	0.181	0.813
0.250	2.541	1.000	0.270	3.709	0.713	0.192	0.824
0.300	2.627	1.000	0.277	3.610	0.727	0.202	0.832
0.350	2.726	1.000	0.287	3.480	0.741	0.213	0.838
0.400	2.807	1.000	0.295	3.395	0.754	0.222	0.847
0.450	2.854	1.000	0.298	3.359	0.762	0.227	0.855
0.500	2.960	1.000	0.309	3.233	0.776	0.240	0.861
0.600	3.092	1.000	0.322	3.108	0.794	0.256	0.875
0.700	3.274	1.000	0.344	2.911	0.814	0.280	0.884
0.800	3.458	1.000	0.366	2.732	0.833	0.305	0.895
0.900	3.634	1.000	0.388	2.580	0.850	0.330	0.906
1.000	3.812	1.000	0.412	2.431	0.866	0.356	0.916
1.100	3.994	1.000	0.436	2.293	0.881	0.384	0.926
1.200	4.189	1.000	0.465	2.153	0.896	0.416	0.935
1.300	4.396	1.000	0.496	2.016	0.910	0.451	0.944
1.400	4.603	1.000	0.528	1.894	0.923	0.488	0.955
1.500	4.819	1.000	0.563	1.777	0.936	0.527	0.965
1.600	5.035	1.000	0.599	1.670	0.948	0.568	0.975
1.700	5.253	1.000	0.648	1.545	0.959	0.621	0.980
1.800	5.506	1.000	0.689	1.453	0.967	0.666	0.986
1.900	5.735	1.000	0.734	1.362	0.975	0.716	0.991
2.000	5.985	1.000	0.789	1.269	0.982	0.775	0.994
2.100	6.188	1.000	0.834	1.199	0.988	0.824	0.997
2.200	6.358	1.000	0.873	1.146	0.992	0.866	0.999
2.300	6.523	1.000	0.913	1.095	0.995	0.909	1.000
2.400	6.631	1.000	0.941	1.064	0.997	0.937	1.000
2.500	6.724	1.000	0.964	1.037	0.998	0.963	1.000
2.600	6.789	1.000	0.981	1.019	0.999	0.980	1.000
2.700	6.842	1.000	0.995	1.005	1.000	0.995	1.000
2.800	6.861	1.000	1.000	1.000	1.000	1.000	1.000
2.900	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.000	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.100	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.200	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.300	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.400	6.861	1.000	1.000	1.000	1.000	1.000	1.000
3.500	6.861	1.000	1.000	1.000	1.000	1.000	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 25.5 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.023	0.231	4.426	0.000	0.000	0.432
0.050	1.479	1.023	0.240	4.254	0.445	0.107	0.597
0.075	1.775	1.023	0.256	4.000	0.518	0.132	0.636
0.100	2.005	1.023	0.264	3.872	0.575	0.152	0.682
0.125	2.151	1.023	0.264	3.872	0.617	0.163	0.727
0.150	2.288	1.023	0.268	3.820	0.652	0.175	0.761
0.175	2.399	1.023	0.276	3.706	0.673	0.186	0.776
0.200	2.487	1.023	0.284	3.604	0.688	0.195	0.784
0.250	2.614	1.017	0.293	3.472	0.710	0.208	0.798
0.300	2.728	1.017	0.304	3.347	0.727	0.221	0.809
0.350	2.861	1.011	0.316	3.200	0.746	0.236	0.819
0.400	2.921	1.011	0.320	3.158	0.757	0.242	0.829
0.450	3.004	1.006	0.327	3.076	0.768	0.251	0.836
0.500	3.090	1.006	0.336	2.990	0.779	0.262	0.843
0.600	3.239	1.000	0.350	2.860	0.799	0.279	0.858
0.700	3.398	1.000	0.368	2.718	0.817	0.301	0.870
0.800	3.538	1.000	0.384	2.602	0.832	0.320	0.882
0.900	3.697	1.000	0.404	2.475	0.848	0.343	0.893
1.000	3.861	1.000	0.426	2.349	0.863	0.367	0.903
1.100	4.018	1.000	0.447	2.237	0.876	0.392	0.913
1.200	4.211	1.000	0.476	2.101	0.890	0.424	0.922
1.300	4.396	1.000	0.504	1.984	0.903	0.455	0.931
1.400	4.573	1.000	0.533	1.878	0.914	0.487	0.938
1.500	4.771	1.000	0.566	1.768	0.925	0.523	0.946
1.600	4.979	1.000	0.602	1.662	0.936	0.563	0.954
1.700	5.204	1.000	0.643	1.555	0.946	0.608	0.961
1.800	5.445	1.000	0.690	1.450	0.956	0.659	0.967
1.900	5.667	1.000	0.733	1.364	0.965	0.708	0.974
2.000	5.911	1.000	0.784	1.276	0.973	0.763	0.980
2.100	6.160	1.000	0.839	1.192	0.981	0.822	0.985
2.200	6.392	1.000	0.892	1.121	0.987	0.880	0.989
2.300	6.555	1.000	0.928	1.077	0.992	0.921	0.993
2.400	6.682	1.000	0.958	1.044	0.996	0.953	0.997
2.500	6.761	1.000	0.976	1.025	0.998	0.974	0.999
2.600	6.807	1.000	0.986	1.014	0.999	0.985	1.000
2.700	6.845	1.000	0.996	1.004	1.000	0.996	1.000
2.800	6.852	1.000	0.998	1.002	1.000	0.998	1.000
2.900	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.000	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.100	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.200	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.300	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.400	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.500	6.858	1.000	1.000	1.000	1.000	1.000	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 28.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.727	0.390	4.426	0.000	0.000	0.432
0.050	0.647	1.716	0.386	5.105	0.213	0.072	0.540
0.075	0.806	1.705	0.324	5.257	0.269	0.087	0.580
0.100	0.988	1.705	0.322	5.286	0.331	0.107	0.617
0.125	1.131	1.693	0.318	5.332	0.380	0.121	0.654
0.150	1.254	1.682	0.311	5.405	0.424	0.132	0.693
0.175	1.423	1.670	0.315	5.307	0.477	0.150	0.727
0.200	1.591	1.659	0.326	5.091	0.523	0.170	0.747
0.250	1.834	1.648	0.350	4.711	0.580	0.203	0.767
0.300	1.991	1.625	0.362	4.484	0.615	0.223	0.782
0.350	2.140	1.602	0.375	4.272	0.645	0.242	0.796
0.400	2.246	1.580	0.382	4.136	0.666	0.254	0.807
0.450	2.374	1.557	0.393	3.963	0.689	0.271	0.818
0.500	2.510	1.534	0.406	3.779	0.711	0.289	0.828
0.600	2.774	1.477	0.429	3.441	0.750	0.322	0.847
0.700	3.035	1.420	0.452	3.141	0.784	0.354	0.864
0.800	3.291	1.364	0.474	2.874	0.813	0.386	0.880
0.900	3.540	1.307	0.496	2.637	0.838	0.415	0.894
1.000	3.775	1.250	0.512	2.440	0.860	0.440	0.907
1.100	4.007	1.193	0.527	2.263	0.879	0.463	0.920
1.200	4.239	1.136	0.540	2.104	0.896	0.484	0.932
1.300	4.490	1.080	0.555	1.945	0.913	0.507	0.943
1.400	4.772	1.023	0.573	1.783	0.929	0.533	0.954
1.500	4.979	1.000	0.595	1.680	0.941	0.560	0.964
1.600	5.153	1.000	0.623	1.605	0.952	0.593	0.974
1.700	5.330	1.000	0.655	1.528	0.961	0.629	0.982
1.800	5.510	1.000	0.689	1.452	0.968	0.667	0.987
1.900	5.683	1.000	0.723	1.384	0.975	0.704	0.992
2.000	5.889	1.000	0.767	1.304	0.980	0.752	0.994
2.100	6.095	1.000	0.813	1.230	0.986	0.801	0.997
2.200	6.281	1.000	0.856	1.169	0.990	0.847	0.998
2.300	6.447	1.000	0.895	1.118	0.994	0.889	1.000
2.400	6.596	1.000	0.932	1.073	0.996	0.928	1.000
2.500	6.702	1.000	0.959	1.043	0.998	0.957	1.000
2.600	6.781	1.000	0.979	1.021	0.999	0.978	1.000
2.700	6.833	1.000	0.993	1.007	1.000	0.993	1.000
2.800	6.858	1.000	1.000	1.000	1.000	1.000	1.000
2.900	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.000	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.100	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.200	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.300	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.400	6.858	1.000	1.000	1.000	1.000	1.000	1.000
3.500	6.858	1.000	1.000	1.000	1.000	1.000	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 30.5 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	3.205	0.724	4.426	0.000	0.000	0.432
0.050	0.123	3.205	0.575	5.573	0.042	0.024	0.546
0.075	0.142	3.205	0.521	6.147	0.051	0.027	0.602
0.100	0.159	3.205	0.489	6.547	0.059	0.029	0.642
0.125	0.224	3.205	0.469	6.831	0.085	0.040	0.673
0.150	0.314	3.205	0.468	6.851	0.120	0.056	0.682
0.175	0.383	3.205	0.466	6.873	0.146	0.068	0.690
0.200	0.465	3.205	0.467	6.865	0.177	0.083	0.699
0.250	0.553	3.205	0.467	6.859	0.210	0.098	0.710
0.300	0.642	3.205	0.471	6.799	0.243	0.115	0.718
0.350	0.743	3.205	0.478	6.708	0.280	0.134	0.727
0.400	0.828	3.205	0.484	6.616	0.309	0.150	0.734
0.450	0.928	3.205	0.494	6.489	0.344	0.170	0.742
0.500	1.013	3.205	0.502	6.387	0.372	0.187	0.750
0.600	1.141	3.205	0.513	6.249	0.415	0.213	0.767
0.700	1.251	3.205	0.523	6.127	0.451	0.236	0.782
0.800	1.481	3.205	0.561	5.716	0.515	0.289	0.799
0.900	1.724	3.205	0.609	5.261	0.576	0.351	0.814
1.000	1.971	3.205	0.665	4.816	0.630	0.420	0.830
1.100	2.290	3.205	0.751	4.264	0.689	0.518	0.847
1.200	2.536	3.205	0.821	3.903	0.730	0.600	0.864
1.300	2.725	3.205	0.876	3.660	0.760	0.665	0.880
1.400	2.877	3.205	0.918	3.489	0.784	0.720	0.895
1.500	3.000	3.205	0.951	3.370	0.803	0.763	0.911
1.600	3.090	3.205	0.964	3.323	0.821	0.792	0.932
1.700	3.147	3.205	0.976	3.283	0.831	0.812	0.943
1.800	3.187	3.205	0.976	3.284	0.842	0.821	0.959
1.900	3.221	3.205	0.978	3.278	0.850	0.831	0.970
2.000	3.285	3.205	0.996	3.217	0.859	0.856	0.977
2.100	3.347	3.205	1.015	3.156	0.867	0.880	0.984
2.200	3.436	3.205	1.047	3.059	0.876	0.918	0.989
2.300	3.566	3.205	1.100	2.913	0.887	0.976	0.992
2.400	3.963	3.295	1.318	2.500	0.914	1.204	0.995
2.500	4.170	3.577	1.716	2.318	0.926	1.588	0.997
2.600	4.469	7.727	3.712	2.082	0.940	3.489	0.999
2.700	4.676	6.591	3.403	1.937	0.949	3.229	1.000
2.800	4.782	5.966	3.194	1.868	0.953	3.043	1.000
2.900	4.847	5.625	3.079	1.827	0.955	2.941	1.000
3.000	4.848	5.511	3.018	1.826	0.955	2.882	1.000
3.100	4.857	5.398	2.966	1.820	0.955	2.833	1.000
3.200	4.841	5.341	2.918	1.830	0.955	2.786	1.000
3.300	4.868	5.227	2.883	1.813	0.956	2.755	1.000
3.400	4.870	5.114	2.821	1.813	0.956	2.697	1.000
3.500	4.853	5.057	2.774	1.823	0.955	2.650	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 33.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	3.841	0.868	4.426	0.000	0.000	0.432
0.050	0.301	3.841	0.605	6.348	0.110	0.067	0.631
0.075	0.333	3.841	0.564	6.807	0.126	0.071	0.679
0.100	0.345	3.841	0.550	6.984	0.132	0.073	0.698
0.125	0.362	3.841	0.546	7.035	0.139	0.076	0.705
0.150	0.362	3.841	0.542	7.087	0.140	0.076	0.710
0.175	0.362	3.841	0.539	7.126	0.140	0.076	0.714
0.200	0.362	3.841	0.536	7.160	0.141	0.075	0.717
0.250	0.351	3.841	0.532	7.223	0.137	0.073	0.722
0.300	0.327	3.841	0.527	7.293	0.128	0.068	0.727
0.350	0.308	3.841	0.523	7.340	0.121	0.063	0.730
0.400	0.293	3.841	0.519	7.400	0.108	0.056	0.732
0.450	0.258	3.841	0.517	7.424	0.102	0.053	0.734
0.500	0.214	3.841	0.514	7.466	0.085	0.044	0.735
0.600	0.145	3.841	0.511	7.515	0.058	0.029	0.736
0.700	0.130	3.841	0.510	7.533	0.052	0.026	0.737
0.800	0.301	3.841	0.516	7.448	0.119	0.062	0.739
0.900	0.457	3.841	0.524	7.332	0.180	0.094	0.744
1.000	0.653	3.841	0.540	7.116	0.253	0.136	0.752
1.100	0.913	3.841	0.568	6.759	0.345	0.196	0.768
1.200	1.165	3.841	0.599	6.409	0.429	0.257	0.792
1.300	1.457	3.841	0.651	5.896	0.515	0.336	0.815
1.400	1.782	3.841	0.725	5.299	0.597	0.433	0.840
1.500	2.136	3.841	0.824	4.662	0.672	0.554	0.863
1.600	2.554	3.841	0.965	3.978	0.743	0.717	0.886
1.700	3.122	3.841	1.203	3.193	0.813	0.978	0.909
1.800	3.757	3.841	1.519	2.529	0.871	1.323	0.932
1.900	4.119	4.432	1.958	2.263	0.903	1.769	0.957
2.000	4.192	6.250	2.769	2.257	0.918	2.542	0.980
2.100	4.252	9.091	4.042	2.249	0.930	3.758	0.998
2.200	4.013	11.364	4.608	2.466	0.919	4.233	1.000
2.300	4.023	11.364	4.625	2.457	0.919	4.252	1.000
2.400	4.023	11.364	4.625	2.457	0.919	4.252	1.000
2.500	3.895	11.364	4.404	2.580	0.912	4.017	1.000
2.600	4.134	8.750	3.713	2.356	0.925	3.435	1.000
2.700	4.624	5.682	2.880	1.973	0.947	2.727	1.000
2.800	4.680	5.114	2.644	1.934	0.949	2.509	1.000
2.900	4.770	4.773	2.545	1.875	0.952	2.424	1.000
3.000	4.822	4.602	2.498	1.842	0.954	2.383	1.000
3.100	4.812	4.545	2.459	1.849	0.954	2.345	1.000
3.200	4.804	4.489	2.422	1.854	0.954	2.309	1.000
3.300	4.796	4.432	2.384	1.859	0.953	2.273	1.000
3.400	4.789	4.375	2.348	1.863	0.953	2.238	1.000
3.500	4.783	4.318	2.313	1.867	0.953	2.204	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 35.5 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	4.545	1.027	4.426	0.000	0.000	0.432
0.050	0.414	4.545	0.611	7.444	0.164	0.100	0.750
0.075	0.451	4.545	0.600	7.572	0.180	0.108	0.767
0.100	0.486	4.545	0.595	7.642	0.195	0.116	0.778
0.125	0.532	4.545	0.591	7.690	0.214	0.126	0.790
0.150	0.599	4.545	0.595	7.637	0.240	0.143	0.796
0.175	0.669	4.545	0.601	7.569	0.267	0.160	0.801
0.200	0.757	4.545	0.610	7.453	0.300	0.183	0.807
0.250	0.863	4.545	0.620	7.328	0.339	0.210	0.817
0.300	0.956	4.545	0.633	7.179	0.372	0.236	0.824
0.350	1.057	4.545	0.649	7.001	0.406	0.264	0.831
0.400	1.144	4.545	0.664	6.846	0.435	0.289	0.838
0.450	1.264	4.545	0.688	6.603	0.472	0.325	0.844
0.500	1.364	4.545	0.710	6.399	0.502	0.356	0.851
0.600	1.605	4.545	0.771	5.892	0.567	0.437	0.864
0.700	1.876	4.545	0.850	5.345	0.632	0.537	0.881
0.800	2.206	4.545	0.965	4.712	0.698	0.673	0.898
0.900	2.573	4.545	1.108	4.102	0.760	0.842	0.920
1.000	3.025	4.545	1.316	3.454	0.820	1.078	0.942
1.100	3.599	4.375	1.565	2.795	0.877	1.373	0.966
1.200	3.999	4.182	1.702	2.457	0.914	1.556	0.991
1.300	4.295	3.966	1.787	2.219	0.933	1.667	0.999
1.400	4.563	3.750	1.860	2.016	0.944	1.757	1.000
1.500	4.797	3.568	1.920	1.858	0.953	1.831	1.000
1.600	5.027	3.409	1.983	1.719	0.961	1.905	1.000
1.700	5.203	3.352	2.066	1.623	0.966	1.996	1.000
1.800	5.302	3.409	2.169	1.572	0.969	2.102	1.000
1.900	5.272	3.636	2.291	1.587	0.968	2.219	1.000
2.000	4.945	4.375	2.476	1.767	0.958	2.373	1.000
2.100	4.717	5.114	2.677	1.910	0.950	2.544	1.000
2.200	4.533	5.909	2.901	2.037	0.943	2.736	1.000
2.300	4.328	6.932	3.161	2.193	0.934	2.954	1.000
2.400	4.178	7.727	3.334	2.318	0.927	3.091	1.000
2.500	4.052	8.466	3.484	2.430	0.921	3.209	1.000
2.600	3.962	8.577	3.598	2.495	0.917	3.300	1.000
2.700	3.981	9.091	3.642	2.496	0.917	3.339	1.000
2.800	4.032	8.577	3.666	2.449	0.920	3.372	1.000
2.900	4.404	6.477	3.036	2.133	0.938	2.847	1.000
3.000	4.644	4.830	2.465	1.959	0.948	2.336	1.000
3.100	4.634	4.205	2.138	1.966	0.947	2.026	1.000
3.200	4.686	4.034	2.089	1.931	0.949	1.982	1.000
3.300	4.696	3.977	2.067	1.924	0.950	1.963	1.000
3.400	4.706	3.920	2.045	1.917	0.950	1.943	1.000
3.500	4.718	3.864	2.023	1.910	0.950	1.923	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 38.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	6.818	1.540	4.426	0.000	0.000	0.432
0.050	1.238	6.761	1.157	5.845	0.436	0.504	0.744
0.075	1.262	6.705	1.126	5.954	0.448	0.505	0.764
0.100	1.285	6.648	1.105	6.015	0.459	0.507	0.778
0.125	1.314	6.591	1.087	6.062	0.471	0.512	0.793
0.150	1.358	6.534	1.085	6.020	0.485	0.526	0.801
0.175	1.398	6.500	1.092	5.952	0.496	0.542	0.804
0.200	1.441	6.477	1.103	5.871	0.508	0.561	0.807
0.250	1.561	6.386	1.136	5.623	0.539	0.612	0.812
0.300	1.681	6.307	1.172	5.381	0.568	0.666	0.818
0.350	1.816	6.250	1.222	5.116	0.599	0.731	0.824
0.400	1.965	6.193	1.282	4.832	0.629	0.806	0.830
0.450	2.131	6.136	1.357	4.521	0.660	0.896	0.836
0.500	2.362	6.080	1.476	4.119	0.699	1.031	0.844
0.600	2.773	6.023	1.718	3.505	0.757	1.301	0.861
0.700	3.276	5.966	2.064	2.890	0.812	1.676	0.880
0.800	3.695	5.966	2.582	2.311	0.863	2.229	0.901
0.900	4.428	5.966	3.068	1.944	0.900	2.762	0.923
1.000	4.821	5.795	3.324	1.744	0.928	3.085	0.949
1.100	4.920	5.568	3.212	1. 34	0.945	3.033	0.974
1.200	4.934	5.000	2.845	1.757	0.954	2.713	0.991
1.300	5.099	3.750	2.235	1.678	0.963	2.152	0.999
1.400	5.253	3.125	1.957	1.597	0.968	1.894	1.000
1.500	5.428	2.841	1.881	1.510	0.972	1.830	1.000
1.600	5.428	2.841	1.881	1.510	0.972	1.830	1.000
1.700	5.430	2.898	1.920	1.509	0.973	1.867	1.000
1.800	5.329	3.068	1.969	1.558	0.970	1.910	1.000
1.900	5.218	3.295	2.040	1.615	0.967	1.972	1.000
2.000	5.118	3.523	2.112	1.668	0.964	2.035	1.000
2.100	5.054	3.864	2.193	1.762	0.959	2.102	1.000
2.200	4.890	4.091	2.272	1.800	0.956	2.174	1.000
2.300	4.758	4.432	2.354	1.883	0.952	2.241	1.000
2.400	4.642	4.773	2.435	1.960	0.948	2.307	1.000
2.500	4.539	5.114	2.516	2.032	0.944	2.374	1.000
2.600	4.415	5.511	2.594	2.125	0.938	2.434	1.000
2.700	4.326	5.852	2.667	2.195	0.934	2.491	1.000
2.800	4.265	6.136	2.734	2.244	0.932	2.547	1.000
2.900	4.259	6.250	2.778	2.249	0.931	2.587	1.000
3.000	4.272	6.307	2.817	2.238	0.932	2.625	1.000
3.100	4.305	6.307	2.852	2.212	0.933	2.662	1.000
3.200	4.321	6.307	2.869	2.199	0.934	2.679	1.000
3.300	4.475	4.545	2.196	2.080	0.941	2.056	1.000
3.400	4.735	3.409	1.796	1.898	0.951	1.708	1.000
3.500	4.731	3.182	1.674	1.900	0.951	1.592	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 40.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	8.432	1.905	4.426	0.000	0.000	0.432
0.050	1.231	8.182	1.247	6.563	0.459	0.572	0.830
0.075	1.310	8.068	1.232	6.550	0.487	0.600	0.852
0.100	1.386	7.955	1.241	6.410	0.510	0.633	0.859
0.125	1.433	7.898	1.244	6.347	0.525	0.653	0.867
0.150	1.479	7.841	1.248	6.284	0.539	0.673	0.874
0.175	1.524	7.784	1.256	6.197	0.552	0.693	0.878
0.200	1.568	7.727	1.263	6.117	0.564	0.713	0.882
0.250	1.654	7.614	1.279	5.952	0.588	0.751	0.890
0.300	1.773	7.500	1.315	5.702	0.616	0.811	0.897
0.350	1.926	7.443	1.386	5.370	0.650	0.901	0.903
0.400	2.054	7.386	1.442	5.122	0.677	0.977	0.912
0.450	2.177	7.330	1.497	4.897	0.702	1.051	0.920
0.500	2.335	7.273	1.573	4.623	0.732	1.151	0.932
0.600	2.614	7.159	1.761	4.065	0.786	1.384	0.952
0.700	3.167	7.045	2.095	3.363	0.847	1.774	0.973
0.800	3.657	6.875	2.440	2.818	0.895	2.183	0.995
0.900	4.219	6.705	2.894	2.316	0.936	2.710	1.014
1.000	4.571	6.477	3.147	2.058	0.956	3.009	1.023
1.100	4.782	6.080	3.179	1.913	0.964	3.065	1.023
1.200	4.952	5.568	3.108	1.791	0.966	3.004	1.015
1.300	4.992	4.886	2.801	1.744	0.961	2.693	1.003
1.400	5.045	4.034	2.361	1.709	0.962	2.270	1.000
1.500	5.240	3.205	1.998	1.604	0.967	1.933	1.000
1.600	5.321	2.955	1.891	1.562	0.970	1.834	1.000
1.700	5.265	2.955	1.857	1.591	0.968	1.798	1.000
1.800	5.288	2.898	1.835	1.579	0.969	1.778	1.000
1.900	5.302	2.898	1.844	1.572	0.969	1.787	1.000
2.000	5.242	3.011	1.879	1.602	0.967	1.818	1.000
2.100	5.139	3.182	1.920	1.657	0.964	1.852	1.000
2.200	5.057	3.352	1.969	1.702	0.962	1.894	1.000
2.300	4.982	3.523	2.018	1.746	0.960	1.936	1.000
2.400	4.815	3.750	2.072	1.810	0.956	1.981	1.000
2.500	4.778	3.977	2.127	1.870	0.953	2.026	1.000
2.600	4.714	4.182	2.187	1.912	0.950	2.079	1.000
2.700	4.655	4.386	2.248	1.951	0.948	2.131	1.000
2.800	4.595	4.602	2.310	1.993	0.946	2.184	1.000
2.900	4.541	4.795	2.361	2.031	0.944	2.227	1.000
3.000	4.485	5.000	2.413	2.072	0.941	2.271	1.000
3.100	4.437	5.193	2.464	2.108	0.939	2.314	1.000
3.200	4.379	5.398	2.507	2.153	0.937	2.349	1.000
3.300	4.384	5.455	2.538	2.149	0.937	2.376	1.000
3.400	4.411	5.455	2.564	2.128	0.938	2.405	1.000
3.500	4.563	5.000	2.481	2.016	0.944	2.343	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 42.5 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	9.432	2.131	4.426	0.000	0.000	0.432
0.050	1.368	9.284	1.481	6.268	0.498	0.738	0.835
0.075	1.429	9.216	1.460	6.313	0.522	0.762	0.861
0.100	1.450	9.148	1.445	6.332	0.531	0.767	0.870
0.125	1.488	9.080	1.440	6.304	0.543	0.783	0.880
0.150	1.525	9.000	1.439	6.256	0.555	0.798	0.886
0.175	1.568	8.932	1.444	6.187	0.567	0.819	0.892
0.200	1.626	8.864	1.458	6.079	0.583	0.850	0.898
0.250	1.733	8.716	1.484	5.874	0.611	0.907	0.908
0.300	1.836	8.580	1.514	5.665	0.636	0.963	0.915
0.350	1.945	8.477	1.554	5.455	0.662	1.028	0.924
0.400	2.063	8.375	1.604	5.222	0.687	1.102	0.932
0.450	2.190	8.273	1.657	4.991	0.713	1.182	0.943
0.500	2.335	8.182	1.732	4.724	0.739	1.281	0.951
0.600	2.669	8.011	1.926	4.160	0.793	1.528	0.970
0.700	3.047	7.864	2.194	3.584	0.841	1.845	0.985
0.800	3.547	7.705	2.602	2.961	0.890	2.315	1.000
0.900	4.037	7.523	3.033	2.480	0.927	2.811	1.014
1.000	4.348	7.330	3.268	2.242	0.949	3.103	1.028
1.100	4.499	7.068	3.324	2.126	0.956	3.180	1.030
1.200	4.588	6.761	3.285	2.058	0.960	3.152	1.028
1.300	4.613	6.384	3.130	2.033	0.959	3.001	1.025
1.400	4.597	5.625	2.775	2.027	0.954	2.648	1.017
1.500	4.641	4.432	2.245	1.974	0.951	2.135	1.006
1.600	4.690	3.750	1.945	1.928	0.949	1.847	1.000
1.700	4.873	3.295	1.820	1.811	0.956	1.740	1.000
1.800	5.063	2.955	1.739	1.699	0.962	1.673	1.000
1.900	5.134	2.841	1.712	1.660	0.964	1.650	1.000
2.000	5.164	2.841	1.729	1.643	0.965	1.668	1.000
2.100	5.194	2.841	1.746	1.628	0.966	1.686	1.000
2.200	5.121	2.955	1.773	1.667	0.964	1.709	1.000
2.300	5.053	3.068	1.800	1.705	0.962	1.731	1.000
2.400	4.988	3.182	1.827	1.742	0.960	1.753	1.000
2.500	4.927	3.295	1.854	1.778	0.958	1.775	1.000
2.600	4.867	3.432	1.891	1.814	0.956	1.808	1.000
2.700	4.789	3.580	1.921	1.863	0.953	1.831	1.000
2.800	4.752	3.693	1.957	1.887	0.952	1.863	1.000
2.900	4.709	3.807	1.988	1.915	0.950	1.888	1.000
3.000	4.658	3.920	2.011	1.949	0.948	1.907	1.000
3.100	4.620	4.034	2.042	1.976	0.947	1.933	1.000
3.200	4.585	4.148	2.074	2.000	0.945	1.961	1.000
3.300	4.557	4.261	2.109	2.020	0.944	1.992	1.000
3.400	4.526	4.318	2.115	2.042	0.943	1.994	1.000
3.500	4.541	4.375	2.154	2.031	0.944	2.032	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 45.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	8.977	2.028	4.426	0.000	0.000	0.432
0.050	1.706	8.830	1.493	5.913	0.604	0.901	0.903
0.075	1.856	8.761	1.551	5.648	0.642	0.996	0.920
0.100	1.891	8.693	1.543	5.634	0.654	1.009	0.932
0.125	1.925	8.636	1.546	5.586	0.662	1.024	0.938
0.150	1.957	8.591	1.553	5.531	0.670	1.041	0.941
0.175	1.991	8.534	1.565	5.453	0.677	1.060	0.942
0.200	2.023	8.485	1.579	5.376	0.683	1.079	0.942
0.250	2.112	8.386	1.623	5.168	0.700	1.135	0.943
0.300	2.187	8.295	1.657	5.005	0.713	1.182	0.944
0.350	2.281	8.227	1.708	4.817	0.730	1.246	0.947
0.400	2.373	8.159	1.759	4.638	0.745	1.310	0.950
0.450	2.484	8.091	1.824	4.436	0.763	1.391	0.955
0.500	2.591	8.034	1.889	4.254	0.779	1.471	0.960
0.600	2.844	7.932	2.061	3.848	0.813	1.677	0.969
0.700	3.143	7.841	2.285	3.431	0.849	1.940	0.982
0.800	3.482	7.773	2.566	3.030	0.884	2.267	0.997
0.900	3.754	7.693	2.780	2.767	0.910	2.531	1.014
1.000	3.992	7.636	3.007	2.540	0.927	2.789	1.020
1.100	4.212	7.557	3.234	2.337	0.939	3.036	1.020
1.200	4.369	7.443	3.404	2.187	0.942	3.206	1.011
1.300	4.455	7.273	3.457	2.104	0.942	3.256	1.004
1.400	4.503	7.091	3.439	2.062	0.943	3.242	1.001
1.500	4.547	6.818	3.363	2.027	0.944	3.174	1.000
1.600	4.621	6.420	3.252	1.975	0.947	3.078	1.000
1.700	4.822	5.682	3.084	1.842	0.954	2.942	1.000
1.800	5.022	4.830	2.805	1.722	0.961	2.695	1.000
1.900	5.082	3.577	2.356	1.688	0.963	2.268	1.000
2.000	5.179	2.955	1.806	1.636	0.966	1.744	1.000
2.100	5.164	2.727	1.659	1.644	0.965	1.601	1.000
2.200	5.205	2.636	1.629	1.622	0.966	1.571	1.000
2.300	5.187	2.670	1.637	1.631	0.966	1.581	1.000
2.400	5.179	2.727	1.667	1.636	0.966	1.610	1.000
2.500	5.156	2.784	1.690	1.648	0.965	1.630	1.000
2.600	5.134	2.841	1.712	1.660	0.964	1.650	1.000
2.700	5.113	2.898	1.734	1.671	0.964	1.671	1.000
2.800	5.092	2.955	1.756	1.683	0.963	1.691	1.000
2.900	5.072	3.011	1.778	1.694	0.962	1.711	1.000
3.000	5.053	3.068	1.800	1.705	0.962	1.731	1.000
3.100	5.043	3.114	1.821	1.710	0.961	1.751	1.000
3.200	5.034	3.159	1.842	1.715	0.961	1.770	1.000
3.300	5.011	3.205	1.854	1.728	0.960	1.781	1.000
3.400	4.989	3.250	1.867	1.741	0.960	1.792	1.000
3.500	4.966	3.295	1.879	1.754	0.959	1.802	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 50.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	7.091	1.602	4.426	0.000	0.000	0.432
0.050	2.207	7.068	1.522	4.645	0.693	1.055	0.886
0.075	2.453	7.045	1.649	4.273	0.739	1.219	0.909
0.100	2.503	7.023	1.653	4.248	0.752	1.243	0.923
0.125	2.527	7.000	1.650	4.243	0.759	1.252	0.932
0.150	2.561	6.977	1.661	4.201	0.765	1.271	0.936
0.175	2.595	6.955	1.673	4.157	0.771	1.290	0.940
0.200	2.641	6.932	1.697	4.086	0.778	1.321	0.943
0.250	2.691	6.898	1.715	4.022	0.787	1.350	0.949
0.300	2.758	6.864	1.749	3.926	0.797	1.393	0.953
0.350	2.822	6.830	1.783	3.831	0.805	1.436	0.957
0.400	2.883	6.784	1.811	3.746	0.813	1.473	0.960
0.450	2.942	6.750	1.844	3.661	0.821	1.513	0.963
0.500	2.996	6.727	1.877	3.584	0.827	1.552	0.964
0.600	3.105	6.705	1.954	3.432	0.838	1.638	0.967
0.700	3.229	6.705	2.051	3.268	0.851	1.746	0.970
0.800	3.367	6.636	2.141	3.100	0.864	1.850	0.974
0.900	3.509	6.614	2.251	2.938	0.877	1.974	0.978
1.000	3.668	6.580	2.376	2.770	0.890	2.114	0.983
1.100	3.839	6.545	2.514	2.603	0.903	2.271	0.988
1.200	3.998	6.534	2.655	2.461	0.914	2.427	0.993
1.300	4.118	6.523	2.758	2.365	0.923	2.547	0.998
1.400	4.223	6.500	2.843	2.286	0.931	2.647	1.003
1.500	4.310	6.477	2.912	2.225	0.937	2.729	1.007
1.600	4.381	6.443	2.969	2.170	0.941	2.794	1.009
1.700	4.436	6.398	3.014	2.123	0.942	2.840	1.006
1.800	4.483	6.341	3.049	2.080	0.943	2.874	1.003
1.900	4.524	6.273	3.069	2.044	0.943	2.894	1.000
2.000	4.557	6.182	3.061	2.020	0.944	2.890	1.000
2.100	4.583	6.102	3.028	2.015	0.944	2.860	1.000
2.200	4.559	6.011	2.978	2.019	0.944	2.812	1.000
2.300	4.570	5.898	2.934	2.010	0.945	2.772	1.000
2.400	4.588	5.750	2.879	1.998	0.945	2.721	1.000
2.500	4.645	5.511	2.814	1.958	0.948	2.667	1.000
2.600	4.727	5.227	2.747	1.903	0.951	2.612	1.000
2.700	4.789	5.000	2.684	1.863	0.953	2.556	1.000
2.800	5.043	4.432	2.591	1.710	0.961	2.491	1.000
2.900	5.201	3.864	2.379	1.624	0.966	2.299	1.000
3.000	5.193	3.068	1.885	1.628	0.966	1.821	1.000
3.100	5.111	2.500	1.495	1.672	0.964	1.440	1.000
3.200	5.005	2.432	1.404	1.732	0.960	1.348	1.000
3.300	5.005	2.432	1.404	1.732	0.960	1.348	1.000
3.400	4.981	2.455	1.406	1.746	0.960	1.349	1.000
3.500	4.958	2.477	1.408	1.760	0.959	1.350	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 55.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	5.364	1.212	4.426	0.000	0.000	0.432
0.050	2.339	5.284	1.383	3.821	0.667	0.922	0.778
0.075	2.681	5.256	1.531	3.433	0.724	1.109	0.813
0.100	2.812	5.227	1.561	3.349	0.750	1.171	0.838
0.125	2.863	5.205	1.556	3.346	0.763	1.187	0.855
0.150	2.914	5.182	1.556	3.330	0.775	1.206	0.869
0.175	2.949	5.159	1.551	3.326	0.784	1.216	0.881
0.200	2.991	5.136	1.552	3.309	0.793	1.231	0.892
0.250	3.070	5.136	1.574	3.263	0.809	1.273	0.909
0.300	3.126	5.136	1.588	3.235	0.820	1.302	0.922
0.350	3.167	5.136	1.594	3.223	0.829	1.321	0.934
0.400	3.215	5.114	1.603	3.191	0.837	1.342	0.943
0.450	3.255	5.114	1.616	3.164	0.844	1.364	0.951
0.500	3.294	5.114	1.634	3.130	0.850	1.388	0.956
0.600	3.354	5.114	1.656	3.087	0.859	1.423	0.966
0.700	3.425	5.114	1.691	3.024	0.869	1.468	0.974
0.800	3.498	5.114	1.731	2.955	0.877	1.517	0.980
0.900	3.592	5.057	1.769	2.859	0.885	1.566	0.984
1.000	3.664	5.057	1.813	2.789	0.892	1.617	0.988
1.100	3.739	5.057	1.858	2.722	0.898	1.669	0.991
1.200	3.816	5.057	1.912	2.645	0.905	1.730	0.994
1.300	3.904	5.057	1.974	2.562	0.911	1.799	0.997
1.400	4.001	5.057	2.042	2.476	0.918	1.875	0.999
1.500	4.092	5.057	2.112	2.394	0.923	1.950	1.000
1.600	4.190	5.000	2.167	2.308	0.928	2.010	1.000
1.700	4.263	5.000	2.226	2.246	0.931	2.073	1.000
1.800	4.331	5.000	2.282	2.191	0.935	2.133	1.000
1.900	4.396	5.000	2.337	2.140	0.937	2.190	1.000
2.000	4.445	5.000	2.379	2.102	0.940	2.235	1.000
2.100	4.491	5.000	2.418	2.068	0.942	2.276	1.000
2.200	4.554	4.943	2.445	2.022	0.944	2.308	1.000
2.300	4.564	4.943	2.470	2.001	0.945	2.335	1.000
2.400	4.649	4.852	2.481	1.956	0.948	2.352	1.000
2.500	4.671	4.818	2.483	1.940	0.949	2.356	1.000
2.600	4.696	4.773	2.481	1.924	0.950	2.356	1.000
2.700	4.721	4.716	2.472	1.908	0.951	2.350	1.000
2.800	4.750	4.655	2.467	1.888	0.952	2.348	1.000
2.900	4.779	4.602	2.462	1.869	0.953	2.346	1.000
3.000	4.800	4.545	2.449	1.856	0.953	2.334	1.000
3.100	4.510	4.489	2.476	1.850	0.954	2.314	1.000
3.200	4.785	4.485	2.410	1.863	0.953	2.296	1.000
3.300	4.800	4.432	2.388	1.856	0.953	2.276	1.000
3.400	4.779	4.432	2.371	1.870	0.953	2.258	1.000
3.500	4.758	4.432	2.354	1.883	0.952	2.241	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 60.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	4.091	0.924	4.426	0.000	0.000	0.432
0.050	2.240	4.091	1.016	4.025	0.655	0.666	0.784
0.075	2.556	4.091	1.111	3.682	0.715	0.794	0.824
0.100	2.680	4.091	1.133	3.612	0.742	0.841	0.852
0.125	2.712	4.091	1.118	3.660	0.756	0.845	0.875
0.150	2.743	4.091	1.118	3.659	0.765	0.855	0.886
0.175	2.787	4.091	1.124	3.639	0.775	0.871	0.898
0.200	2.855	4.091	1.143	3.579	0.788	0.900	0.909
0.250	2.912	4.091	1.149	3.562	0.801	0.920	0.926
0.300	3.000	4.034	1.164	3.467	0.814	0.947	0.936
0.350	3.068	4.034	1.187	3.398	0.824	0.979	0.944
0.400	3.114	4.034	1.202	3.357	0.832	1.000	0.951
0.450	3.177	4.034	1.227	3.288	0.840	1.030	0.956
0.500	3.239	4.000	1.243	3.219	0.847	1.053	0.960
0.600	3.343	3.977	1.280	3.108	0.859	1.099	0.968
0.700	3.408	3.977	1.306	3.046	0.867	1.132	0.974
0.800	3.479	3.977	1.336	2.977	0.875	1.169	0.980
0.900	3.582	3.920	1.367	2.867	0.884	1.209	0.983
1.000	3.656	3.920	1.404	2.793	0.891	1.250	0.986
1.100	3.733	3.920	1.442	2.719	0.897	1.294	0.990
1.200	3.830	3.864	1.472	2.624	0.904	1.332	0.992
1.300	3.918	3.864	1.520	2.542	0.911	1.384	0.994
1.400	3.996	3.864	1.564	2.471	0.916	1.432	0.996
1.500	4.118	3.807	1.611	2.363	0.923	1.487	0.997
1.600	4.196	3.807	1.656	2.298	0.927	1.536	0.998
1.700	4.272	3.807	1.702	2.237	0.932	1.585	0.999
1.800	4.378	3.750	1.742	2.153	0.937	1.631	1.000
1.900	4.451	3.750	1.787	2.098	0.940	1.680	1.000
2.000	4.511	3.750	1.826	2.053	0.942	1.721	1.000
2.100	4.604	3.693	1.859	1.987	0.946	1.759	1.000
2.200	4.658	3.693	1.894	1.950	0.948	1.796	1.000
2.300	4.706	3.693	1.927	1.917	0.950	1.830	1.000
2.400	4.789	3.636	1.952	1.863	0.953	1.860	1.000
2.500	4.820	3.636	1.972	1.844	0.954	1.882	1.000
2.600	4.848	3.636	1.991	1.826	0.955	1.902	1.000
2.700	4.904	3.580	1.998	1.792	0.957	1.912	1.000
2.800	4.972	3.580	2.010	1.781	0.958	1.925	1.000
2.900	4.929	3.580	2.015	1.777	0.958	1.930	1.000
3.000	4.969	3.523	2.010	1.753	0.959	1.928	1.000
3.100	4.969	3.523	2.010	1.753	0.959	1.928	1.000
3.200	4.969	3.523	2.010	1.753	0.959	1.928	1.000
3.300	4.957	3.523	2.001	1.760	0.959	1.919	1.000
3.400	4.985	3.466	1.988	1.744	0.960	1.908	1.000
3.500	4.972	3.466	1.979	1.751	0.959	1.899	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 65.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	3.057	0.691	4.426	0.000	0.000	0.432
0.050	2.196	3.057	0.750	4.074	0.646	0.485	0.778
0.075	2.561	3.057	0.814	3.753	0.723	0.589	0.841
0.100	2.757	3.057	0.863	3.541	0.756	0.653	0.864
0.125	2.788	3.057	0.858	3.565	0.767	0.658	0.881
0.150	2.824	3.057	0.855	3.576	0.779	0.665	0.897
0.175	2.905	3.057	0.877	3.489	0.791	0.693	0.905
0.200	2.978	3.057	0.895	3.414	0.802	0.718	0.914
0.250	3.088	3.057	0.925	3.306	0.819	0.757	0.927
0.300	3.189	3.057	0.954	3.203	0.832	0.794	0.937
0.350	3.270	3.057	0.978	3.124	0.843	0.824	0.945
0.400	3.327	3.057	0.995	3.072	0.850	0.846	0.951
0.450	3.374	3.057	1.009	3.030	0.856	0.864	0.956
0.500	3.427	3.045	1.022	2.979	0.862	0.882	0.961
0.600	3.512	3.023	1.041	2.903	0.872	0.908	0.969
0.700	3.591	2.989	1.055	2.832	0.881	0.930	0.975
0.800	3.659	2.966	1.070	2.771	0.888	0.950	0.980
0.900	3.722	2.955	1.089	2.714	0.894	0.973	0.984
1.000	3.797	2.932	1.108	2.645	0.900	0.998	0.988
1.100	3.872	2.920	1.134	2.576	0.906	1.027	0.990
1.200	3.953	2.909	1.162	2.504	0.912	1.060	0.993
1.300	4.029	2.909	1.194	2.436	0.917	1.095	0.994
1.400	4.112	2.898	1.225	2.366	0.922	1.129	0.996
1.500	4.182	2.898	1.255	2.309	0.926	1.163	0.998
1.600	4.257	2.898	1.290	2.247	0.930	1.200	0.998
1.700	4.339	2.898	1.328	2.182	0.934	1.241	0.999
1.800	4.415	2.898	1.365	2.123	0.938	1.280	0.999
1.900	4.487	2.898	1.400	2.070	0.941	1.317	1.000
2.000	4.562	2.898	1.437	2.017	0.944	1.357	1.000
2.100	4.644	2.898	1.479	1.959	0.948	1.402	1.000
2.200	4.719	2.886	1.512	1.909	0.950	1.437	1.000
2.300	4.783	2.886	1.546	1.867	0.953	1.473	1.000
2.400	4.847	2.875	1.574	1.827	0.955	1.503	1.000
2.500	4.910	2.864	1.602	1.788	0.957	1.533	1.000
2.600	4.954	2.864	1.626	1.762	0.959	1.558	1.000
2.700	5.013	2.852	1.652	1.727	0.961	1.586	1.000
2.800	5.061	2.841	1.671	1.700	0.962	1.607	1.000
2.900	5.102	2.830	1.687	1.677	0.963	1.625	1.000
3.000	5.140	2.818	1.701	1.657	0.964	1.641	1.000
3.100	5.158	2.818	1.711	1.647	0.965	1.651	1.000
3.200	5.187	2.807	1.720	1.631	0.966	1.662	1.000
3.300	5.209	2.795	1.726	1.619	0.966	1.668	1.000
3.400	5.232	2.784	1.732	1.607	0.967	1.675	1.000
3.500	5.243	2.773	1.731	1.602	0.967	1.675	1.000

TABLE 6

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 70.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	2.455	0.555	4.426	0.000	0.000	0.432
0.050	2.240	2.455	0.614	3.999	0.653	0.401	0.778
0.075	2.680	2.455	0.694	3.536	0.735	0.510	0.835
0.100	2.874	2.455	0.730	3.363	0.769	0.561	0.864
0.125	2.936	2.455	0.729	3.365	0.785	0.573	0.886
0.150	2.997	2.455	0.739	3.322	0.796	0.588	0.898
0.175	3.039	2.455	0.745	3.296	0.804	0.599	0.906
0.200	3.119	2.455	0.762	3.223	0.819	0.621	0.915
0.250	3.212	2.455	0.782	3.139	0.829	0.649	0.927
0.300	3.305	2.455	0.804	3.053	0.842	0.677	0.938
0.350	3.402	2.455	0.829	2.962	0.854	0.707	0.946
0.400	3.485	2.455	0.850	2.886	0.863	0.734	0.953
0.450	3.565	2.443	0.868	2.814	0.872	0.757	0.960
0.500	3.625	2.432	0.881	2.759	0.878	0.774	0.964
0.600	3.732	2.409	0.903	2.668	0.889	0.802	0.972
0.700	3.813	2.386	0.918	2.600	0.896	0.823	0.977
0.800	3.885	2.364	0.929	2.543	0.903	0.840	0.983
0.900	3.938	2.352	0.940	2.501	0.908	0.854	0.986
1.000	3.995	2.341	0.953	2.456	0.913	0.870	0.990
1.100	4.052	2.341	0.971	2.411	0.917	0.890	0.993
1.200	4.112	2.341	0.991	2.363	0.921	0.913	0.995
1.300	4.166	2.341	1.009	2.319	0.925	0.934	0.997
1.400	4.235	2.330	1.029	2.265	0.929	0.956	0.998
1.500	4.289	2.330	1.048	2.222	0.932	0.977	0.999
1.600	4.341	2.330	1.068	2.181	0.935	0.998	0.999
1.700	4.408	2.318	1.088	2.130	0.938	1.021	1.000
1.800	4.464	2.318	1.110	2.088	0.940	1.044	1.000
1.900	4.524	2.318	1.134	2.044	0.943	1.069	1.000
2.000	4.586	2.307	1.154	2.000	0.945	1.091	1.000
2.100	4.640	2.307	1.176	1.962	0.947	1.114	1.000
2.200	4.693	2.307	1.198	1.926	0.949	1.137	1.000
2.300	4.757	2.295	1.219	1.883	0.952	1.160	1.000
2.400	4.813	2.295	1.242	1.848	0.954	1.185	1.000
2.500	4.865	2.295	1.265	1.815	0.956	1.208	1.000
2.600	4.929	2.284	1.285	1.777	0.958	1.231	1.000
2.700	4.983	2.284	1.309	1.745	0.960	1.256	1.000
2.800	5.038	2.273	1.327	1.713	0.961	1.276	1.000
2.900	5.081	2.273	1.346	1.689	0.963	1.295	1.000
3.000	5.119	2.273	1.363	1.668	0.964	1.313	1.000
3.100	5.170	2.261	1.378	1.641	0.965	1.331	1.000
3.200	5.203	2.261	1.394	1.623	0.966	1.347	1.000
3.300	5.243	2.250	1.405	1.602	0.967	1.359	1.000
3.400	5.276	2.250	1.420	1.585	0.968	1.375	1.000
3.500	5.306	2.250	1.433	1.570	0.969	1.389	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 75.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	2.000	0.452	4.426	0.000	0.000	0.432
0.050	2.030	2.000	0.463	4.320	0.615	0.285	0.767
0.075	2.561	2.000	0.541	3.700	0.718	0.388	0.830
0.100	2.736	2.000	0.564	3.548	0.751	0.424	0.858
0.125	2.831	2.000	0.572	3.498	0.772	0.441	0.881
0.150	2.916	2.000	0.581	3.441	0.789	0.458	0.898
0.175	2.951	2.000	0.594	3.365	0.800	0.475	0.906
0.200	3.064	2.000	0.607	3.293	0.811	0.492	0.915
0.250	3.198	2.000	0.634	3.153	0.828	0.525	0.926
0.300	3.340	2.000	0.664	3.010	0.845	0.561	0.938
0.350	3.431	2.000	0.683	2.929	0.856	0.585	0.947
0.400	3.518	1.989	0.698	2.848	0.866	0.604	0.953
0.450	3.617	1.989	0.721	2.758	0.876	0.631	0.960
0.500	3.701	1.977	0.738	2.680	0.883	0.652	0.965
0.600	3.820	1.977	0.766	2.582	0.895	0.685	0.973
0.700	3.918	1.966	0.786	2.503	0.904	0.710	0.980
0.800	4.014	1.966	0.811	2.425	0.911	0.739	0.985
0.900	4.104	1.955	0.830	2.354	0.918	0.762	0.989
1.000	4.153	1.955	0.842	2.321	0.922	0.777	0.993
1.100	4.202	1.955	0.855	2.285	0.926	0.792	0.995
1.200	4.241	1.943	0.861	2.257	0.929	0.800	0.997
1.300	4.284	1.943	0.873	2.226	0.932	0.813	0.999
1.400	4.316	1.943	0.883	2.202	0.934	0.824	0.999
1.500	4.355	1.932	0.896	2.172	0.936	0.832	1.000
1.600	4.397	1.932	0.903	2.139	0.937	0.847	1.000
1.700	4.438	1.932	0.917	2.108	0.939	0.861	1.000
1.800	4.482	1.920	0.926	2.074	0.941	0.871	1.000
1.900	4.523	1.920	0.939	2.045	0.943	0.886	1.000
2.000	4.567	1.909	0.952	2.006	0.945	0.900	1.000
2.100	4.627	1.909	0.969	1.971	0.947	0.917	1.000
2.200	4.671	1.898	0.978	1.940	0.949	0.928	1.000
2.300	4.721	1.886	0.989	1.908	0.951	0.940	1.000
2.400	4.774	1.875	1.001	1.872	0.952	0.954	1.000
2.500	4.819	1.864	1.011	1.844	0.954	0.964	1.000
2.600	4.863	1.852	1.030	1.798	0.957	0.985	1.000
2.700	4.966	1.841	1.049	1.754	0.959	1.006	1.000
2.800	5.006	1.830	1.057	1.731	0.960	1.015	1.000
2.900	5.070	1.818	1.073	1.695	0.962	1.032	1.000
3.000	5.113	1.818	1.088	1.671	0.964	1.048	1.000
3.100	5.156	1.818	1.103	1.649	0.965	1.065	1.000
3.200	5.198	1.818	1.119	1.625	0.966	1.081	1.000
3.300	5.230	1.818	1.130	1.608	0.967	1.093	1.000
3.400	5.249	1.818	1.137	1.599	0.968	1.100	1.000
3.500	5.267	1.818	1.144	1.589	0.968	1.107	1.000

TABLE 6 — CONCLUDED

15 DEGREE SHOCK WAVE GENERATOR

15 DEGREE SHOCK WAVE GENERATOR, X = 85.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.375	0.311	4.426	0.000	0.000	0.432
0.050	1.879	1.375	0.320	4.299	0.568	0.182	0.716
0.075	2.256	1.375	0.361	3.806	0.653	0.236	0.761
0.100	2.561	1.375	0.377	3.646	0.713	0.269	0.818
0.125	2.720	1.375	0.393	3.499	0.742	0.291	0.841
0.150	2.801	1.375	0.400	3.436	0.757	0.303	0.855
0.175	2.864	1.375	0.406	3.384	0.768	0.312	0.865
0.200	2.925	1.375	0.413	3.329	0.778	0.321	0.873
0.250	3.054	1.375	0.429	3.204	0.797	0.342	0.888
0.300	3.157	1.375	0.442	3.112	0.812	0.359	0.900
0.350	3.277	1.375	0.459	2.993	0.827	0.380	0.910
0.400	3.359	1.364	0.467	2.923	0.837	0.391	0.919
0.450	3.454	1.364	0.481	2.835	0.848	0.408	0.926
0.500	3.556	1.364	0.498	2.738	0.858	0.427	0.932
0.600	3.637	1.364	0.508	2.685	0.869	0.441	0.943
0.700	3.785	1.364	0.534	2.556	0.882	0.471	0.952
0.800	3.878	1.364	0.548	2.486	0.892	0.488	0.960
0.900	3.953	1.364	0.560	2.433	0.899	0.504	0.966
1.000	4.018	1.364	0.571	2.386	0.905	0.517	0.971
1.100	4.089	1.364	0.584	2.334	0.911	0.532	0.976
1.200	4.144	1.364	0.594	2.295	0.915	0.544	0.979
1.300	4.214	1.364	0.608	2.244	0.920	0.559	0.982
1.400	4.268	1.364	0.618	2.207	0.924	0.571	0.985
1.500	4.313	1.364	0.627	2.176	0.929	0.581	0.988
1.600	4.373	1.364	0.639	2.134	0.931	0.595	0.990
1.700	4.439	1.364	0.653	2.089	0.935	0.611	0.992
1.800	4.489	1.364	0.663	2.055	0.938	0.623	0.994
1.900	4.533	1.364	0.672	2.026	0.941	0.633	0.995
2.000	4.589	1.364	0.686	1.988	0.944	0.647	0.996
2.100	4.631	1.364	0.695	1.962	0.946	0.657	0.997
2.200	4.680	1.364	0.706	1.931	0.948	0.670	0.998
2.300	4.721	1.364	0.716	1.905	0.950	0.680	0.999
2.400	4.769	1.364	0.727	1.875	0.952	0.692	0.999
2.500	4.810	1.364	0.737	1.850	0.954	0.703	1.000
2.600	4.863	1.364	0.751	1.816	0.956	0.717	1.000
2.700	4.909	1.364	0.763	1.788	0.957	0.730	1.000
2.800	4.949	1.364	0.773	1.765	0.958	0.741	1.000
2.900	4.988	1.364	0.783	1.742	0.960	0.751	1.000
3.000	5.027	1.364	0.793	1.719	0.961	0.762	1.000
3.100	5.065	1.364	0.803	1.698	0.962	0.773	1.000
3.200	5.110	1.364	0.815	1.673	0.964	0.785	1.000
3.300	5.148	1.364	0.825	1.652	0.965	0.796	1.000
3.400	5.142	1.386	0.838	1.655	0.965	0.808	1.000
3.500	5.137	1.409	0.850	1.658	0.964	0.819	1.000

15 DEGREE SHOCK WAVE GENERATOR, X = 95.0 CM

Y(CM)	M	P / P INF	RHO / RHO INF	T / T INF	U / U INF	RHOU / RHOU INF	TT / TT INF
0.000	0.000	1.136	0.257	4.426	0.000	0.000	0.432
0.050	1.785	1.136	0.269	4.232	0.535	0.144	0.676
0.075	2.161	1.136	0.288	3.948	0.626	0.180	0.744
0.100	2.480	1.136	0.299	3.803	0.682	0.204	0.796
0.125	2.527	1.136	0.305	3.729	0.711	0.217	0.824
0.150	2.647	1.136	0.313	3.625	0.735	0.230	0.844
0.175	2.720	1.136	0.318	3.573	0.750	0.238	0.858
0.200	2.797	1.136	0.325	3.497	0.763	0.248	0.868
0.250	2.905	1.125	0.331	3.397	0.781	0.259	0.883
0.300	3.008	1.125	0.342	3.294	0.796	0.272	0.894
0.350	3.127	1.114	0.352	3.166	0.811	0.285	0.904
0.400	3.244	1.102	0.362	3.043	0.825	0.299	0.912
0.450	3.347	1.091	0.371	2.940	0.837	0.310	0.919
0.500	3.431	1.091	0.381	2.862	0.846	0.323	0.926
0.600	3.581	1.091	0.400	2.730	0.863	0.345	0.938
0.700	3.714	1.091	0.416	2.620	0.876	0.365	0.949
0.800	3.832	1.091	0.431	2.528	0.888	0.383	0.959
0.900	3.926	1.091	0.444	2.458	0.897	0.398	0.966
1.000	3.958	1.091	0.453	2.408	0.904	0.410	0.972
1.100	4.058	1.091	0.461	2.361	0.910	0.419	0.977
1.200	4.146	1.091	0.474	2.300	0.917	0.435	0.982
1.300	4.205	1.091	0.483	2.260	0.922	0.445	0.986
1.400	4.271	1.091	0.493	2.212	0.926	0.457	0.989
1.500	4.328	1.091	0.502	2.172	0.930	0.467	0.991
1.600	4.386	1.085	0.509	2.130	0.933	0.475	0.993
1.700	4.444	1.080	0.516	2.090	0.937	0.484	0.994
1.800	4.481	1.080	0.522	2.067	0.939	0.491	0.996
1.900	4.520	1.074	0.526	2.041	0.942	0.495	0.998
2.000	4.578	1.068	0.533	2.003	0.944	0.504	0.999
2.100	4.614	1.068	0.540	1.979	0.946	0.511	0.999
2.200	4.653	1.062	0.544	1.953	0.948	0.516	1.000
2.300	4.693	1.057	0.549	1.926	0.949	0.521	1.000
2.400	4.728	1.057	0.555	1.903	0.951	0.528	1.000
2.500	4.754	1.057	0.561	1.885	0.952	0.533	1.000
2.600	4.794	1.051	0.565	1.860	0.953	0.539	1.000
2.700	4.825	1.051	0.572	1.838	0.954	0.546	1.000
2.800	4.877	1.045	0.578	1.808	0.956	0.553	1.000
2.900	4.903	1.045	0.583	1.792	0.957	0.558	1.000
3.000	4.951	1.040	0.590	1.764	0.959	0.565	1.000
3.100	4.985	1.040	0.596	1.744	0.960	0.572	1.000
3.200	5.011	1.040	0.601	1.729	0.960	0.578	1.000
3.300	5.058	1.034	0.608	1.702	0.962	0.585	1.000
3.400	5.092	1.034	0.615	1.683	0.963	0.592	1.000
3.500	5.125	1.034	0.621	1.664	0.964	0.599	1.000

TABLE 7

7.5 DEGREE SHOCK WAVE GENERATOR

x, cm	δ	δ^*	θ	δ_i^*	θ_i
42.0	3.30	1.737	0.125	0.469	0.332
44.0	3.20	1.707	0.127	0.458	0.327
46.0	3.60	1.472	0.129	0.442	0.309
48.0	1.90	0.864	0.147	0.458	0.253
50.0	1.60	1.024	0.093	0.566	0.261
52.0	1.30	0.753	0.114	0.444	0.212
54.0	1.10	0.586	0.097	0.316	0.178
56.0	1.10	0.619	0.079	0.287	0.170
58.0	1.15	0.629	0.076	0.274	0.166
60.0	1.25	0.609	0.081	0.262	0.165
62.0	1.35	0.661	0.077	0.249	0.162
64.0	1.50	0.705	0.073	0.231	0.157
66.0	1.65	0.731	0.078	0.234	0.162
68.0	1.85	0.757	0.080	0.224	0.160
70.0	2.00	0.804	0.084	0.226	0.165
74.0	2.40	0.898	0.102	0.253	0.188
78.0	2.80	1.031	0.108	0.267	0.200
82.0	3.25	1.191	0.115	0.275	0.211
86.0	3.60	1.316	0.120	0.286	0.220

TABLE 8

15 DEGREE SHOCK WAVE GENERATOR

x, cm	δ	δ^*	θ	δ_i^*	θ_i
20.0	2.70	1.393	0.096	0.354	0.254
25.5	2.70	1.374	0.108	0.369	0.266
28.0	2.80	1.332	0.123	0.444	0.271
30.5	2.85	2.250	0.098	0.913	0.412
33.0	2.20	2.018	0.026	1.399	0.158
35.5	1.70	0.952	0.104	0.544	0.245
38.0	1.30	0.304	0.126	0.312	0.182
40.0	1.32	0.438	0.088	0.264	0.157
42.5	1.45	0.251	0.101	0.247	0.151
45.0	1.60	0.485	0.080	0.203	0.138
50.0	2.00	0.577	0.083	0.175	0.130
55.0	2.40	0.660	0.095	0.181	0.137
60.0	2.70	0.781	0.106	0.207	0.160
65.0	2.95	0.925	0.101	0.207	0.160
70.0	3.10	0.897	0.098	0.191	0.148
75.0	3.25	0.861	0.099	0.190	0.146
85.0	3.40	1.020	0.106	0.224	0.171
95.0	3.50	0.919	0.117	0.235	0.178

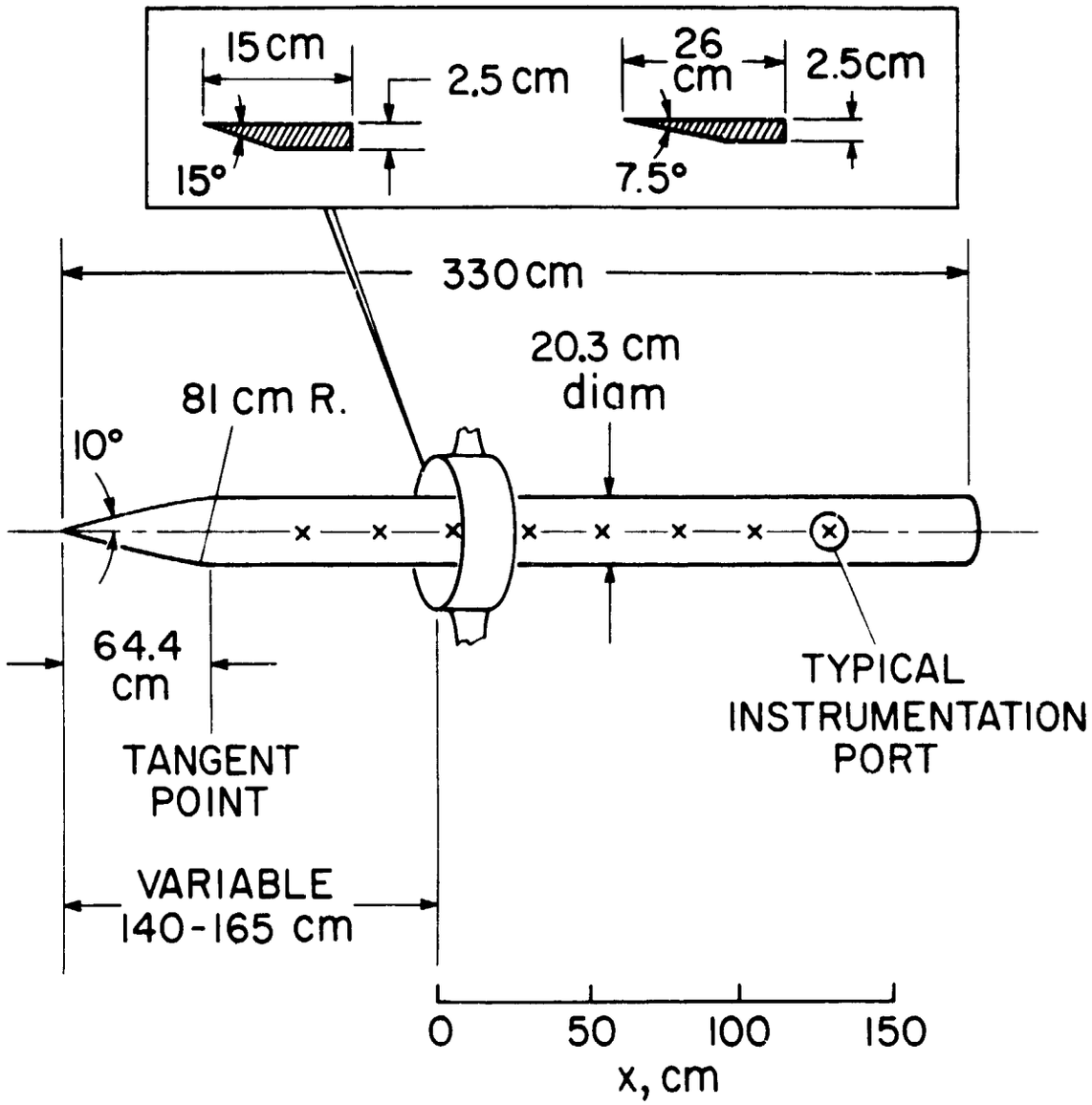


Figure 1.– Test model.

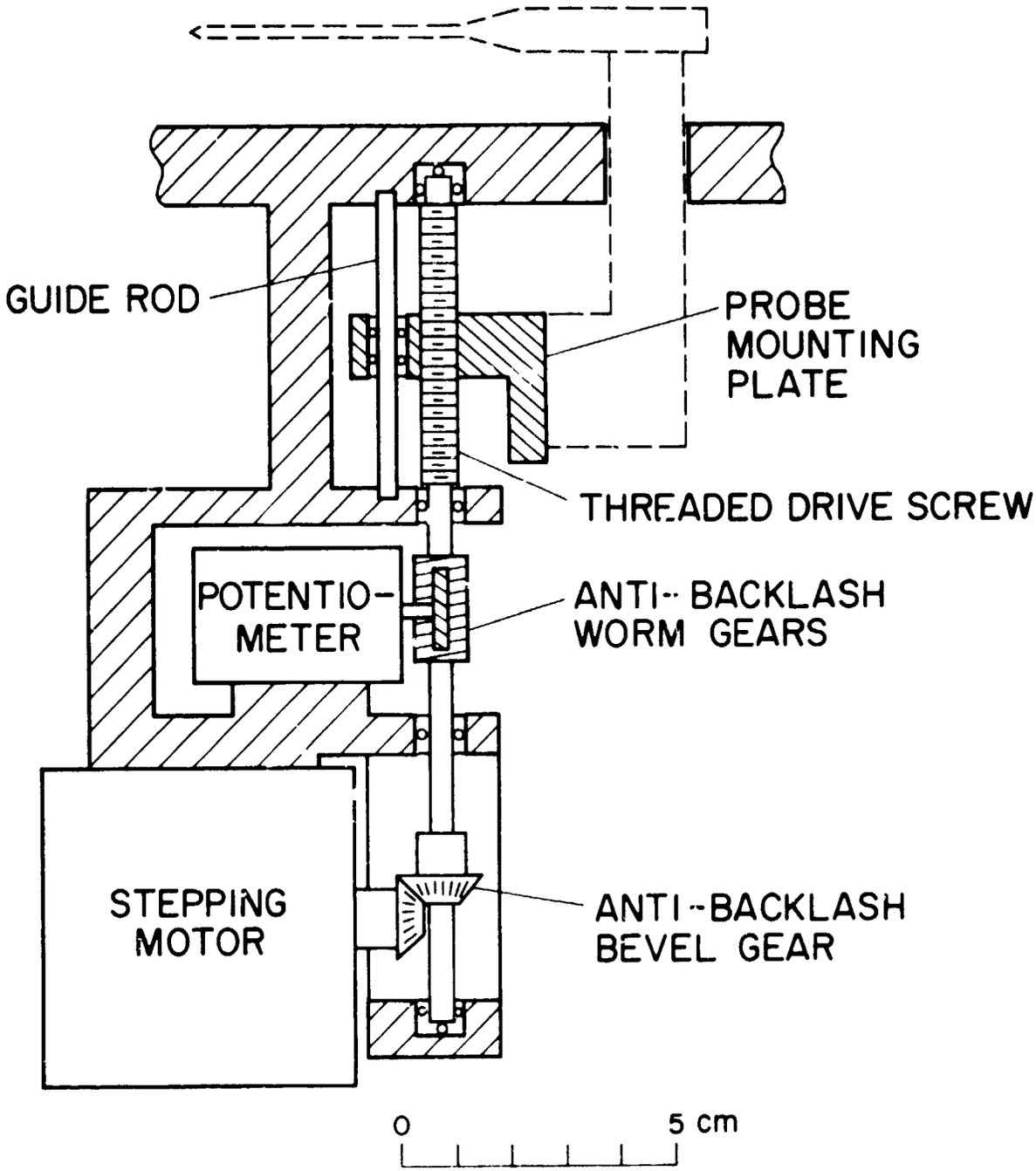


Figure 2.– Survey mechanism.

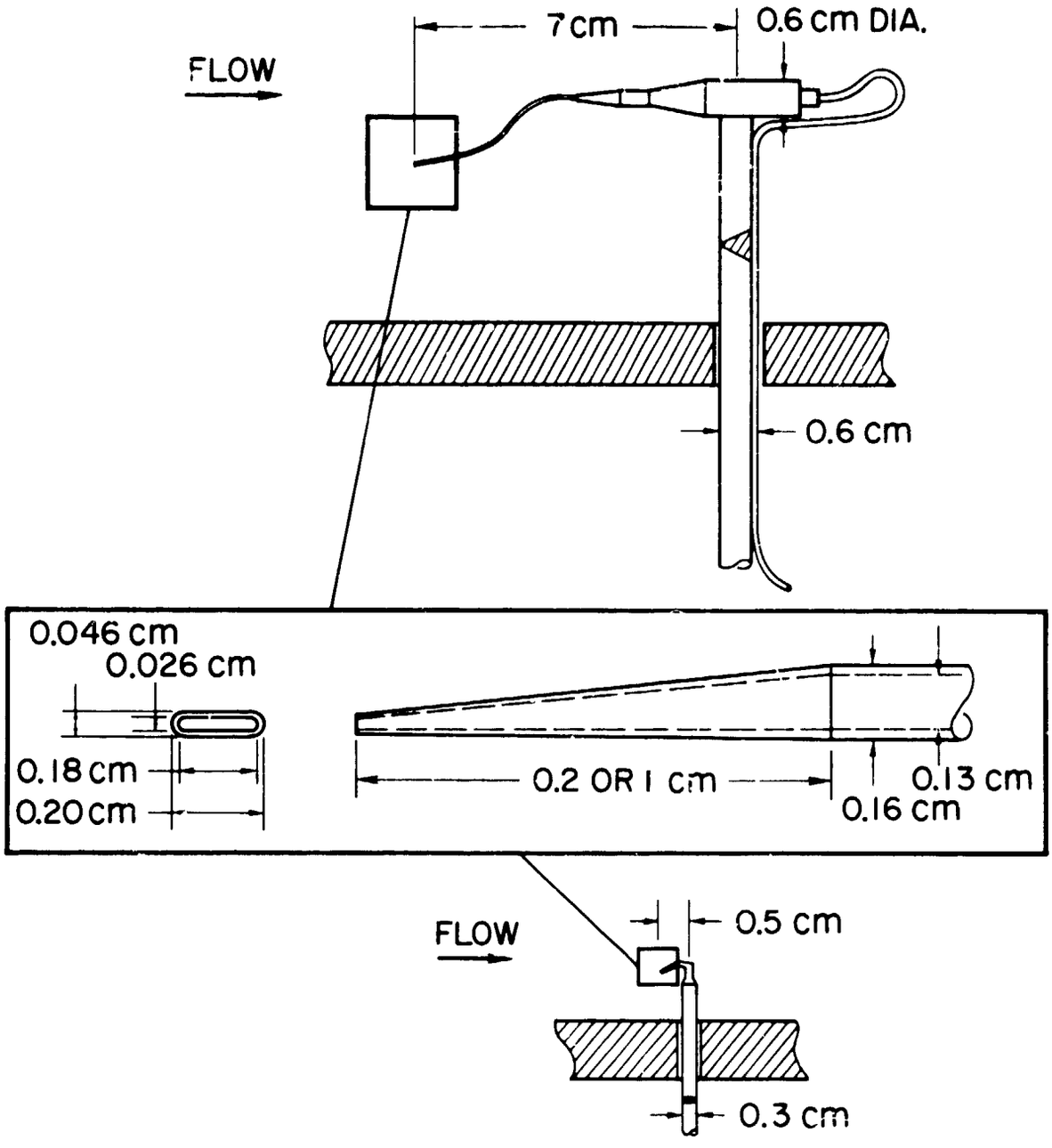


Figure 3.– Pitot pressure probes.

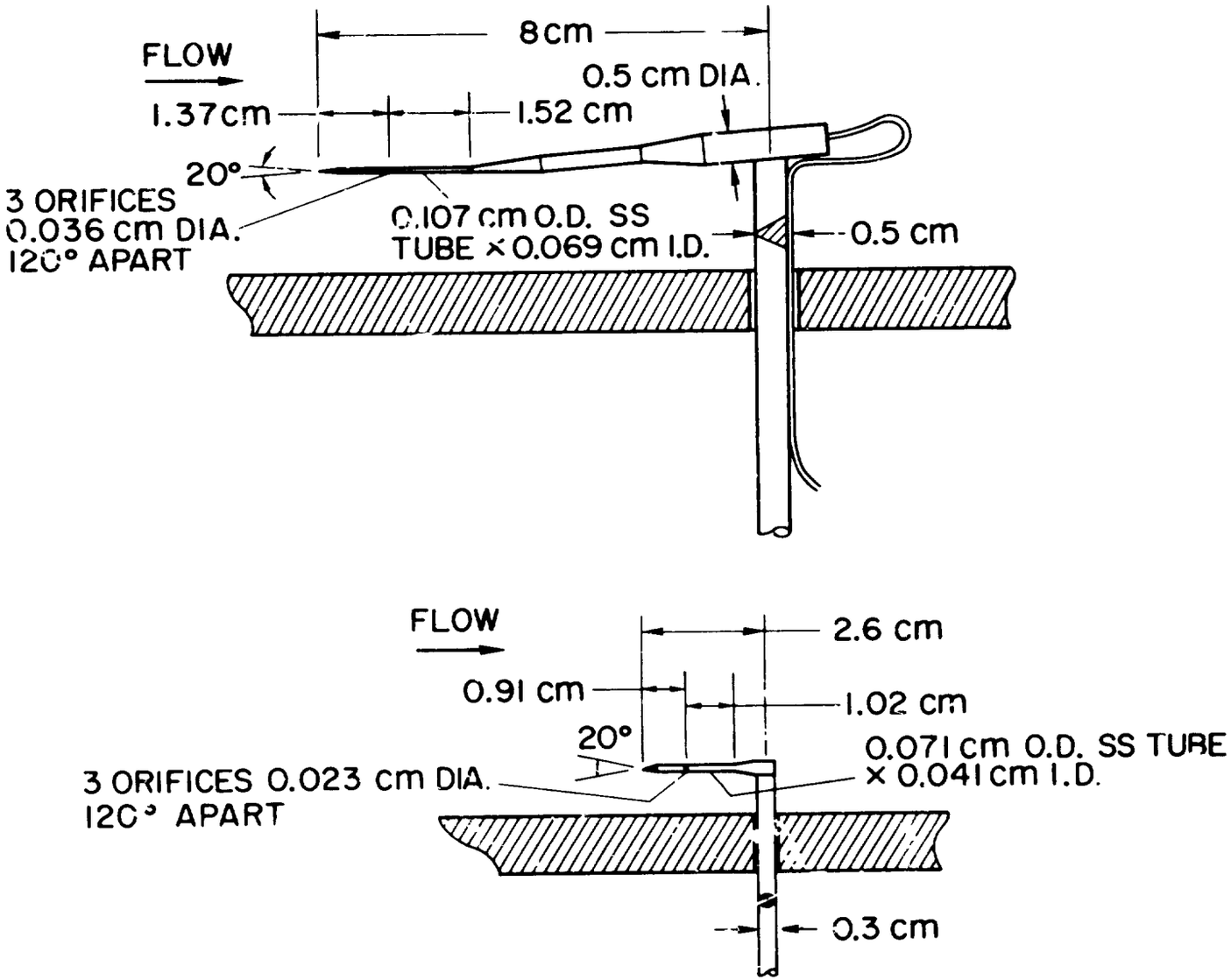


Figure 4.— Static pressure probes.

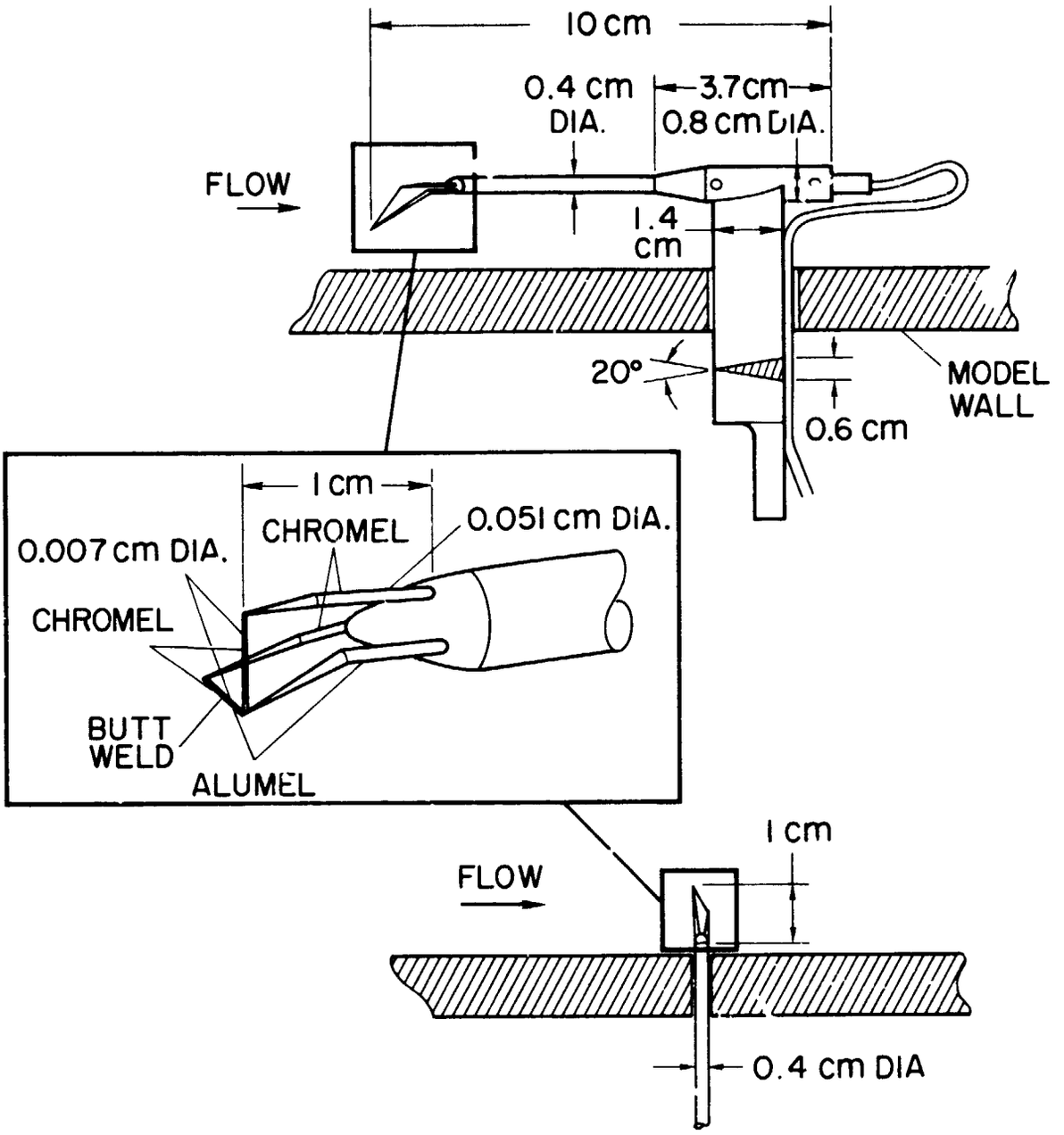


Figure 5.— Total temperature probes.

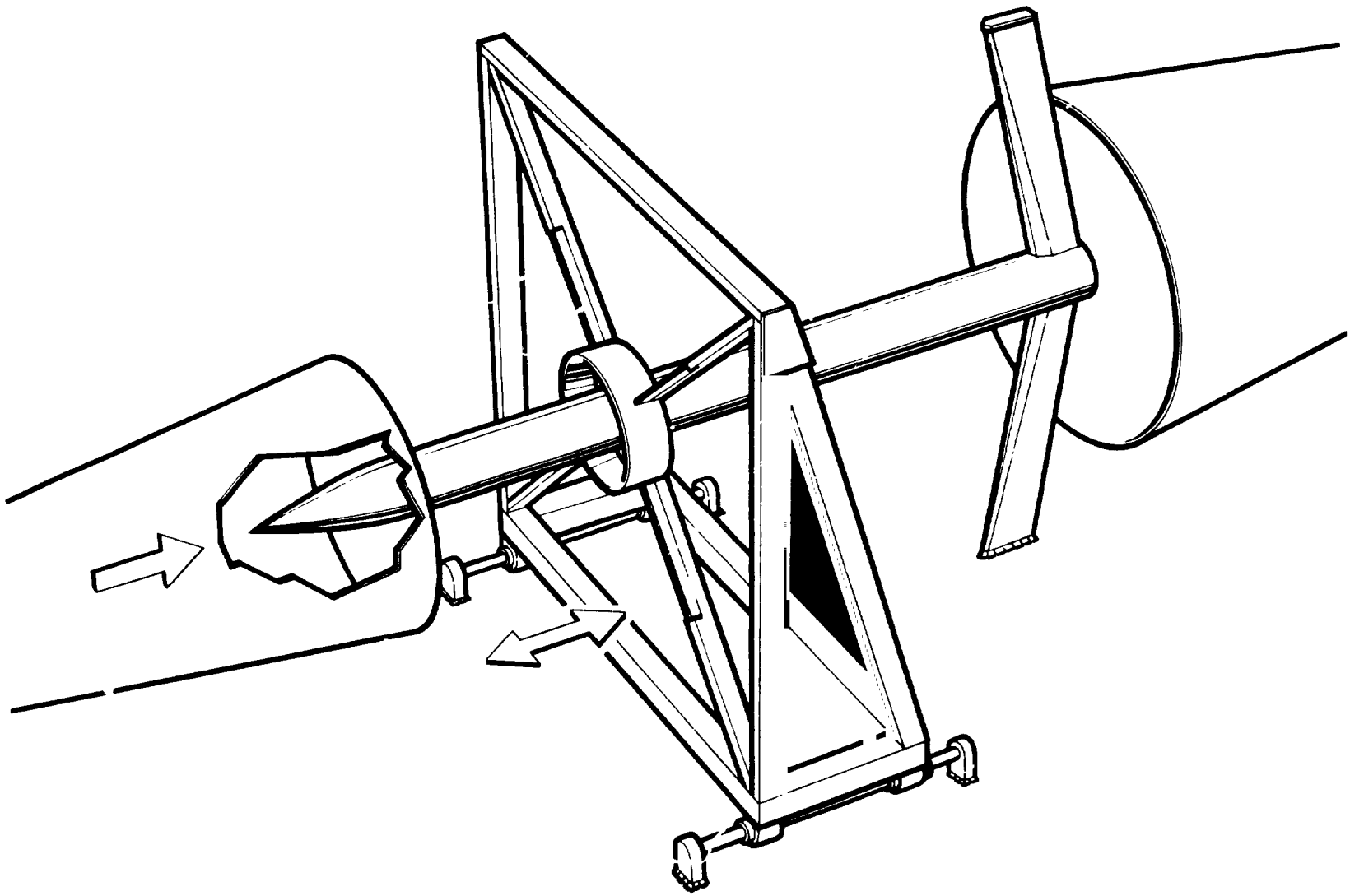


Figure 6.— Shock-wave generator traverse mechanism.

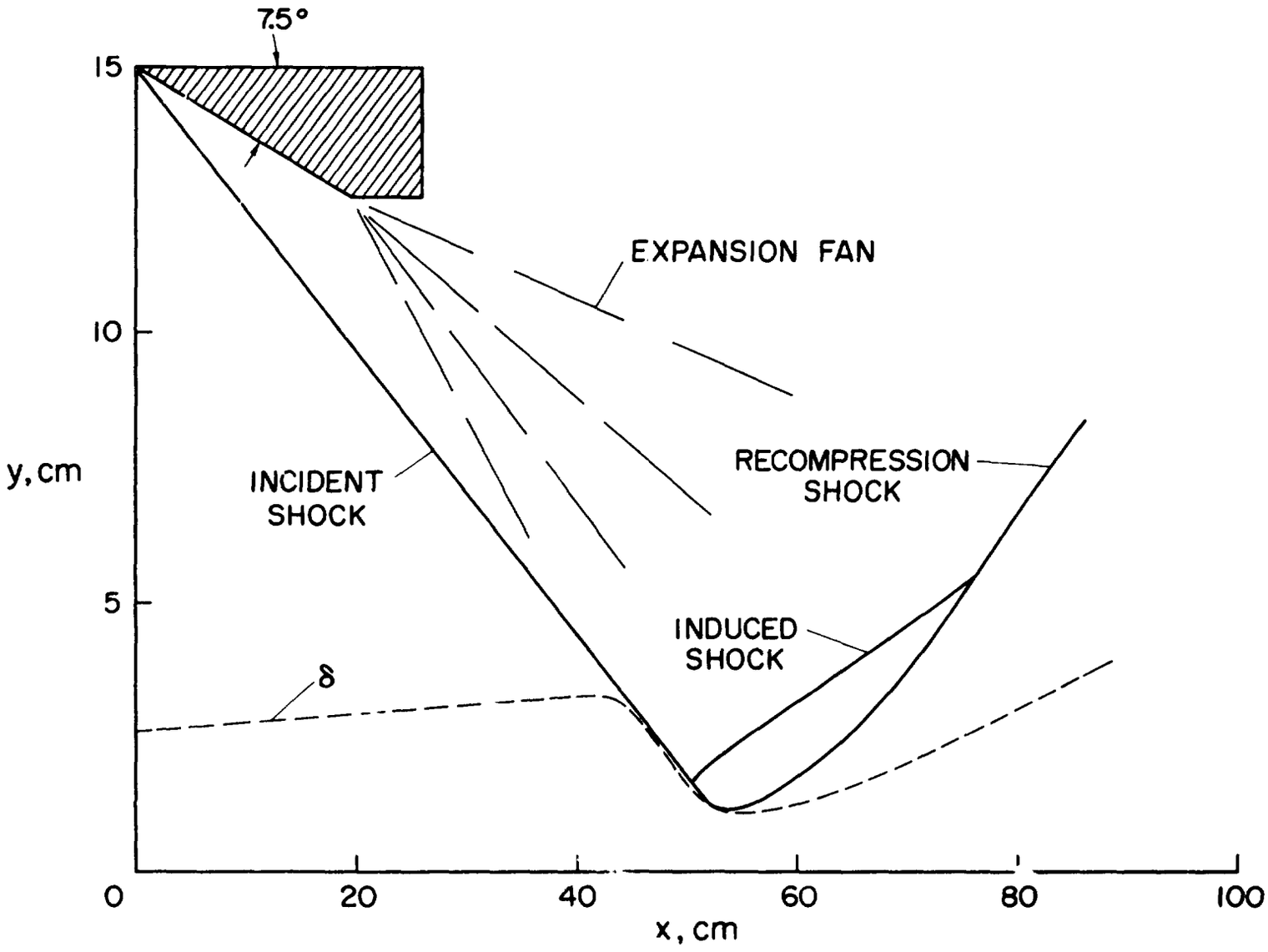


Figure 7.— Flow field schematic, $\alpha = 7.5°$, $M_\infty = 6.86$, $T_w/T_{o_\infty} = 0.43$.

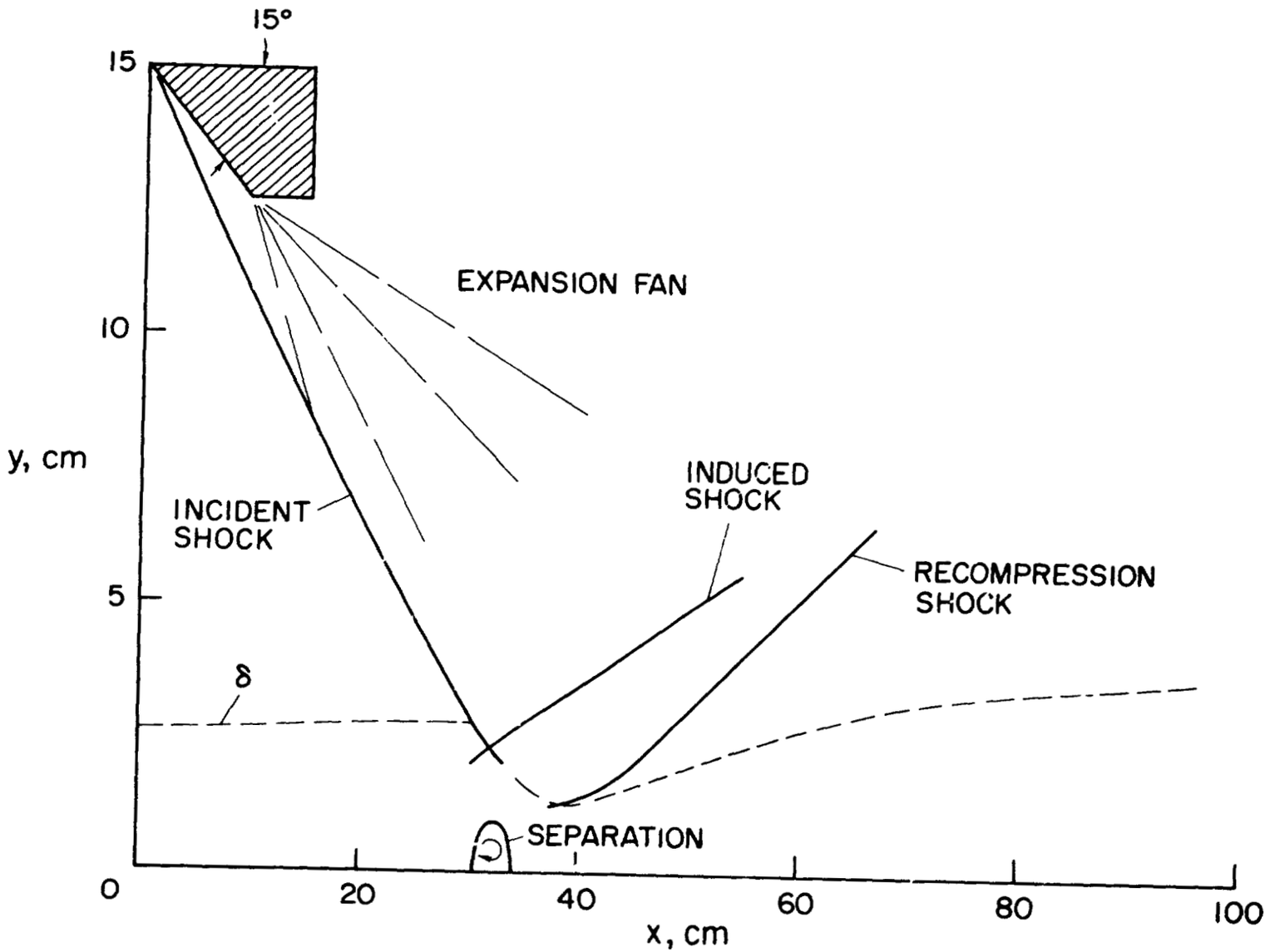


Figure 8.—Flow field schematic, $\alpha = 15°$, $M_\infty = 6.86$, $T_w/T_{o_\infty} = 0.43$.

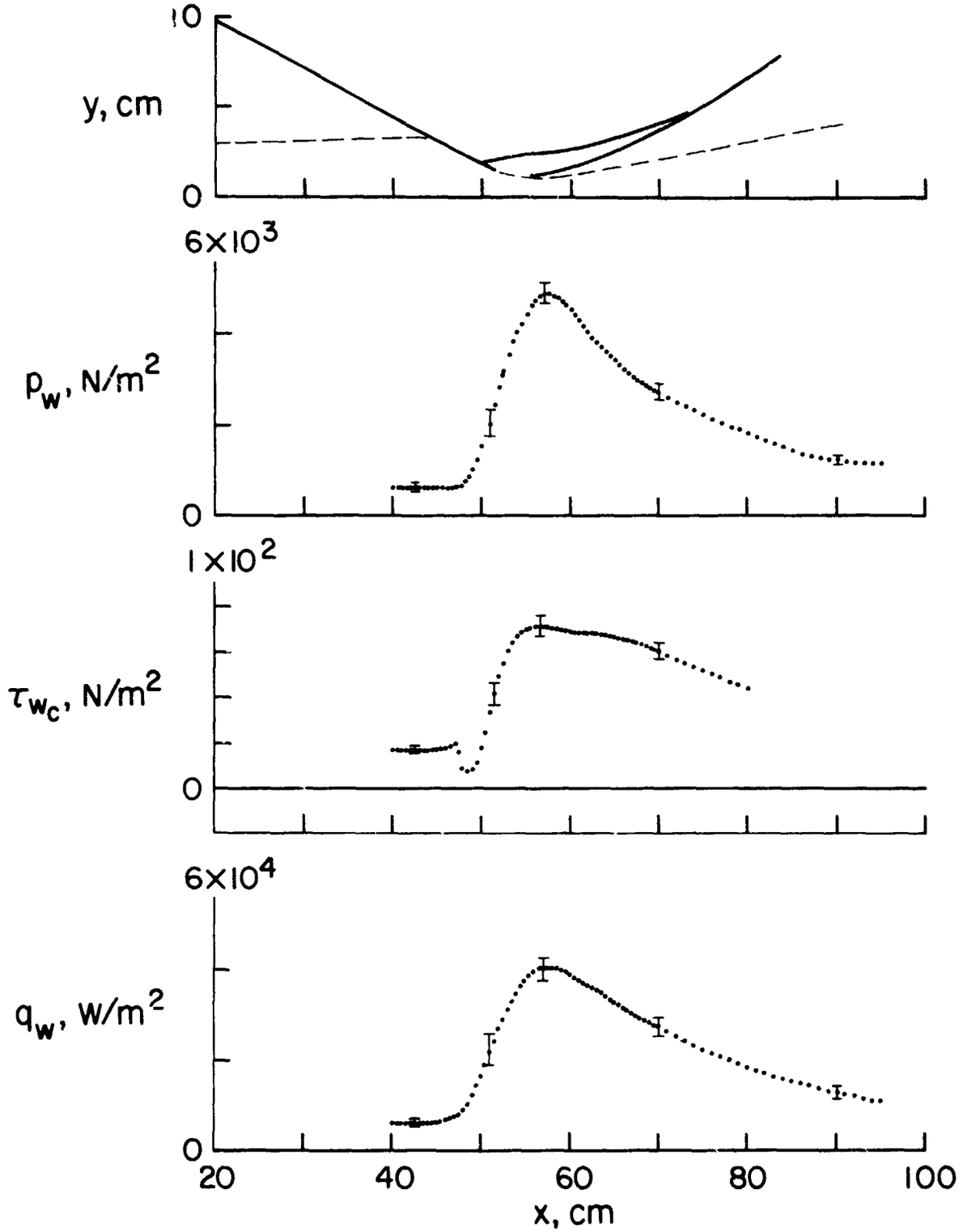


Figure 9.—Measurements along the model surface, $\alpha = 7.5°$, $M_\infty = 6.71$, $T_w/T_{o_\infty} = 0.43$.

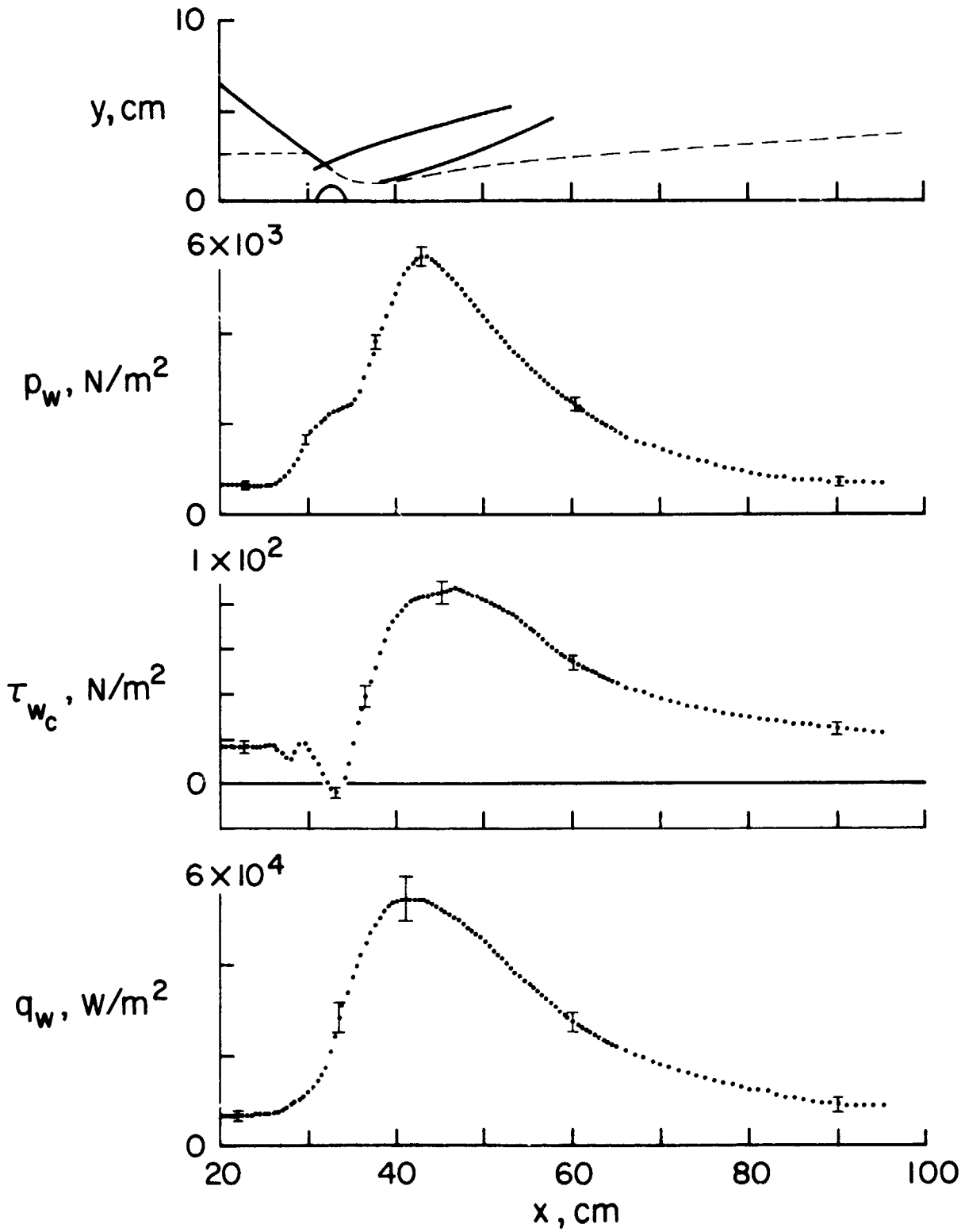
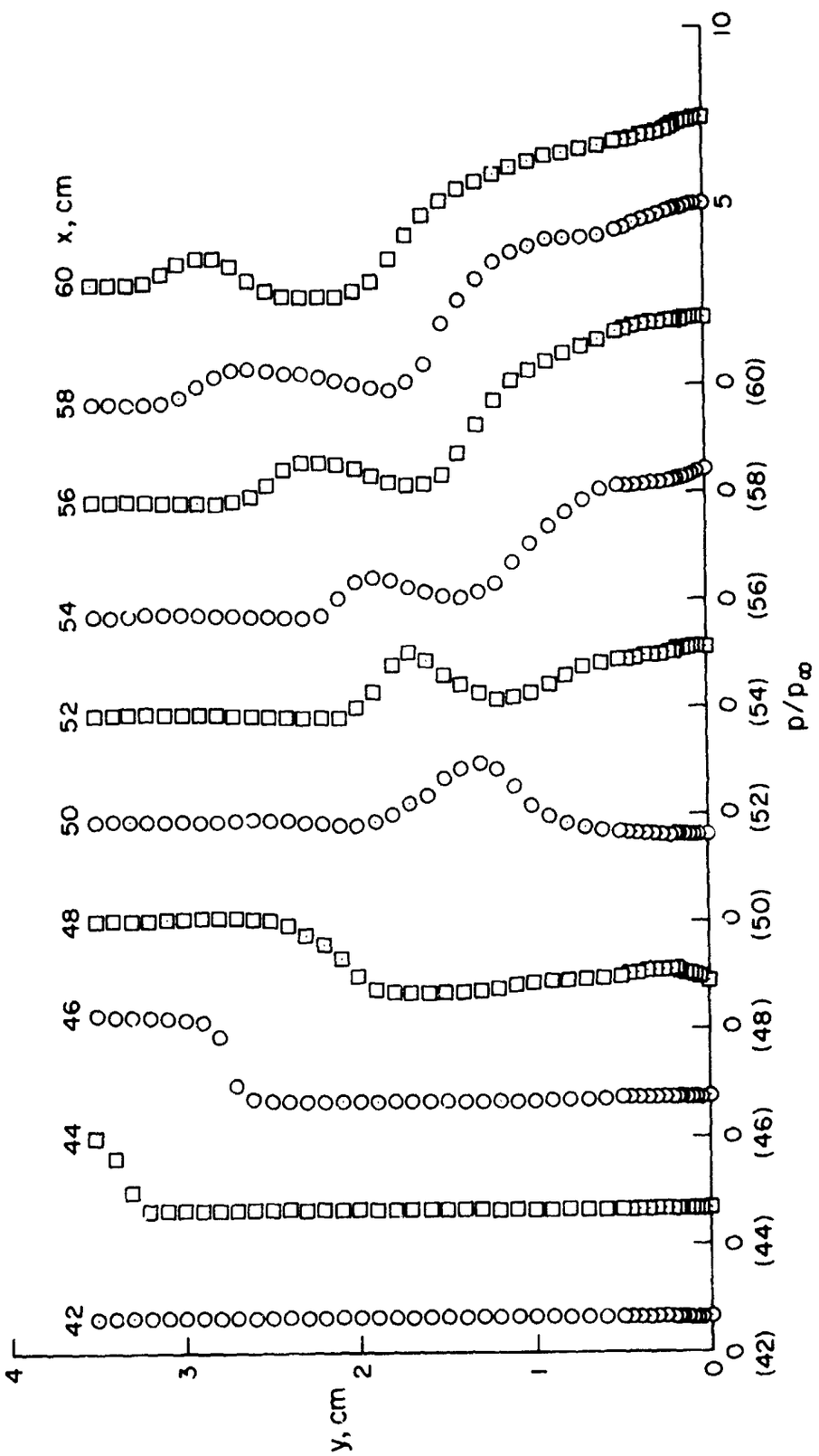
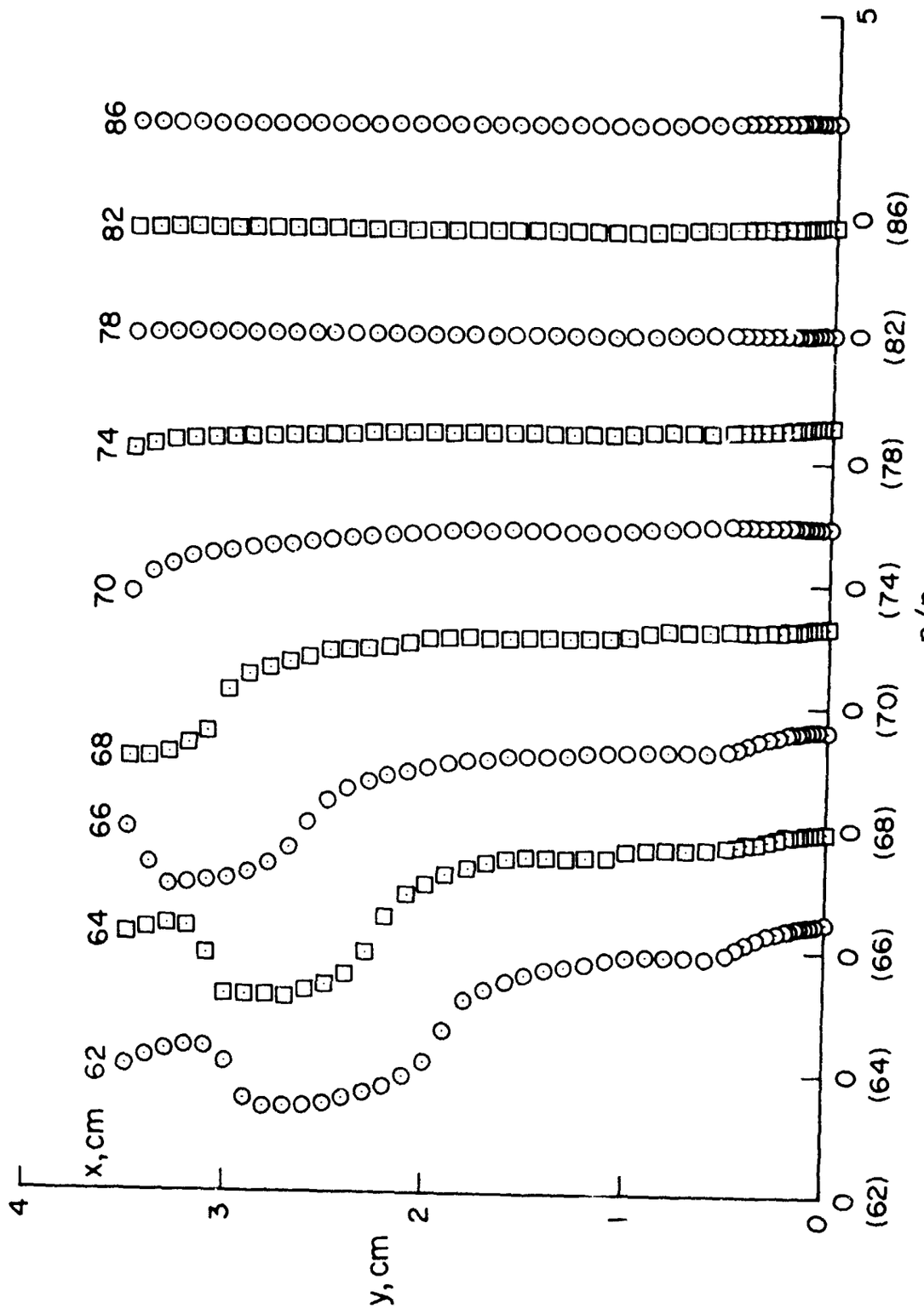


Figure 10.— Measurements along the model surface, $\alpha = 15°$, $M_\infty = 6.86$, $T_w/T_{o_\infty} = 0.43$.



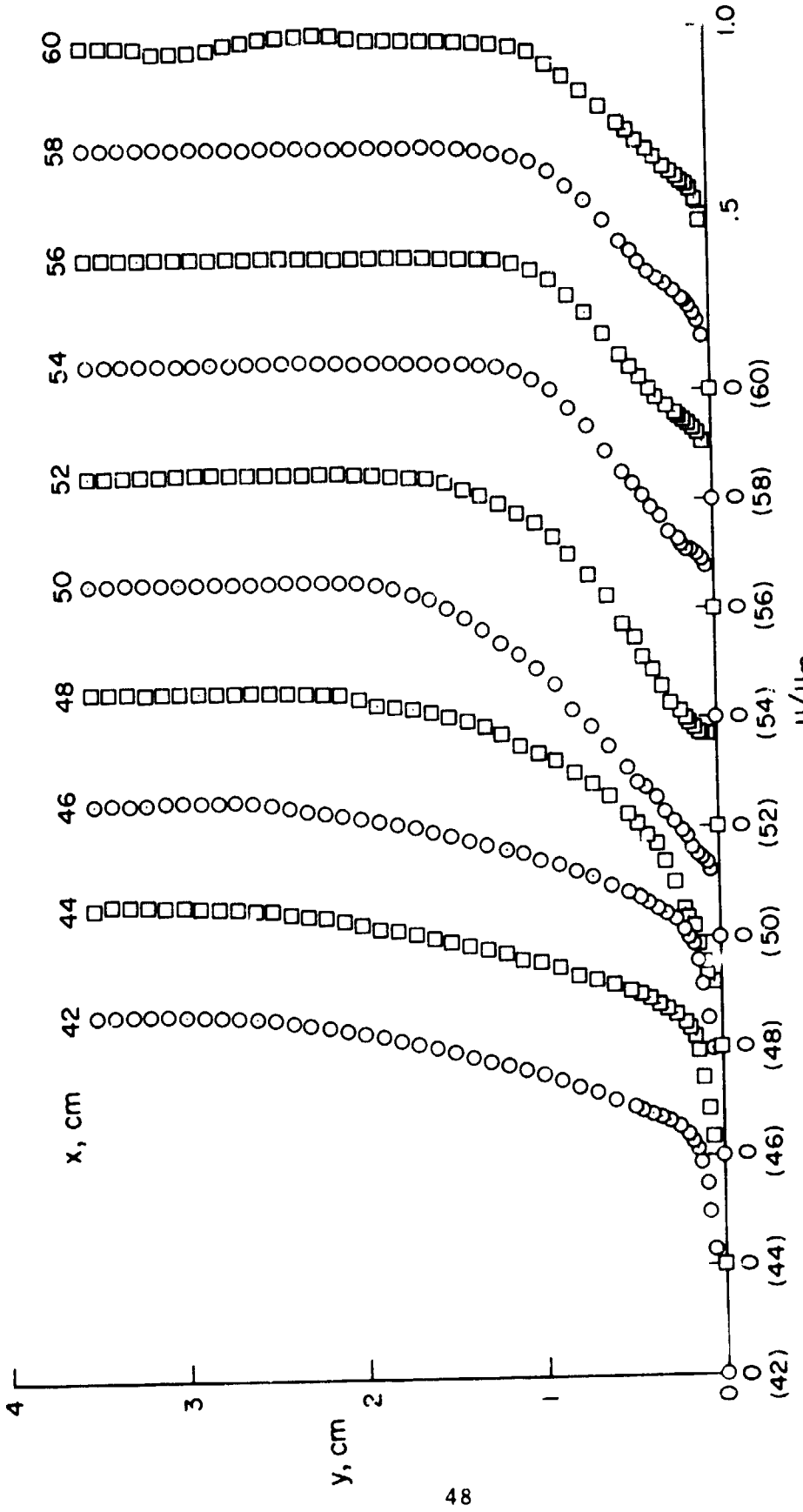
(a) Static pressure.

Figure 11.– Flow field profiles, $\alpha = 7.5°$, $M_\infty = 6.71$, $T_w/T_{o_\infty} = 0.43$.



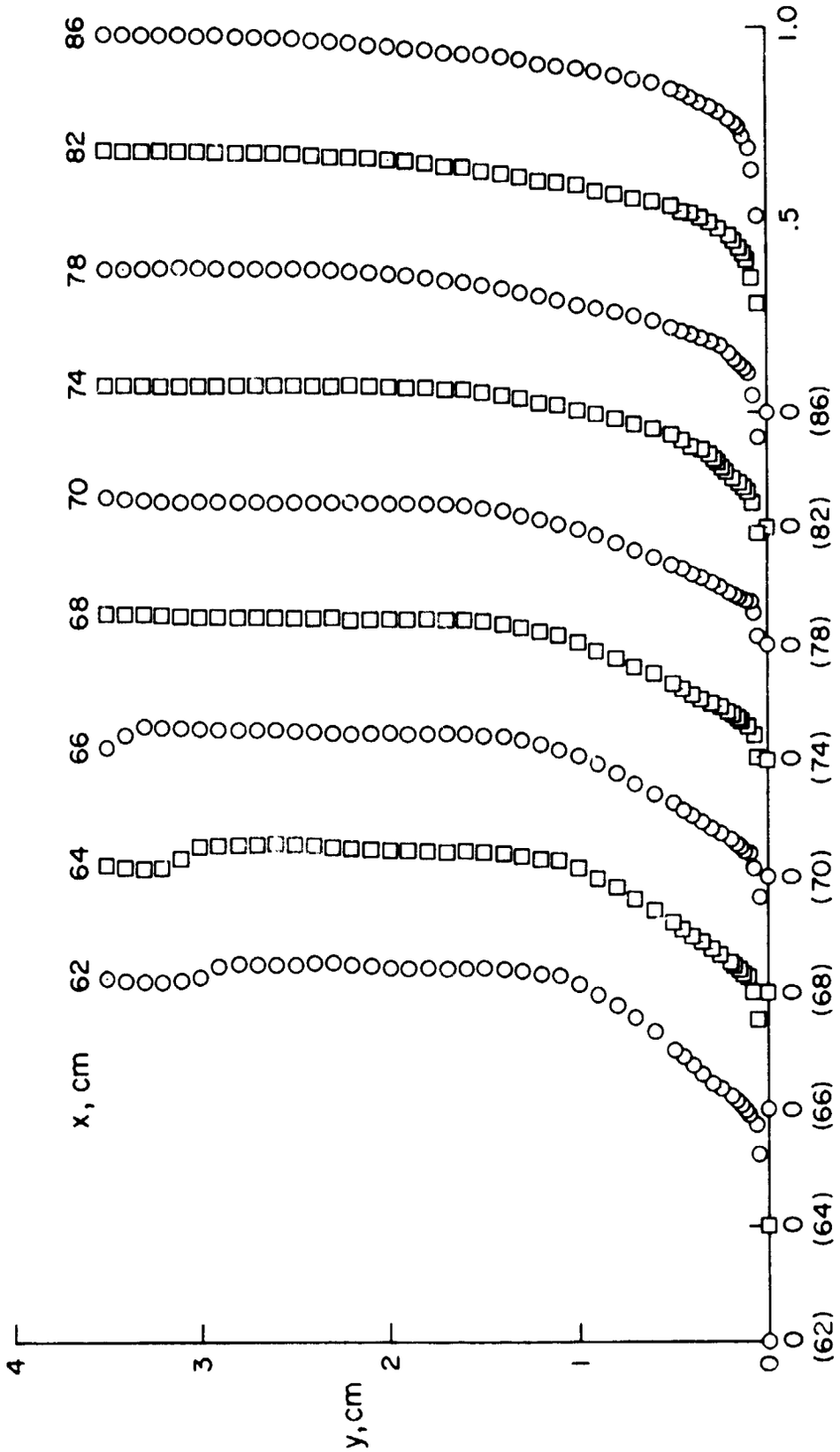
(a) Static pressure - Concluded.

Figure 11.- Continued.



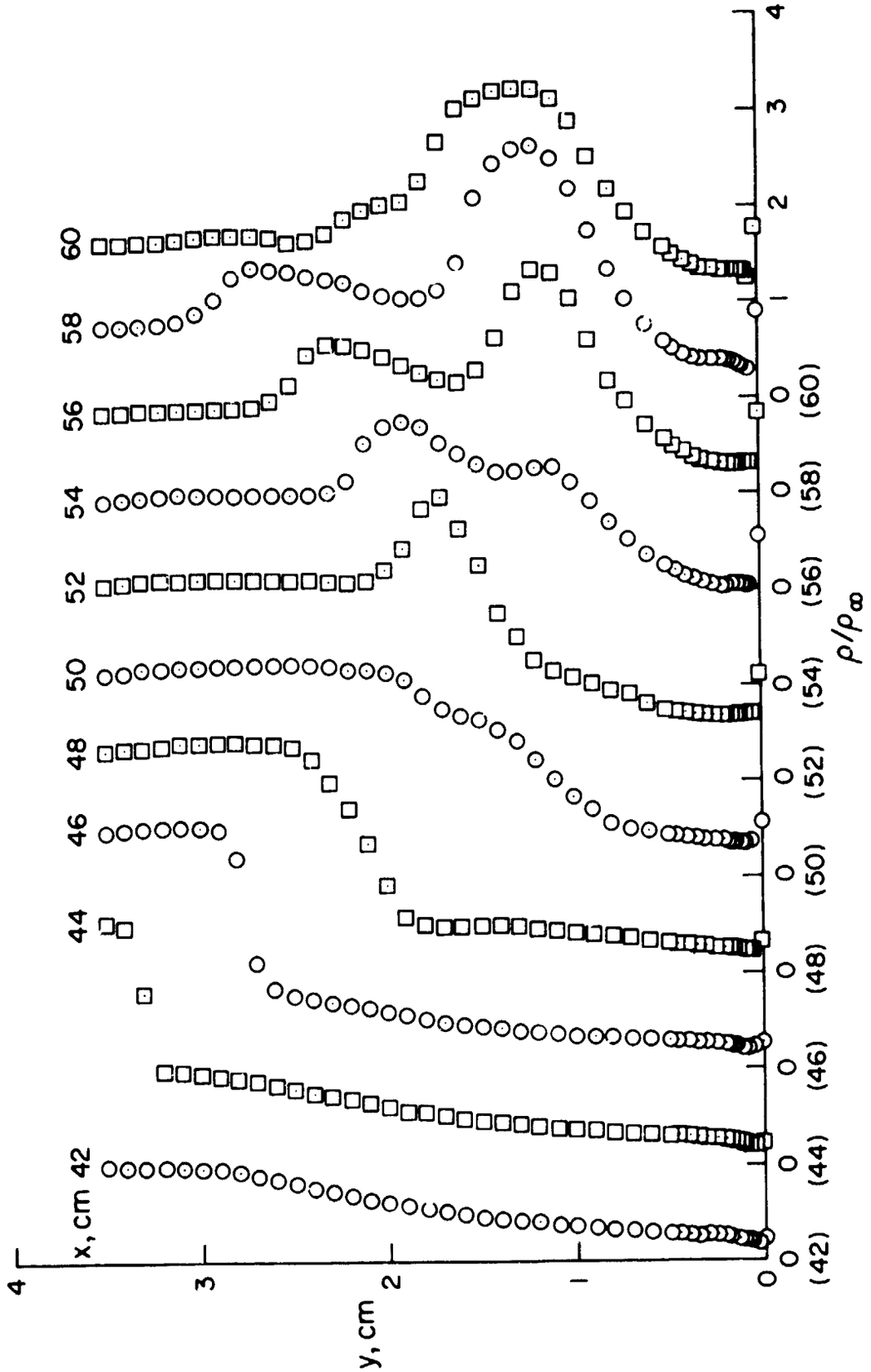
(b) Velocity.

Figure 11.- Continued.



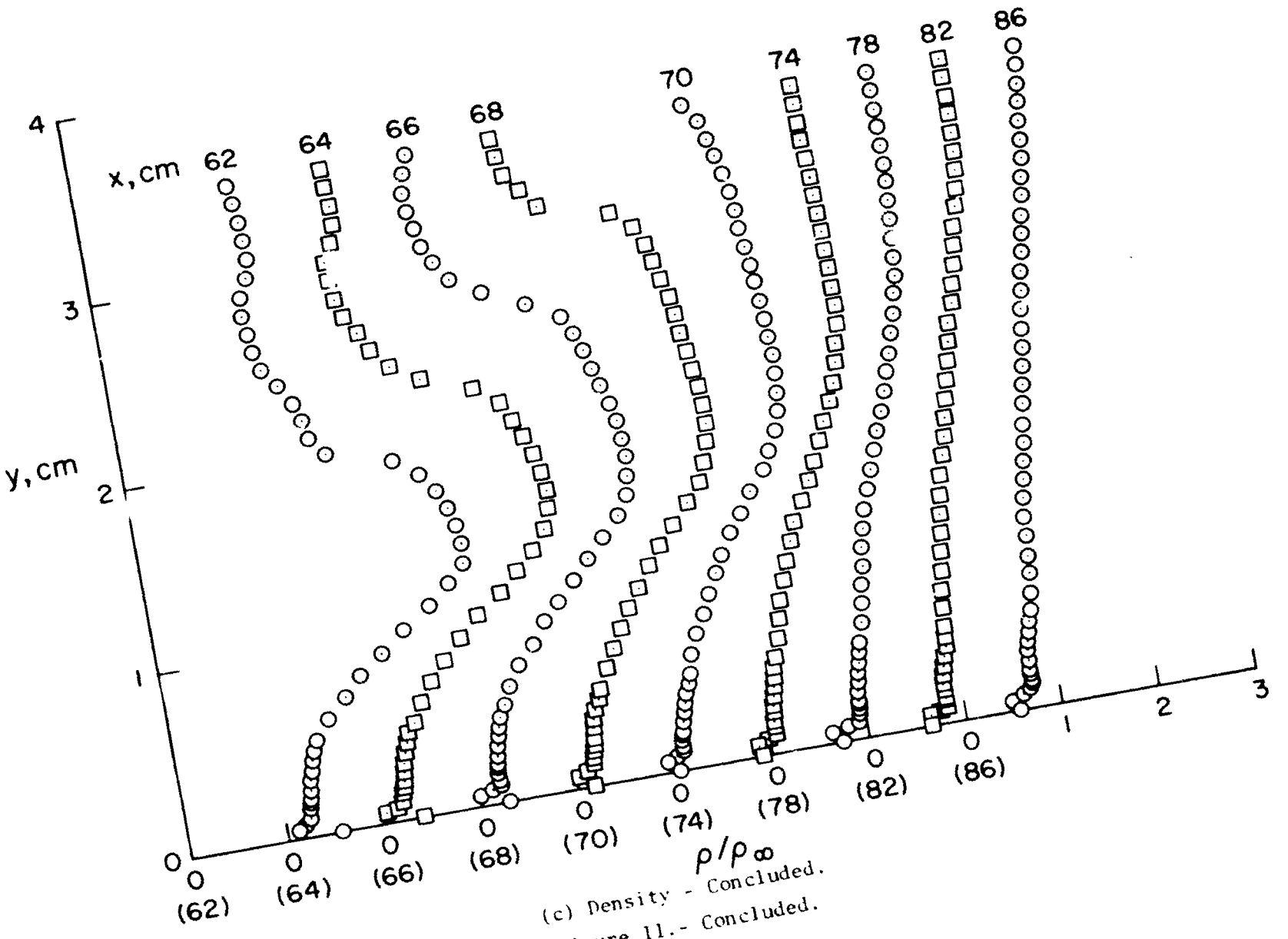
(b) Velocity - Concluded.

Figure 11.- Continued.



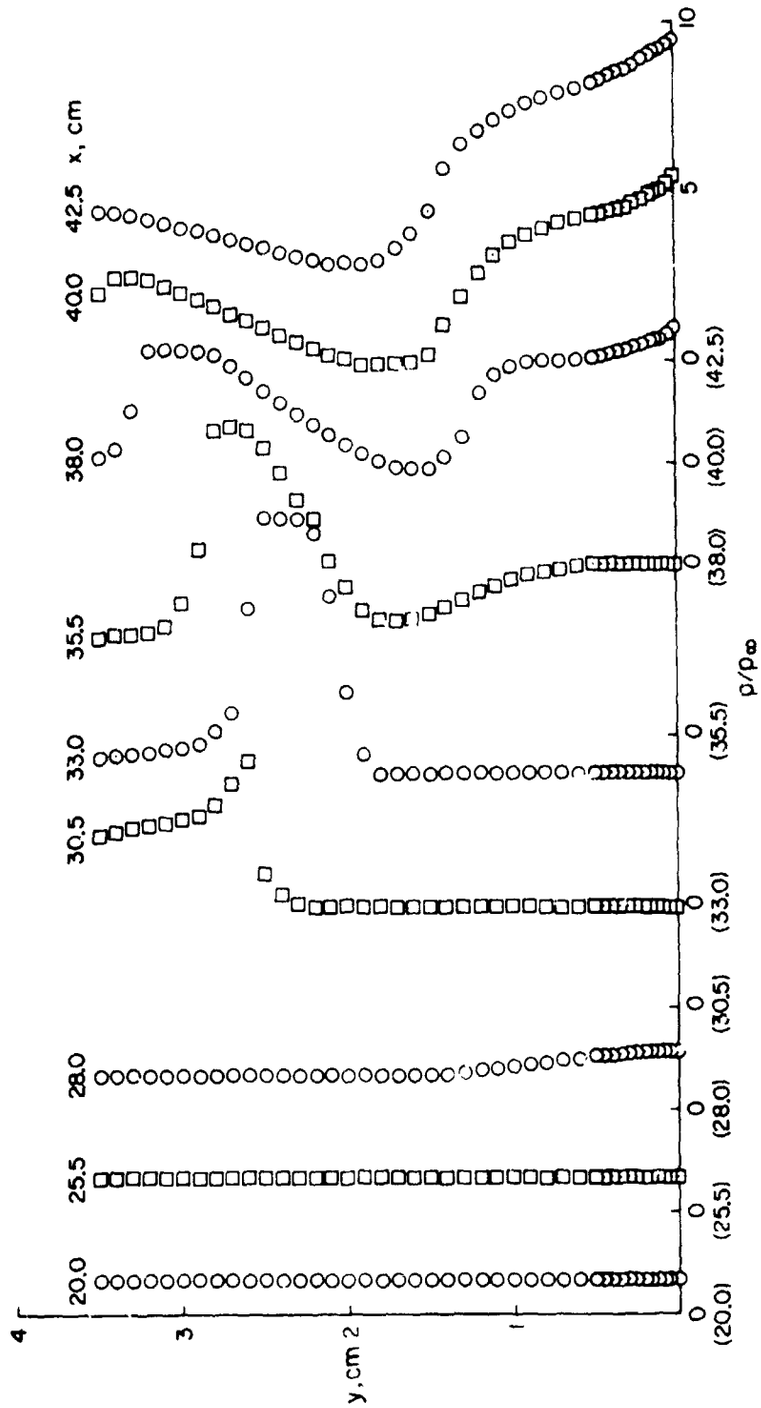
(c) Density.

Figure 11.- Continued.



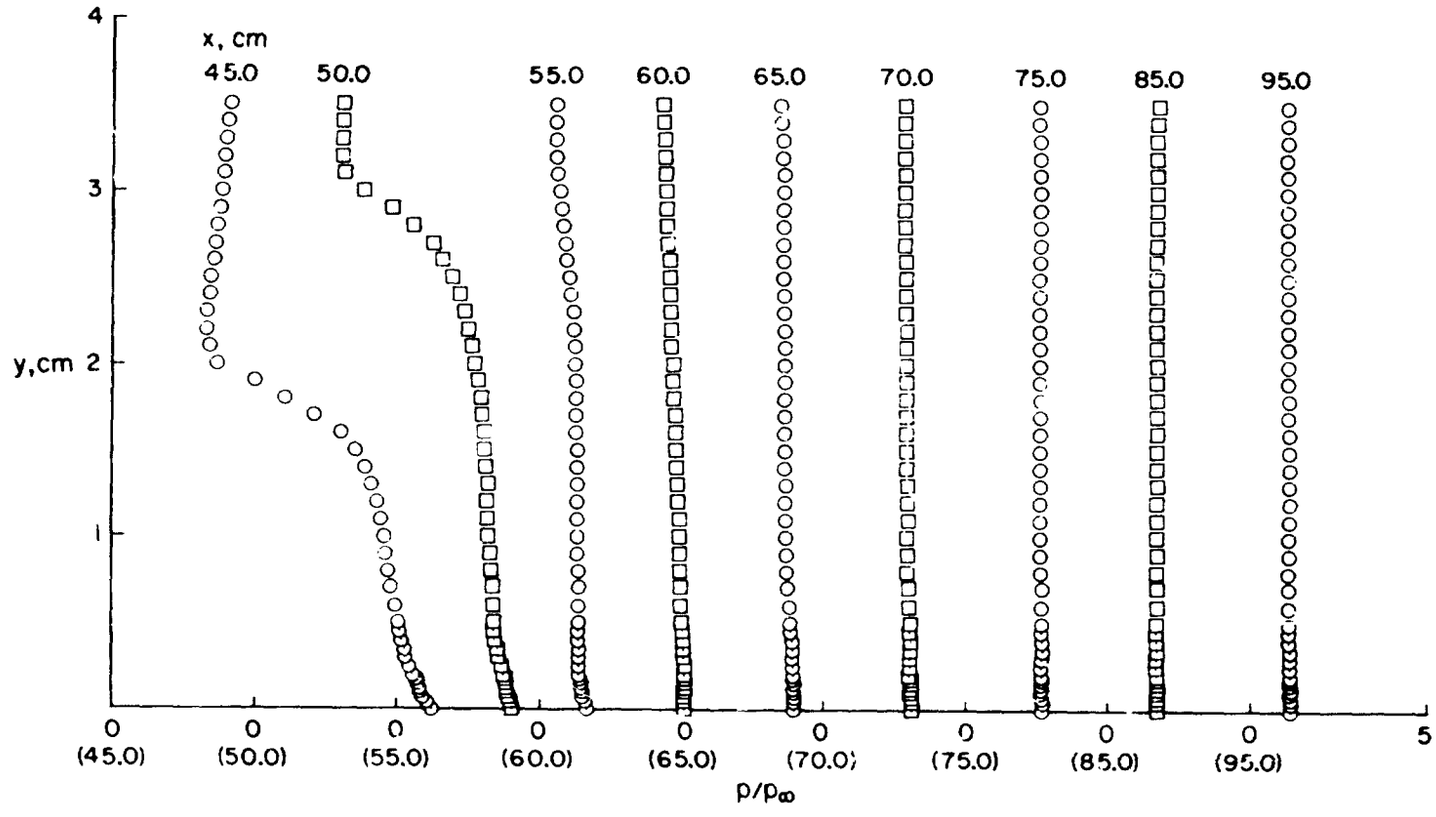
(c) Density - Concluded.

Figure 11.- Concluded.



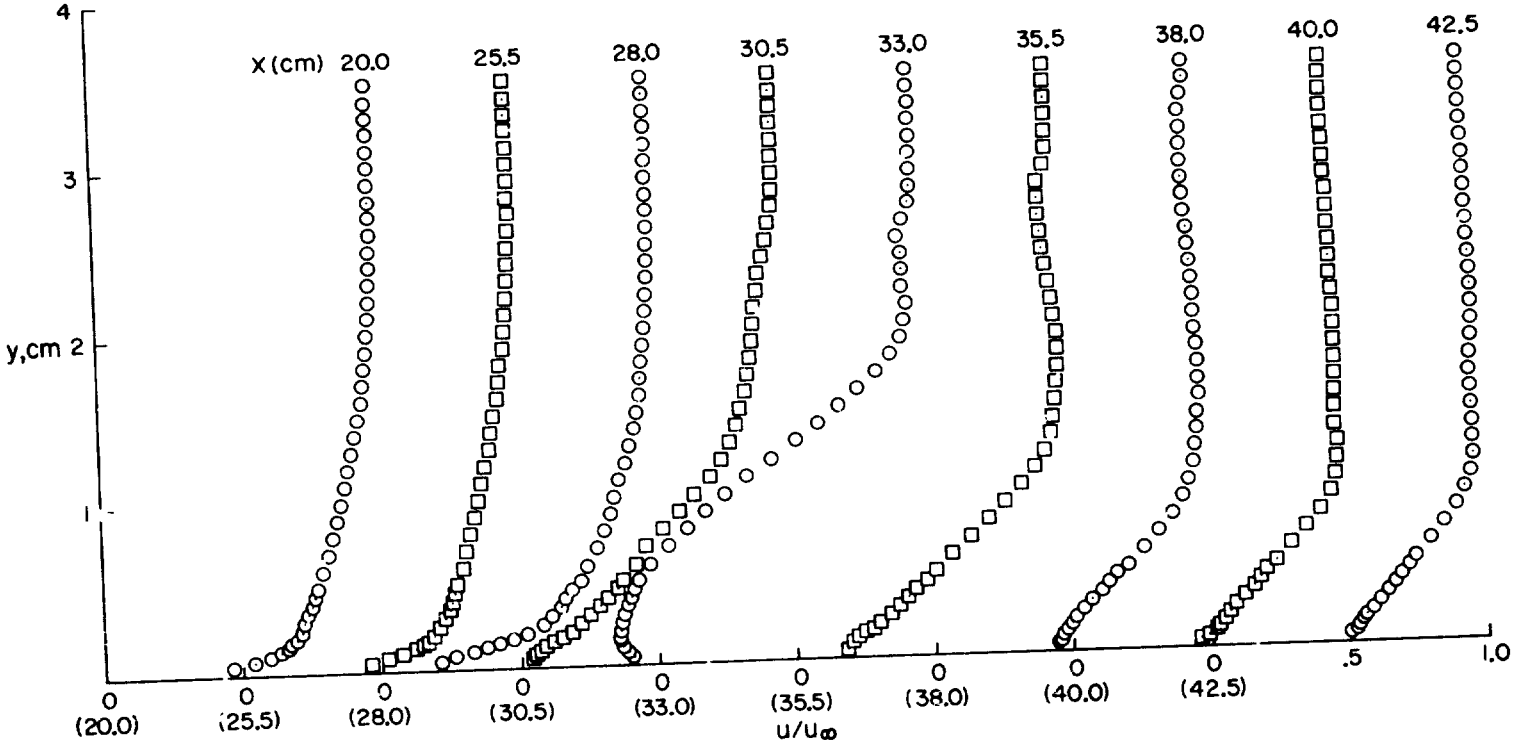
(a) Static pressure.

Figure 12.- Flow field profiles, $\alpha = 15°$, $M_\infty = 6.86$, $T_w/T_{o_\infty} = 0.43$.



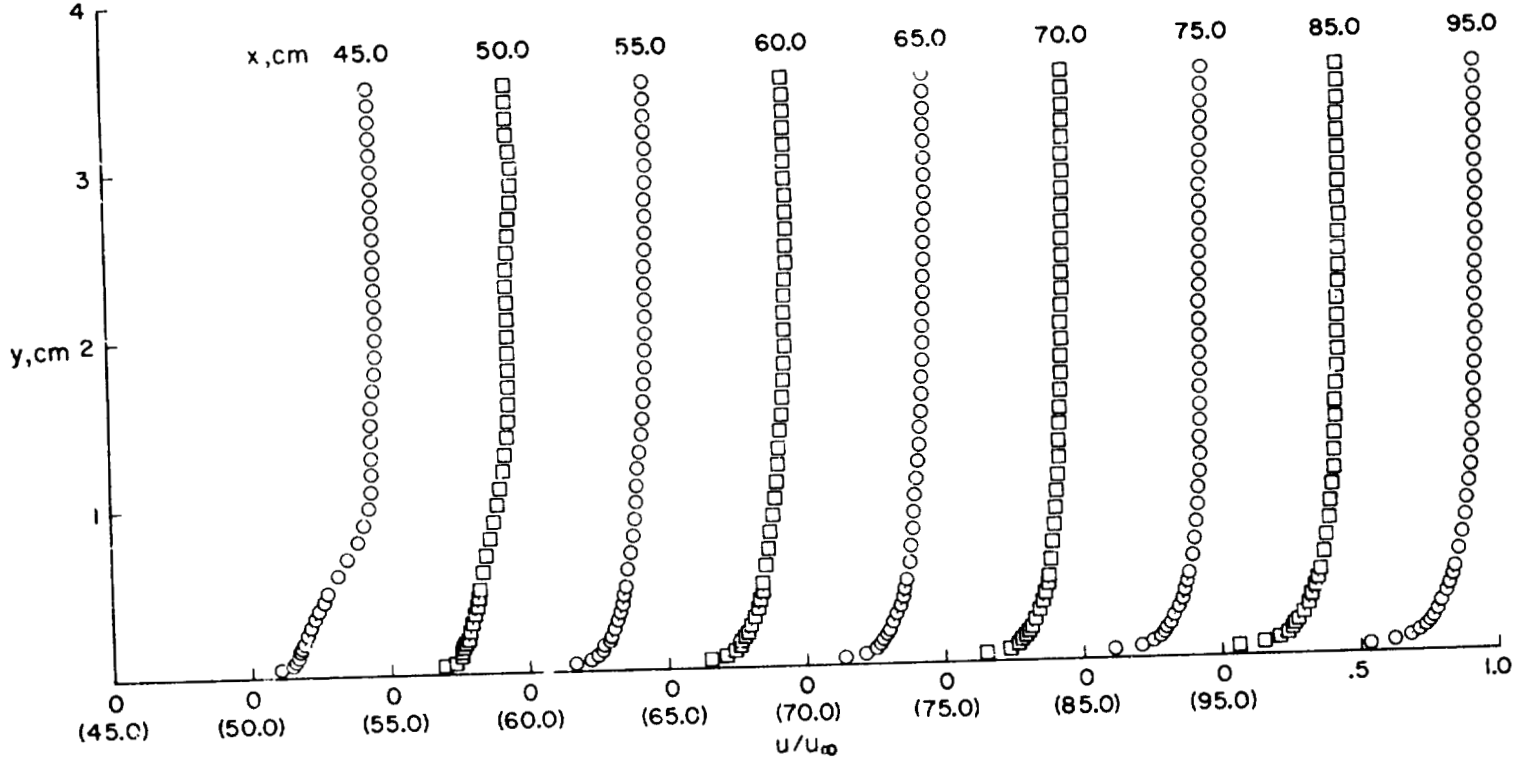
(a) Static pressure - Concluded.

Figure 12.- Continued.



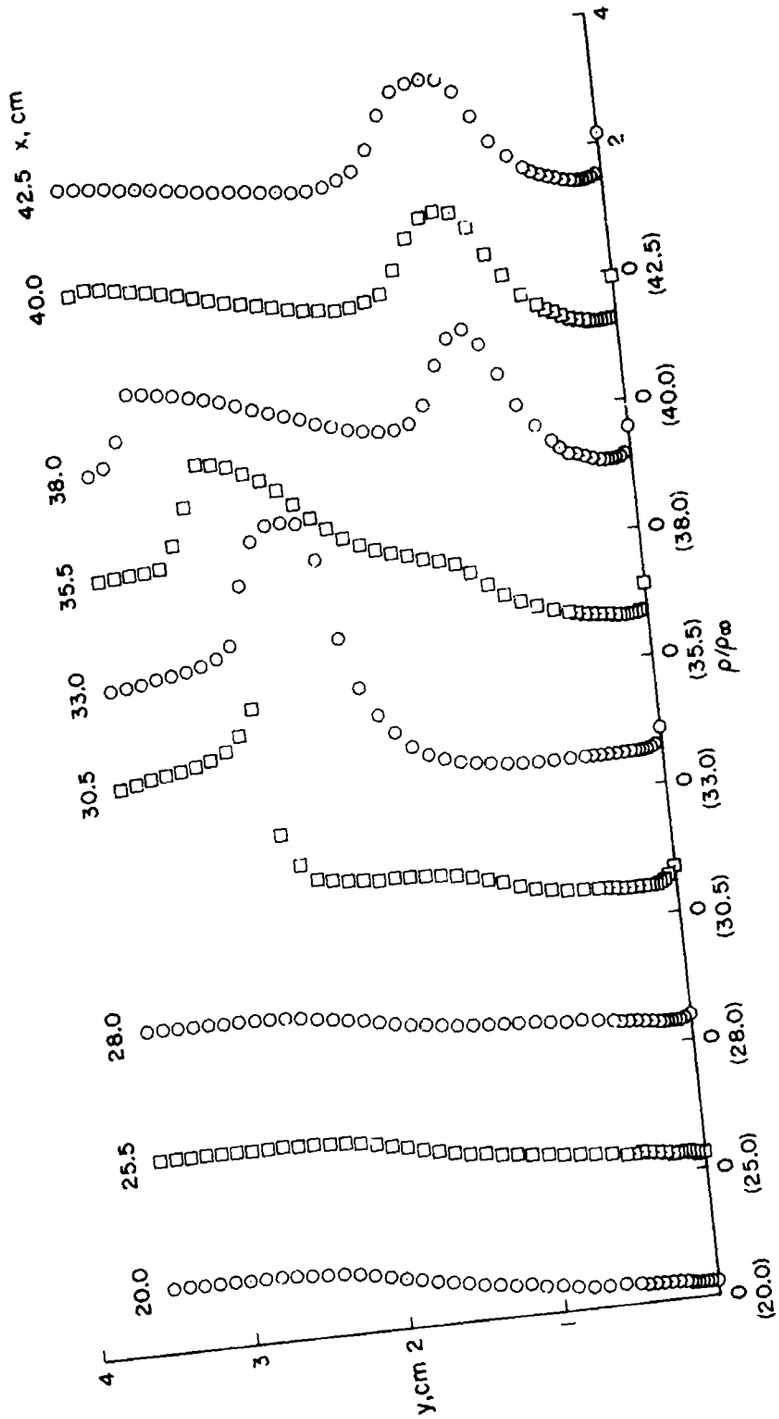
(b) Velocity.

Figure 12.- Continued.



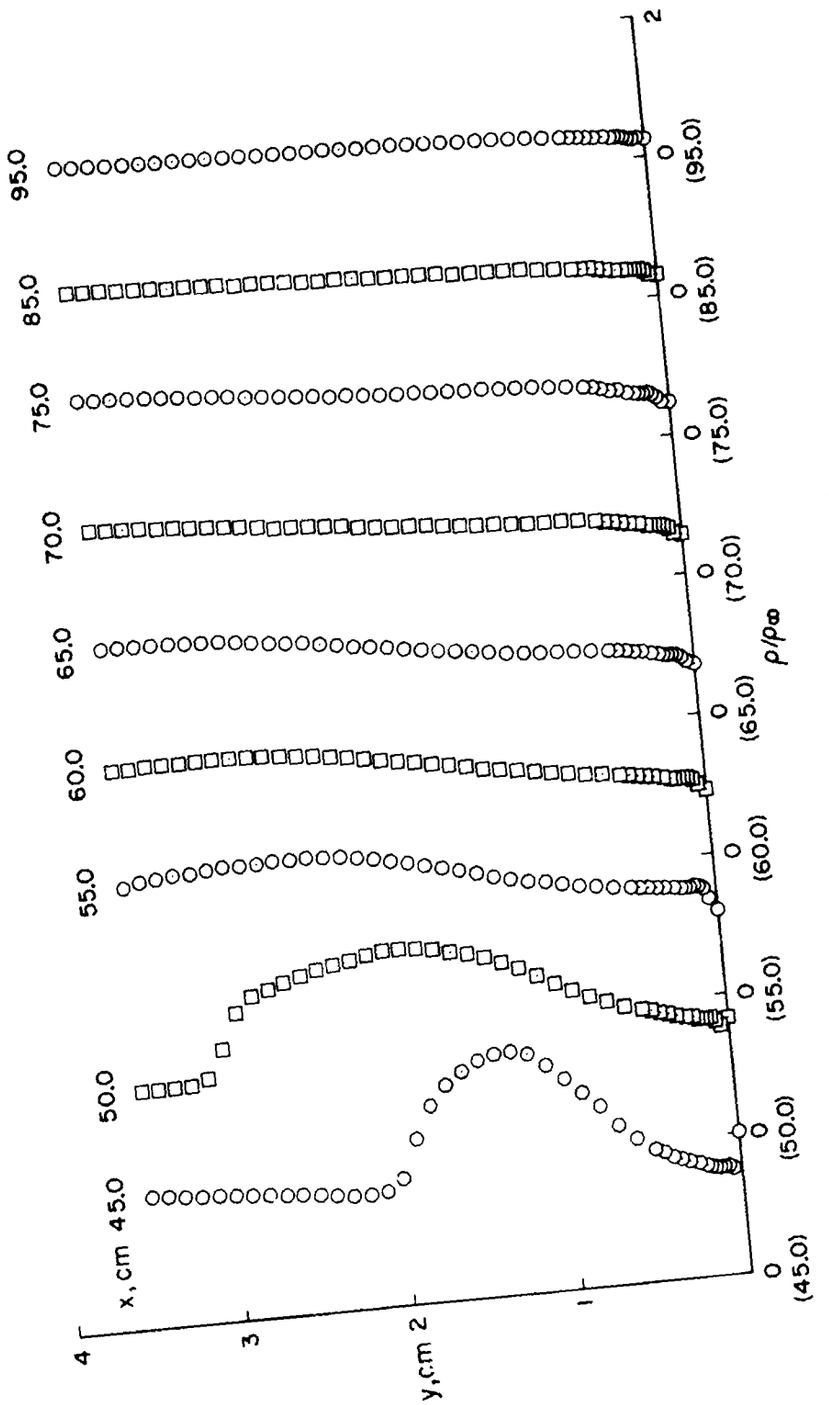
(b) Velocity - Concluded.

Figure 12.- Continued.



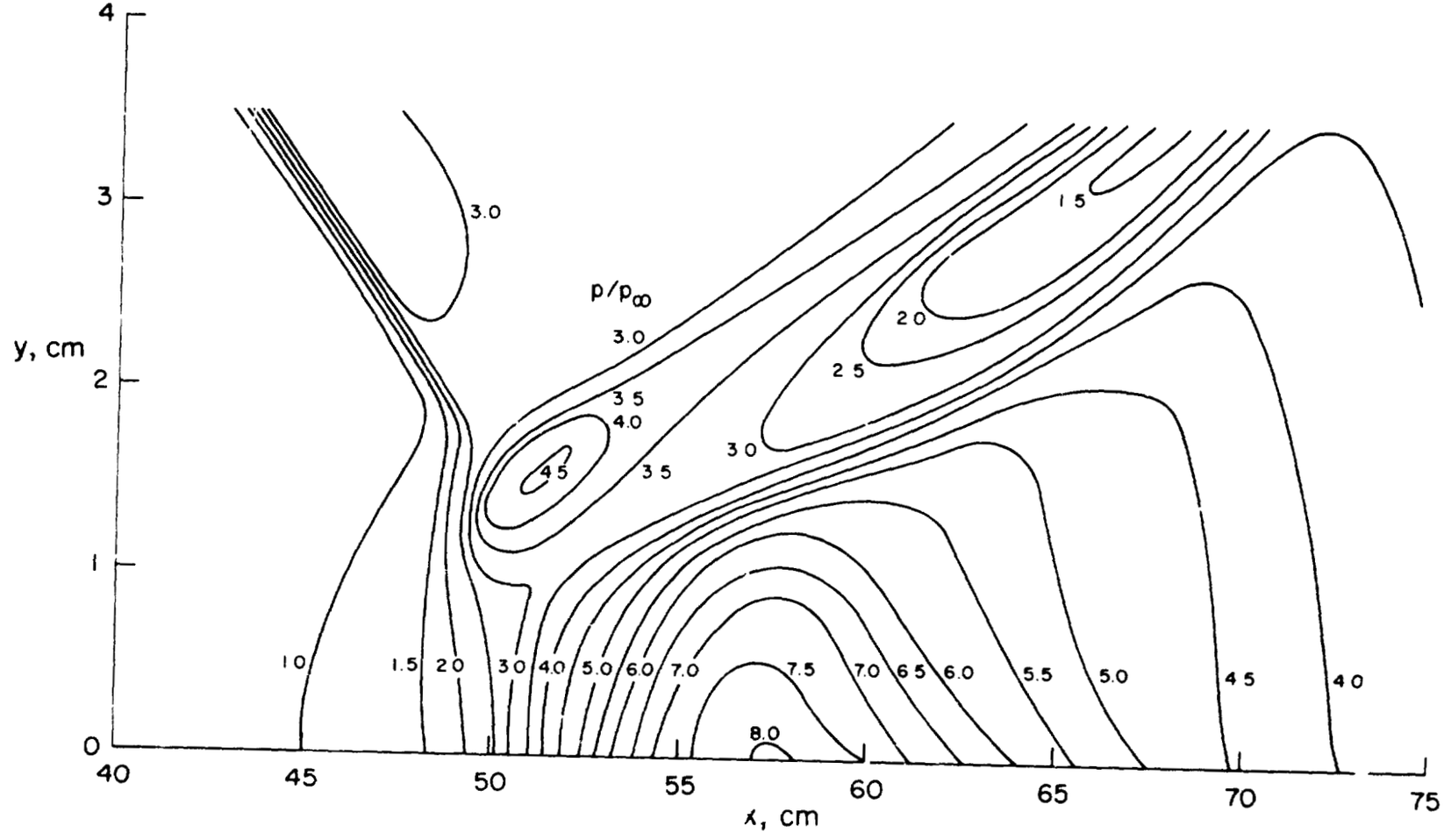
(c) Density.

Figure 12.- Continued.



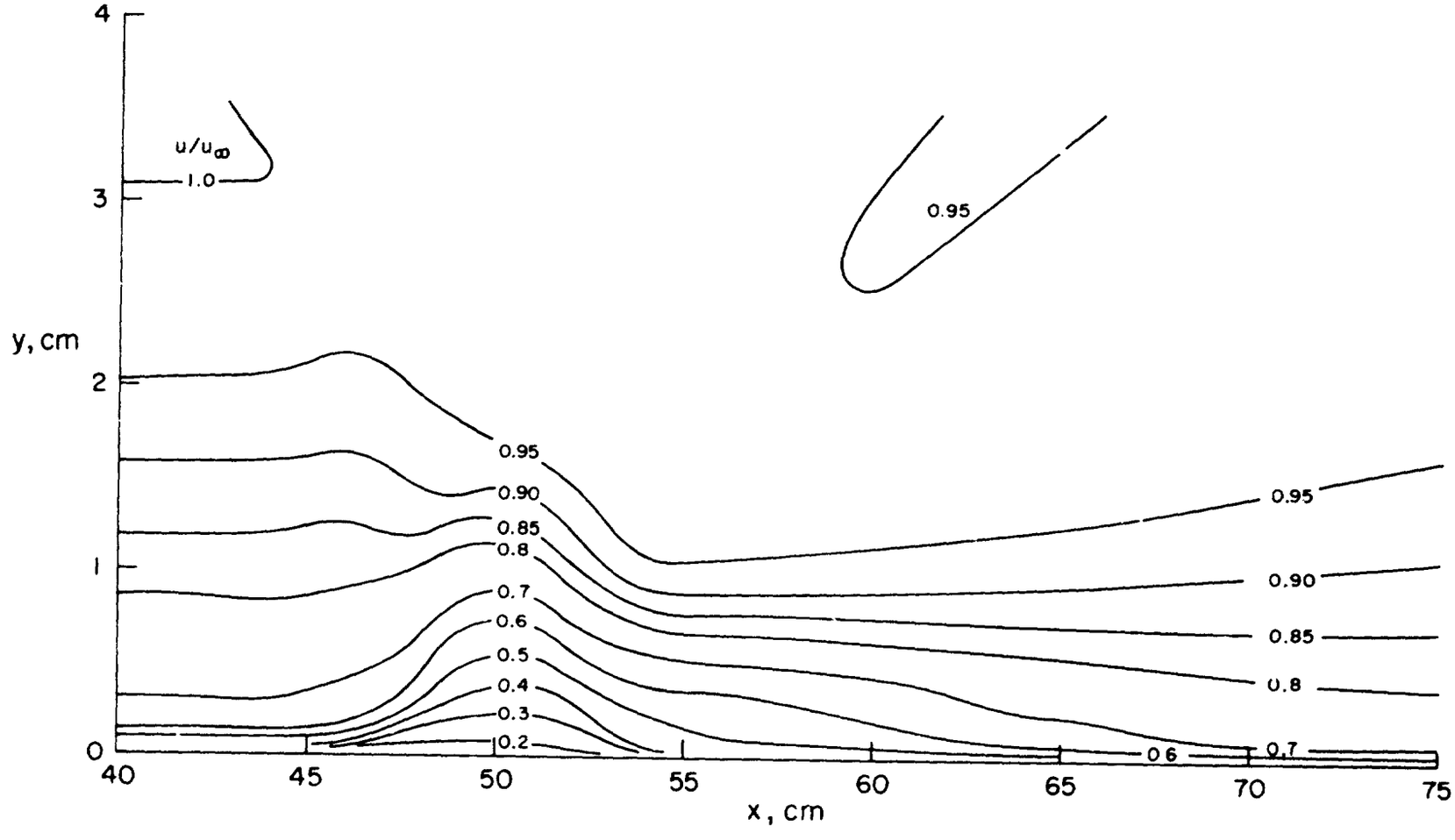
(c) Density - Concluded.

Figure 12.- Concluded.



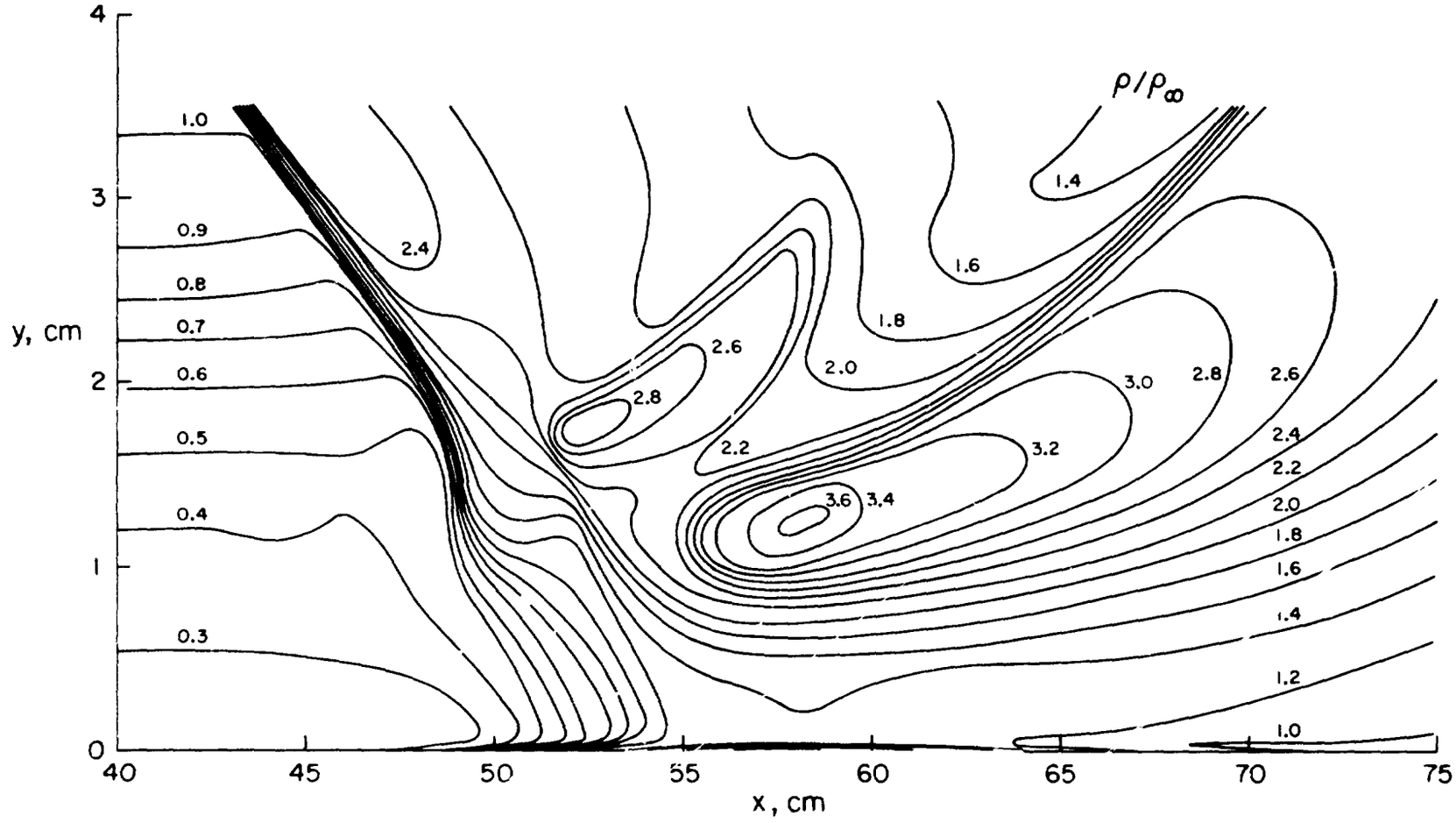
(a) Static pressure.

Figure 13.- Flow field contours, $\alpha = 7.5°$, $M_\infty = 6.71$, $T_w/T_{o_\infty} = 0.43$.



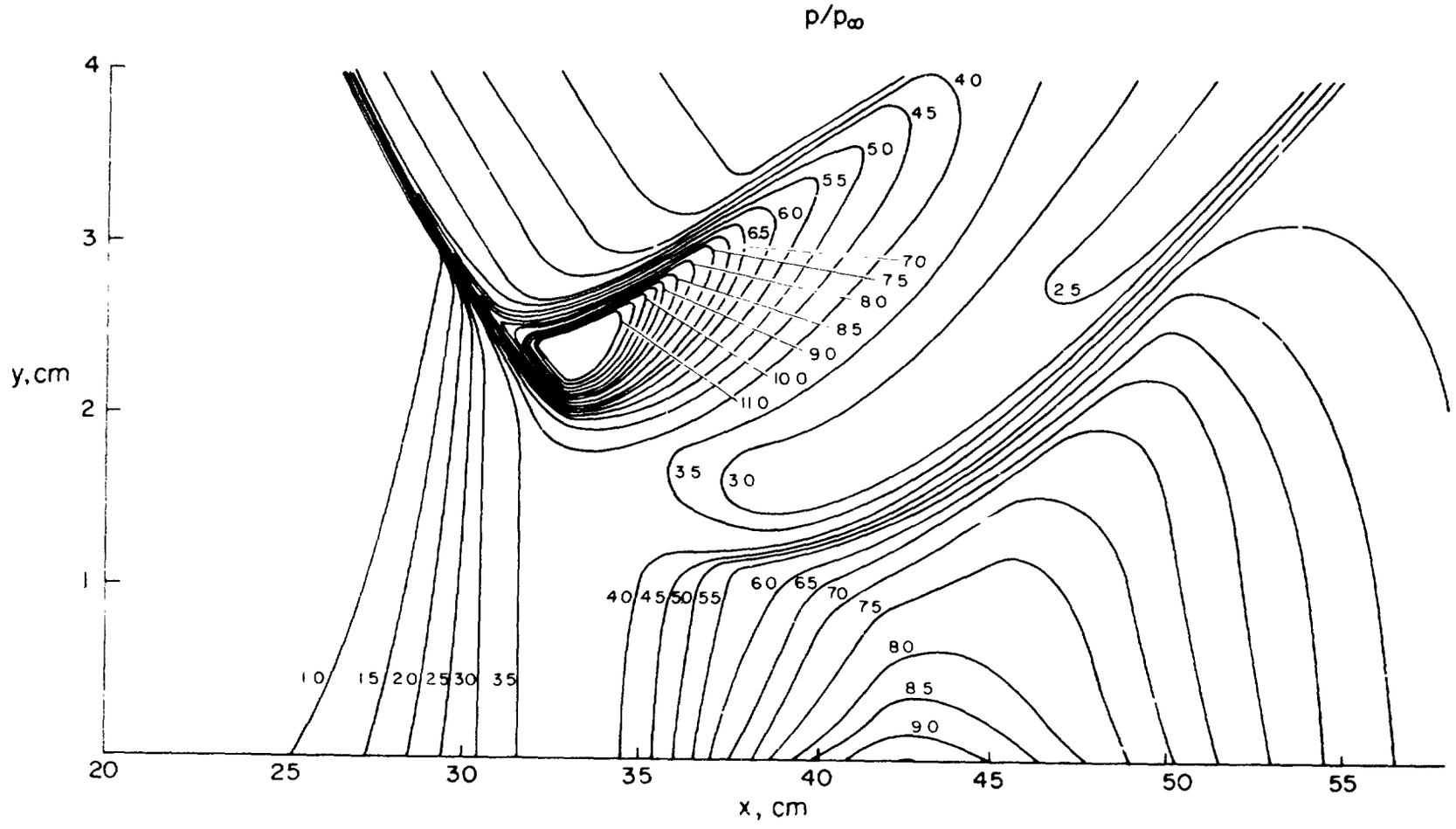
(b) Velocity.

Figure 13.- Continued.



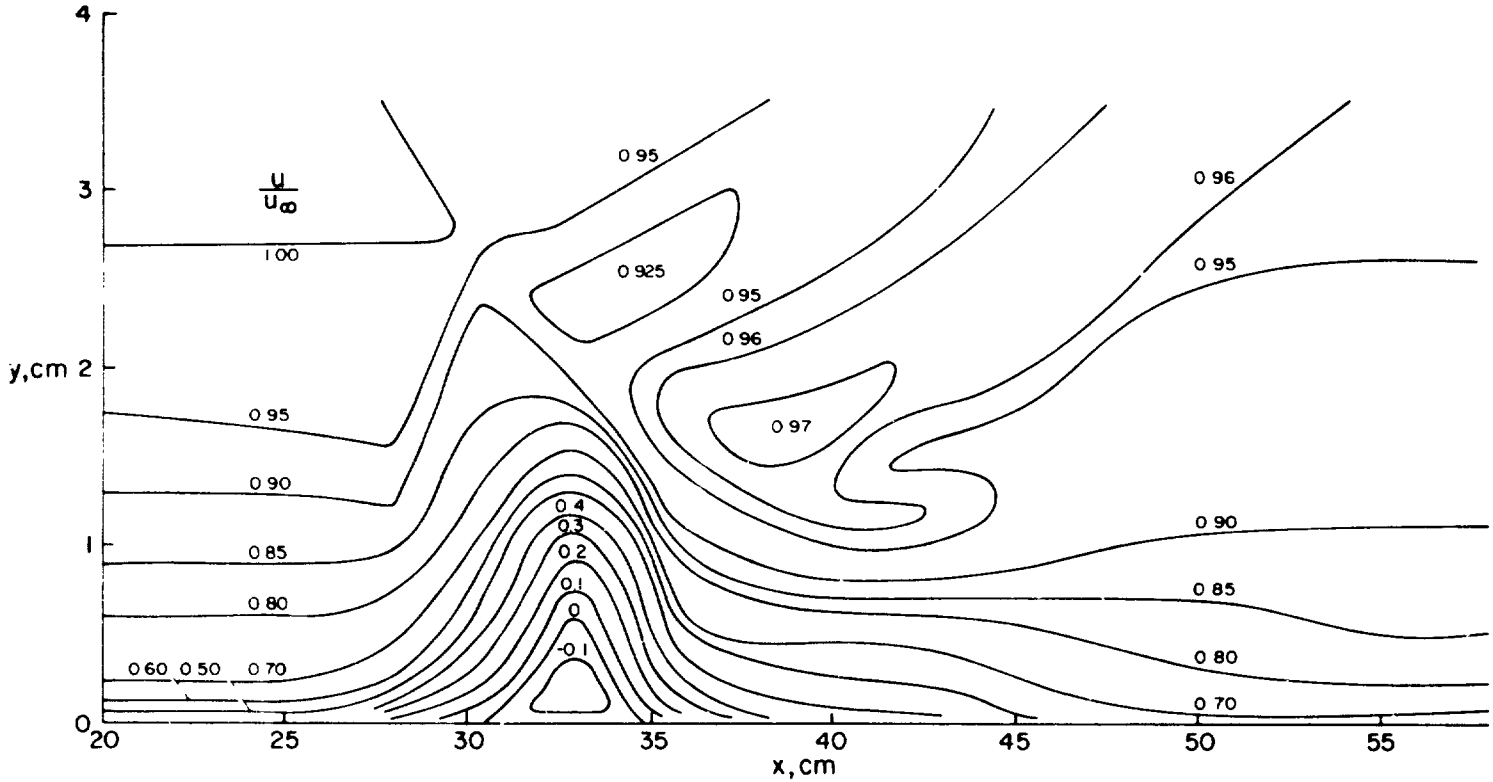
(c) Density.

Figure 13.- Concluded.



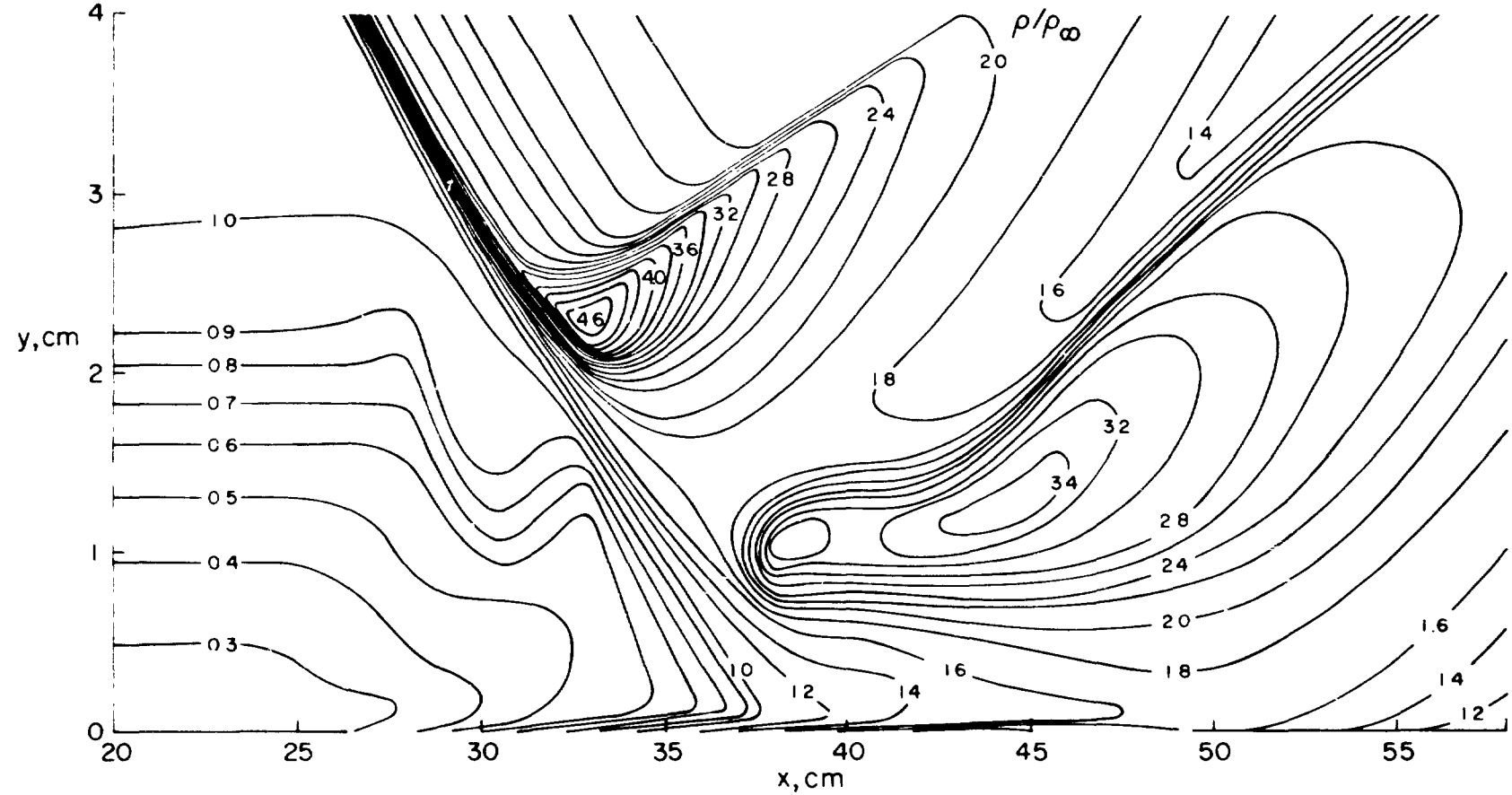
(a) Static pressure.

Figure 14.- Flow field contours, α = 15°, M_∞ = 6.86, T_w/T_{o_∞} 0.43.



(b) Velocity.

Figure 14.- Continued.



(c) Density

Figure 14.- Concluded.

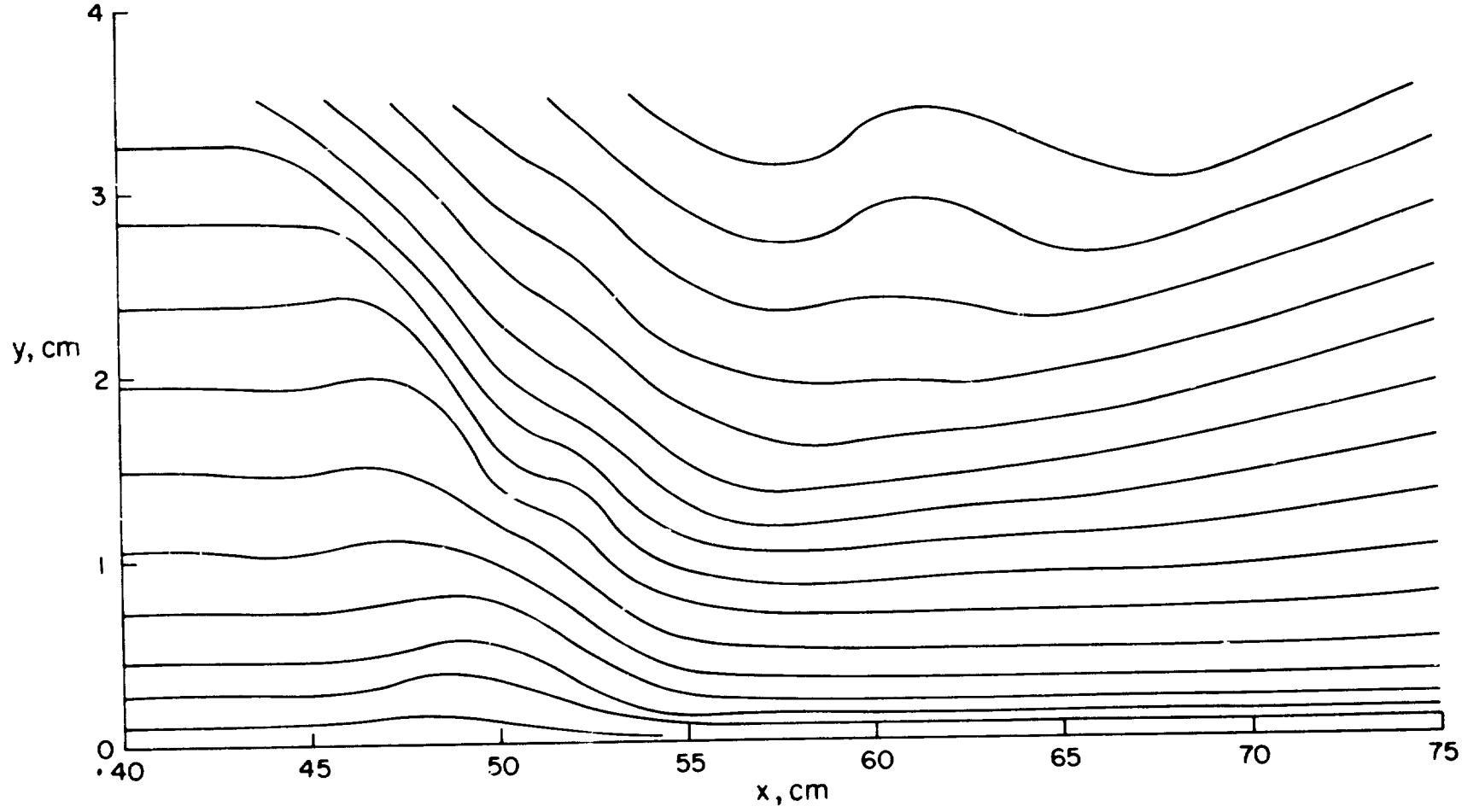


Figure 15.- Streamline contours, $\alpha = 7.5°$, $M_\infty = 6.71$, $T_w/T_{o_\infty} = 0.43$.

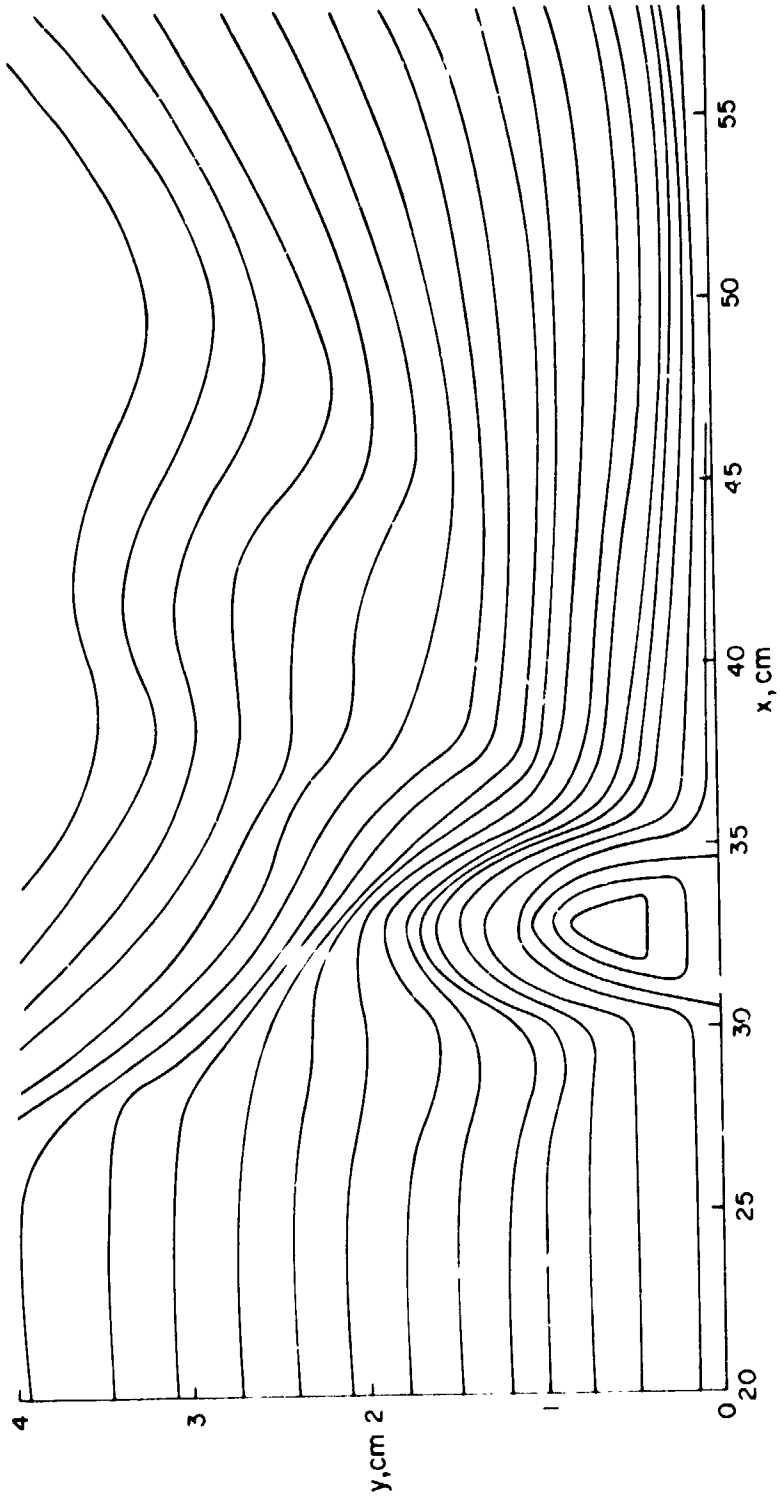


Figure 16.- Streamline contours, $\alpha = 15°$, $M_\infty = 6.86$, $T_w/T_{o_\infty} = 0.43$.