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Tables of Supersonic Symmetrical Flow around Right Circular Cones, with and without the Addition of Heat at the Wave

By R. S. Bartlett, M.A.

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Tables of Supersonic Symmetrical Flow around Right Circular Cones, with and without the Addition of Heat at the Wave

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Summary.

The generalised relations for shock, strong detonation and Chapman-Jouguet detonation waves are used to determine the flow variables behind an attached conical shock wave. The non-linear ordinary differential equations of conical flow and their integration, inwards from the wave, are discussed.

In the case of the shock wave (adiabatic flow), tables of the flow are given over representative ranges of cone angle and Mach number, for an ideal gas, with $\gamma = 1{\cdot}4$. A few tables of the complete flow between wave and cone are given for the case of non-zero heat addition. The dependence of the wave angle and the transverse velocity component on a heat addition parameter, F, is also studied. It is found that the variation of wave angle, for given values of Mach number and cone angle, is such that an approximate collapse onto a single curve is possible. As a result, a good approximation to the value of the wave angle corresponding to any value of F may be obtained, within the ranges of Mach number and cone angle considered here.

CONTENTS

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1. *Introduction.*

We consider the steady, axisymmetric, flow of a compressible fluid past a cone in which the velocities are constant along rays from the apex of the cone. If the effects of viscosity and heat conduction are neglected, the partial differential equations of steady potential flow can be reduced to ordinary differential equations which, in general, can be integrated numerically and in closed form in certain special cases.

The problem of the conical shock wave was first studied, over thirty years ago, by various investigators, in particular, by Taylor and Maccoll[1]. They first derived the now well known ordinary differential equations which define conical flow, equations (9), (13) and (14) of the present Report. However, their calculation of the free-stream Mach number and shock position involved a lengthy and rather cumbersome graphical interpolation procedure based on diagrams constructed by Meyer[2].

In the set of tables edited by Kopal[3], the lengthy procedure just mentioned has been by-passed by the use of relations for shock position and free-stream Mach number which are easily solved numerically. More recently, various methods have been published which have also yielded prescribed values of the free-stream Mach number. These can be divided into two groups, those in which the exact Taylor-Maccoll differential equations are solved and others in which a simplifying approximation is introduced. Of the first group, Sims[4] and Maasdem and Zandbergen[5] both tabulate functions different from those used by Kopal. In addition, the tabulation is given at points along a certain characteristic line and in terms of cylindrical polar co-ordinates x and r. This approach is suitable when the conical flow solution is primarily intended for use as starting data for the calculation of supersonic flow around an axisymmetric body having a conical tip, or round a cone at incidence. However, when the conical flow characteristics are of high intrinsic interest, as here, retention of the conical symmetry in a more explicit form is desirable. In this respect the present work follows Kopal in its presentation of the results, although another version of the programme has been written to provide starting data for the calculation of more general axisymmetric flows, in combination with the characteristics method devised by Walkden and Howie[6].

As regards the numerical solution in a particular case, both Kopal and Sims use iteration methods based on the function u_c, the velocity on the cone surface. With such a choice, the calculation of any case not computed by them requires prior knowledge of the dependence of u_c upon Mach number, M_∞, and cone angle, θ_c, which is not readily available without extensive plotting from, say, Kopal's results. In the present Report, the integration is performed inwards from the shock wave. This choice eases the starting procedure, since approximate values of θ_s corresponding to particular values of θ_c and M_∞ are readily available[7]. Two values of the wave angle are used to calculate corresponding values for the cone and these, in turn, are used as a basis for an iteration to obtain the shock angle corresponding to a prescribed cone angle. The method of integration is described in detail in Section 4.

No attempt has been made to make the tables exhaustive, since a computer programme has been written in Mercury Autocode which enables any particular case to be computed very easily. However,

tables are given which are thought to be representative of the ranges of Mach number and cone angle which are of interest. In order to keep the number of tables within a reasonable limit, the results are restricted to the case of an ideal gas, with $\gamma = 1{\cdot}4$, except for a few results for $\gamma = 1{\cdot}405$, for comparison with other authors. In any case, Strike and Norton have shown (Fig. 3 of Ref. 8) that the variation of shock angle with γ is very small in the range $\gamma = 1{\cdot}28$ to $1{\cdot}40$, especially at low Mach numbers. In the tables, values of density, pressure and total velocity are given in addition to the functions tabulated by Kopal, namely the speed of sound and velocity components.

It is believed that a need exists for the tables just described, although their calculation is not new with the possible exception of conical flow in the presence of heat addition in the wave. The method of solution for these cases is, however, essentially identical to that used for the shock wave, except that extra care is required in the integration of the equations of motion. Initial values of the flow variables for this integration are obtained from the general detonation wave relations in the form derived by Townend[9], which assume that all the heat is released in the wave (Table 1 of Ref. 9). γ is again taken to be constant across the wave. Following Townend, we use the parameter F to indicate the amount of heat added in the wave (*see* equation (7c)). Physical considerations limit its value to the range $[1,2]$; the shock wave is given by $F = 2$, the Chapman-Jouguet detonation wave by $F = 1$ and strong detonation waves by intermediate values. A few cases have been computed and comparison is made, in Section 5.2.3, with the approximate results of Woolard[10].

2. *Relations Across an Oblique Wave in Supersonic Flow with Heat Added in the Wave.*

The equations of conservation of mass flow, energy per unit mass and the two (normal and transverse) components of momentum across the wave can be manipulated to produce the following equations for $\frac{\rho_w}{\rho_\infty}, \frac{p_w}{p_\infty}, \frac{q_w}{q_\infty}, \frac{a_w}{q_\infty}$, $\tan\delta_w$ and S behind the wave:

$$\frac{\rho_w}{\rho_\infty} = \frac{1}{1-A/M_N^2}, \tag{1}$$

$$\frac{p_w}{p_\infty} = 1+\gamma A, \tag{2}$$

$$\left(\frac{q_w}{q_\infty}\right)^2 = 1+\frac{A(A-2M_N^2)}{M_\infty^2 M_N^2}, \tag{3}$$

$$\left(\frac{a_w}{q_\infty}\right)^2 = \left(\frac{1+\gamma A}{M_\infty^2}\right)(1-A/M_N^2), \tag{4}$$

$$\tan\delta_w = \sqrt{\left(\frac{M_\infty}{M_N}\right)^2-1}\Big/\left(\frac{M_\infty^2}{A}-1\right), \tag{5}$$

$$(\gamma-1)S = \log(1+\gamma A)+\gamma\log(1-A/M_N^2), \tag{6}$$

where

$$M_N = M_\infty \sin\theta_w, \tag{7a}$$

$$A = F(M_N^2-1)/(\gamma+1), \tag{7b}$$

$$F = 1+\sqrt{1-\frac{2(\gamma+1)M_N^2}{(M_N^2-1)^2}\left(\frac{Q}{C_{p_\infty}T_\infty}\right)}. \tag{7c}$$

Substitution of $F = 2$ into equations (1) – (6) enables the shock-wave relations to be recovered (*see*, for example, equations (96) to (100) of Ref. 6).

Finally, the geometry of Fig. 1 yields the following two relations:

$$u_w = q_w \cos(\theta_w - \delta_w) \tag{8a}$$

$$v_w = -q_w \sin(\theta_w - \delta_w) \tag{8b}$$

3. *Equations of Motion of the Flow Between Wave and Cone.*

The general equations of motion can be greatly simplified in the present case, and are given by Kopal in the following form:

$$\frac{du}{d\theta} - v = 0 \tag{9}$$

$$\frac{dv}{d\theta} + u + \frac{1}{\rho v}\frac{dp}{d\theta} = 0\,. \tag{10}$$

The equation of continuity reduces to

$$\frac{d}{d\theta}(\rho v \sin\theta) + 2\rho u \sin\theta = 0\,. \tag{11}$$

Introducing the speed of sound, a, by its usual definition

$$a^2 = \frac{dp}{d\rho}, \tag{12}$$

we can combine equations (10) and (11) to produce the following equation:

$$\frac{d^2u}{d\theta^2} + u = \frac{a^2(u + v\cot\theta)}{(v^2 - a^2)}\,. \tag{13}$$

A third equation is required in order that solutions may be obtained. We use the energy equation in the following form:

$$a^2 = \tfrac{1}{2}(\gamma - 1)(q_{\max}^2 - u^2 - v^2)\,, \tag{14}$$

where $q_{\max}$ is the velocity the flow behind the wave would attain, if allowed to expand adiabatically into a vacuum. It is given by

$$\left(\frac{q_{\max}}{q_\infty}\right)^2 = \left\{1 + \frac{2(\gamma+1)M_N^2 + F(2-F)(M_N^2-1)^2}{(\gamma-1)(\gamma+1)M_N^2 M_\infty^2}\right\}\,. \tag{15}$$

4. *Method of Solution.*

Equations (9) and (13), together with (14) and (15), have no closed-form solution, but solutions may be obtained in particular cases, by numerical integration. The details of this procedure may be arranged in a number of ways. In the first place, the integration may be made in either of two directions, that is with increasing or decreasing θ. It has been found convenient to adopt the latter approach, that is, beginning at the wave. There are two reasons for this choice; the availability of estimates of wave angle (for shock waves) from Ref. 7, and the simplicity of the boundary condition on the cone with the present system of velocity components; namely $v_c = 0$.

In principle, any of the three quantities u, v or θ may be used as the independent variable for the purpose of the numerical integration. However, it can be shown, by combining equations (3), (4), (5) and (8b), that

$$\{1-(V_w/A_w)^2\} = \frac{(\gamma+1)(M_N^2-1)(F-1)}{\gamma+1+\gamma F(M_N^2-1)}, \tag{16}$$

where capital letters on the left hand side of this equation have been used to denote quantities non-dimensionalised with respect to q_{max}.

Substituting this value into equation (13), we obtain

$$\left(\frac{d^2U}{d\theta^2}\right)_{\theta=\theta_w} = -U_w - \frac{(U_w+V_w\cot\theta_w)[\gamma+1+\gamma F(M_N^2-1)]}{(\gamma+1)(M_N^2-1)(F-1)}. \tag{17}$$

Since $(U_w+V_w\cot\theta_w) \neq 0$, it follows that the value of $\left(\frac{d^2U}{d\theta^2}\right)_{\theta=\theta_w}$ is infinite for $F = 1$, but finite for other values of F. As a result, θ cannot be used as independent variable for any case in which $F = 1$, nor when F is close to 1, since $\left(\frac{d^2U}{d\theta^2}\right)_{\theta=\theta_w}$, though now finite, is still large. As a result, V has been used as independent variable in all the cases presented here. V is chosen in preference to U as this simplifies the application of the boundary condition on the cone.

Since the functions $\left(\frac{d\theta}{dV}\right)_{\theta=\theta_w}$ and $\left(\frac{d^2\theta}{dV^2}\right)_{\theta=\theta_w}$ involve negative powers of $\left(\frac{dV}{d\theta}\right)_{\theta=\theta_w}$, these two quantities are finite (or zero) for all values of F. It follows that the functions θ and U may be expanded at any point in the flow between the wave and cone, at say $\theta = \theta_0$ (where $V = V_0$) as a power series in terms of a small step interval, ΔV, in the form

$$\left.\begin{aligned} U(V_0+\Delta V) &= U(V_0)+(\Delta V)\left(\frac{dU}{dV}\right)_{\theta=\theta_0}+\tfrac{1}{2}(\Delta V)^2\left(\frac{d^2U}{dV^2}\right)_{\theta=\theta_0}+0(\Delta V)^3 \\ \theta(V_0+\Delta V) &= \theta(V_0)+(\Delta V)\left(\frac{d\theta}{dV}\right)_{\theta=\theta_0}+\tfrac{1}{2}(\Delta V)^2\left(\frac{d^2\theta}{dV^2}\right)_{\theta=\theta_0}+0(\Delta V)^3 \end{aligned}\right\} \tag{18}$$

A positive interval ΔV is used as V increases from a negative value at the wave to zero on the cone surface.

This process is started at the wave, where $\theta_0 = \theta_w$, using a suitable value of θ_w, for a given value of M_∞. The value of Q_w $(= q_w/q_{max})$ follows from equations (3) and (15). Corresponding values of U_w, V_w and $\left(\frac{d^2U}{d\theta^2}\right)_{\theta=\theta_w}$ are then calculated from equations (8a), (8b) and (13) respectively. By making ΔV sufficiently small, the inaccuracies in the values of U and θ at $V = V_w+\Delta V$, as calculated from equations (18), may be made as small as required. (*See* Section 5.2 for discussion of accuracy.) The corresponding value of A may be calculated from equations (14) and (15). The equation connecting p and ρ may be written:

$$\left(\frac{\rho}{\rho_\infty}\right)^{\gamma-1} = \frac{M_\infty^2(a/q_\infty)^2(\rho_w/\rho_\infty)^\gamma}{(p_w/p_\infty)},$$

from which ρ/ρ_∞ may be found, as all the terms on the right hand side of the equation are known, since $a/q_\infty = A(q_{max}/q_\infty)$.

In this way the values of the flow variables may be calculated at a point close to the starting point at the wave, and then at successive points inwards from the wave until the first point at which the transverse velocity component V becomes positive (say $V = V_p$). The position of the cone, given by $V = 0$, may be

found by repeating this last step with a smaller step size $h = (\Delta V - V_p)$. Use of V rather than U as independent variable enables the position of the cone to be determined precisely, since no iteration is involved. This procedure results in a solution to the equations of motion, but the value of the cone angle, θ_c, has been derived during the course of the calculation. For most practical applications, prescribed values of cone angle are required. Solutions have been obtained, under this condition, by repetition of the integration for a second value of the wave angle, close to the first. Linear interpolation is then used to obtain a better starting value, θ_w, for a given θ_c. This process converges rapidly and is terminated when the required value of θ_c is achieved with sufficient accuracy.

5. *Results.*

5.1. *Description of Tables.*

5.1.1. *Shock waves (adiabatic flow).* As has been stated in the introduction, no attempt has been made to make these tables exhaustive. It is intended that particular cases not included here should be computed as required*. For this purpose values of shock angle have been plotted in Fig. 2 as a function of cone angle for various Mach numbers between 2 and 10. More accurate estimates are obtainable from this Figure than from Ref. 7. Fig. 2 can also be used for estimates of wave angle for values of γ other than 1.4, since its variation with γ in the range 1·28 to 1·40 appears to be quite small (*see* Fig. 3 of Ref. 8). Tables of the flow are presented for representative** ranges of Mach number and cone angle, and $\gamma = 1{\cdot}4$ (Tables 1 to 56). Each of these tables contains the results for a single Mach number and cone angle. The functions listed in the tables are θ, $U = u/q_{max}$, $V = v/q_{max}$, $Q = q/q_{max}$, $A^2 = a^2/q^2_{max}$, following Kopal, together with the additional quantities $P = p/p_\infty$ and ρ/ρ_∞. The values of q_{max}/q_∞ and entropy rise across the wave, S, are also given (calculated from equations (15) and (6) respectively).

5.1.2. *Detonation waves.* A few tables similar to those just described have been included (Tables 57 to 67) to show the dependence of the flow variables upon F. This limited number of results indicate that, for a given value of θ, the functions U, $-V$, Q and ρ/ρ_∞ decrease with F, but that the reverse is true for P and A. The sizes of the percentage increases and decreases above the shock values are given in the first of the following Tables, and are found to depend upon Mach number and cone angle, being quite small for the case $M_\infty = 2$, $\theta_c = 10$ deg, but increasing rapidly as either of these parameters increases. The size of the variation is almost independent of θ for the functions U and Q, and here the average value is given, but varies for the other quantities. The maximum percentage increases and decreases are comparable for the functions U, $-V$, Q and P, being about 12 to 15 per cent at $M_\infty = 10$, $\theta_c = 20$ deg, but are much larger for ρ/ρ_∞ and A, being -54 per cent and $+42$ per cent respectively for the same Mach number and cone angle.

In Fig. 3, the quantity $(\theta_w - \theta_s)$ has been plotted as a function of F for various Mach numbers and cone angles. For a given value of F, its value increases with both Mach number and cone angle. In order to analyse this variation further, the same function, but multiplied by the factor $(\theta_{CJ} - \theta_s)^{-1}$, has been plotted in Fig. 4. In each case this function has the values 0 and 1 for $F = 2$ and 1 respectively. It can be seen that its values almost collapse onto a single curve for intermediate values of F, a consequence which enables an approximate value of wave angle to be obtained for any value of F. This is possible by the combined use of Figs. 2, 3 and 4, since a value of θ_s is obtainable from Fig. 2, a value of $(\theta_{CJ} - \theta_s)$ from Fig. 3 and an approximate value of $(\theta_w - \theta_s)/(\theta_{CJ} - \theta_s)$ from Fig. 4. Consider, for example, the cases listed in the second of the following Tables, in which the seventh and eighth columns show, respectively, values of wave angle estimated in the way just described, and calculated independently. The cases marked with an asterisk appear explicitly in Figs. 2 and 3, so here no estimation is required of the values of θ_s and $(\theta_{CJ} - \theta_s)$. The others do not appear in these two figures, with the result that they provide a better test of the method of estimation. The values of θ_w agree to within the accuracy of measurement from the figures.

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*As a guide to the time required, it may be noted that the results presented in Tables 1 to 70 were computed using the Intstep Routine and printed using the Atlas computer in a little over 12 minutes. Suitable step sizes are discussed in Section 5.2.1.

**$M_\infty = 2{\cdot}5(0{\cdot}5)\ 6{\cdot}0,\ 6{\cdot}8,\ 7,\ 8,\ 8{\cdot}6,\ 9$ and 10; $\theta_c = 5$ deg (5 deg) 20 deg.

Values, or Range of Values of the Function $\{100\,(f_{CJ}-f_s)/f_s\}$ *at Given Values of* θ *Between wave and cone, and also Immediately Behind the Waves (the latter in brackets)*

			Functions (f) which decrease with F (for a given θ)				Functions (f) which increase with F (for a given θ)	
Tables	M_∞	θ_c	u/q_{max}	$-v/q_{max}$	q/q_{max}	ρ/ρ_∞	p/p_∞	a/q_{max}
57 & 61	2	10	−0·08 (−0·5)	0 to −0·15 (3·2)	−0·08 (0·4)	−0·13 to −0·04 (−2·0)	0·08 to 0·21 (−2·5)	0·05 to 0·07 (−0·32)
30 & 64	6	10	−1·8 (−2·3)	0 to −3·4 (49·6)	−1·8 (−1·1)	−14·8 to −12·7 (−25·7)	3·3 to 6·9 (−14·8)	8·5 to 9·0 (5·6)
54 & 66	10	10	−2·7 (−3·2)	0 to −4·6 (116·0)	−2·7 (−2·1)	−34·6 to −32·7 (−45·9)	6·8 to 11·2 (−18·1)	24·9 to 25·7 (20.3)
62 & 63	2	20	−3·1 (−6·8)	0 to −4·4 (20·7)	−3·2 (0·4)	−4·2 to −2·5 (−12·2)	2·3 to 5·0 (−9·3)	1·5 to 1·9 (−0·24)
32 & 65	6	20	−10·5 (−12·5)	0 to −12·4 (131·7)	−10·5 (−7·8)	−40·7 to −38·7 (−51·5)	9·2 to 14·3 (−17·5)	25·0 to 25·8 (20·0)
56 & 67	10	20	−12·0 (−13·9)	0 to −13·5 (207·3)	−12·0 (−9·6)	−53·8 to −52·6 (−63·0)	11·3 to 15·5 (−18·4)	40·9 to 41·8 (34·8)

M_∞	θ_c	F	θ_s	$(\theta_{CJ}-\theta_s)$	$\frac{(\theta_w-\theta_s)}{(\theta_{CJ}-\theta_s)}$	$\theta_{w(\text{estimated})}$	$\theta_{w(\text{calc. ind.})}$	Type (*see* text)
2	10	1·5	31·25	0·44	0·53	31·5	31·4(5)	*
10	10	1·5	12·2	2·45	0·53	13·5	13·5(5)	*
3	20	1·5	29·6	4·52	0·50	31·8(5)	31·9	*
9	20	1·5	22·9	6·15	0·50	26·0	26·0	*
4·5	20	1·25	25·7	5·3	0·796	29·9	29·9	
4·5	20	1·4	25·7	5·3	0·620	29·0	28·9(5)	
4·5	20	1·5	25·7	5·3	0·5	28·3(5)	28·3	
4·5	20	1·6	25·7	5·3	0·388	27·7(5)	27·7	
4·5	20	1·75	25·7	5·3	0·232	26·9	26·8(5)	

In Fig. 5, V is plotted as a function of $(\theta - \theta_c)$, for various cases in which $F = 1$ or 2. It is clear that the dependence of V upon θ is approximately linear for all values of F, except in the angular neighbourhood of the wave, for F close to 1. The effect of the addition of heat is to decrease the value of $\frac{d(-V)}{d\theta}$, except near the wave.

5.2. *Accuracy.*

5.2.1. *The effect of step size upon accuracy.* The accuracy of calculations which include numerical integration of differential equations depends on the step size used, and, in the case of the power series method developed here, on the number of terms in the Taylor series expansions of the quantities U and θ (equations (18)). It is clear that the answers will generally* become more accurate with decreasing step size, since the error term is proportional to an integral power of this quantity. On the other hand, the number of steps from shock to body, and hence the computing time, increases as the step size is decreased.

Two sources of inaccuracy are possible; the truncation error (discussed above), which is dependent upon step size, and an error introduced in the process of obtaining, by iteration, a prescribed cone angle. This second error may be made insignificantly small, by taking the iteration sufficiently far, and this has been done in the tables presented here. In order to study the truncation error in isolation, calculations have been made in a number of cases in each of which the integration was made using each of several different step sizes. The cases were chosen to cover a range of Mach numbers, shock angles and two values of the parameter F.

We denote by $\phi(h)$ the value of a particular function evaluated in the integration, using a step size h. In order to estimate the accuracy of the integration we assume that an error of order h^n is introduced into the calculation at each step; i.e. that $\phi(h)$ satisfies the equation

$$\phi(h) = \phi(0) + \lambda h^n \text{ (at each step)} \tag{19}$$

where $\phi(0)$ is the 'correct' value of this function (zero truncation error),

$$\lambda \text{ and } n \text{ are constants.}$$

The use of several different step sizes for each case enables the constants $\phi(0)$, λ and n to be calculated. It was found from this analysis that:

(i) the value of the constant n is approximately 3 for the power series method, as expected from equations (18), and approximately 5 for the Intstep Routine. [The details of their calculation are given in the Appendix.]

(ii) For given values of Mach number, cone angle and step size, the accuracy was greater for $F = 2$ than for $F = 1$. The reason for this is clear from Fig. 5 where it can be seen that the rate of change of the function $|dV/d\theta|$ is much higher near the wave for $F = 1$ than for $F = 2$.

(iii) The power series method underestimated the value of the cone angle, θ_c, in all cases, whereas the Intstep Routine overestimated it. This result follows from the number of terms taken in the power series expansions of U and θ, and therefore on the sign of the truncation error; i.e. $\frac{1}{6}(\Delta V)^3 \left(\frac{d^3U}{dV^3}\right)$ and $\frac{1}{6}(\Delta V)^3 \left(\frac{d^3\theta}{dV^3}\right)$, for the power series method and two terms of order $(\Delta V)^5$ for the Intstep Routine.

(iv) The percentage accuracy using either method depended on the cone angle and Mach number, as well as on step size. In general, for a given number of steps, the accuracy increased with an increase in either Mach number or cone angle. It also depended upon the function being considered; for the step sizes used in this analysis the accuracy generally diminished in the order listed: U_c, A_c^2, ρ_c/ρ_∞, p_c/p_∞ and θ_c.

*The possible exception could occur if the number of integration steps were so large that rounding errors became large.

(v) For a given step size, the Intstep Routine was found to be more accurate, as one would expect from comparing the values of the constant n. However it does take longer in computing time, owing to the subdivision of the interval ΔV. The Tables (1 to 70) given here were calculated using both methods, and the ratio of computing time used was 2.2 : 1.

(vi) In the main Tables given here (1 to 56), each quantity is printed to 6 figures (except p/p_∞ and ρ/ρ_∞, which are given to 5 figures). These figures are accurate, the errors in the calculations are restricted to the figures which have been omitted. In most of the cases, a step size* given by

$$h = \Delta V = 0{\cdot}005/M_\infty \; [= (\Delta V)_0]$$

has been used.

For the cases in which the values of cone angle and Mach number are smallest, a smaller step size has been used in order to ensure that all the figures given in the tables are accurate. These step sizes are as follows:

θ_c \ M_∞	2·5, 3, 3·5	4, 4·5	5, 5·5, 6	6·8, 7
5°	$\frac{1}{8}(\Delta V)_0$	$\frac{1}{4}(\Delta V)_0$	$\frac{1}{2}(\Delta V)_0$	$\frac{1}{2}(\Delta V)_0$
10°	$\frac{1}{2}(\Delta V)_0$	$\frac{1}{2}(\Delta V)_0$	$\frac{1}{2}(\Delta V)_0$	$(\Delta V)_0$

5.2.2. *Comparison with other exact solutions.* Three cases computed by Kopal have been recalculated, namely those which appear on pages 49/50, 301/2 and 305 of his report. The corresponding calculations using the Intstep Routine are presented in Tables 68 to 70, respectively. The free stream Mach numbers, M_∞, used in these calculations have been obtained from Kopal's results, in which they are calculated in the course of the computation. They are given to five figures and are, therefore, subject to errors of about 0·001 per cent to 0·002 per cent. The results obtained using Intstep agree with Kopal's figures to within this uncertainty.

The last of these cases has also been calculated by Maasden and Zandbergen. Their results are given in a form suitable for use as starting data in a characteristics calculation, but have been transformed for the purpose of this comparison. Values of U and V, for this third case, are given in Fig. 6 as functions of θ. These results also agree to within 0·001 per cent with those of Kopal.

5.2.3. *Comparison with some approximate solutions.* Hord[11] has obtained analytical solutions for shock waves, using an approximation to equation (13). The method yields values of shock wave angle which are subject to inaccuracies of up to about 4 per cent in typical cases. This accuracy was adequate, until the effort required to integrate the exact equations was substantially reduced by the advent of large high speed digital computers.

Woolard[10] has also used a simplified form of equation (13), equation (9) of Ref. 10, and has plotted values of wave angle against Mach number for the Chapman-Jouguet detonation wave and the shock wave (his Fig. 13). Table 71 contains values of wave angle taken from this figure (to an estimated accuracy of 0·05 degrees), and calculated by the method described here. It can be seen that his approximation generally overestimates the size of the Chapman-Jouguet wave angle. Inaccuracies in the values of up to 1·8 per cent occur in the cases considered, together with a further $\pm 0{\cdot}2$ per cent due to inaccuracies in reading values from his figure.

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*A dependence of the step size upon M_∞ was chosen in order to keep the number of steps from wave to cone roughly constant [about 125 to 175, when $\Delta V = (\Delta V)_0$].

6. *Conclusions.*

A method for computing supersonic symmetrical flow around right circular cones, with and without heat added in the wave, has been described. Results are presented, in the form of tables, for adiabatic flow (zero heat addition), for a range of Mach numbers and cone angles for an ideal gas, with $\gamma = 1{\cdot}4$. These, and a few tables of flows with heat added, illustrate the use of the computer program. A method has been described for estimating the value of the wave angle corresponding to any values of the heat addition parameter (F), cone angle, Mach number and ratio of specific heats (within the range $1{\cdot}28 \leqslant \gamma \leqslant 1{\cdot}4$).

The accuracy obtainable with the present method depends on the method used to integrate the non-linear ordinary differential equations which define the problem, and also on the step size. The Mercury Autocode 'Intstep Routine' has been used and it is shown that the errors introduced at each step by this method are of the order of the fifth power of the step size. As a result of this high accuracy, it is possible to assess the accuracy of other methods of solution of the same problem, by comparison with the present results. For example, Kopal's results are also shown to be of a high accuracy. On the other hand, Woolard's approximate results for detonation waves contain errors of up to 2 per cent in the values of the wave angle.

Some guidance is given on the number of steps required to achieve the accuracy of the tables presented here. About 150 steps is sufficient for the majority of cases, but a larger number is required for the smaller cone angles, when the free stream Mach number is at the lower end of the range considered here.

APPENDIX

Determination of the Order of Accuracy of the Two Methods of Integration.

We have, by equation (19),

$$\phi(h) = \phi(0) + \lambda h^n, \text{ at each step}. \tag{A1}$$

We denote by $\phi_k(ph)$ the value of ϕ after k/p integration steps, using a step size $\Delta V = ph$; and by λ_k the value of λ when $V = V_w + kh$. By taking p to be equal to 1, 2 and 4, in turn, we obtain the following expressions from the general equation (A1):

$$\left.\begin{aligned} \phi_4(4h) &= \phi_4(0) + \lambda_4 (4h)^n \\ \phi_4(2h) &= \phi_4(0) + (\lambda_2 + \lambda_4)(2h)^n \\ \phi_4(h) &= \phi_4(0) + (\lambda_1 + \lambda_2 + \lambda_3 + \lambda_4) h^n \end{aligned}\right\} \tag{A2}$$

We assume that, over the small interval $V_w \leqslant V \leqslant V_w + 4h$, the functions λ_k may be expanded in a power series in h about the point $V = V_w + 4h$. We have, therefore,

$$\lambda_k = \lambda_4 + (k-4)\, h\, \lambda_4' + \tfrac{1}{2}(k-4)^2 h^2 \lambda_4'' + \ldots\ldots .$$

We denote by $\psi(h)$ the quantity

$$\psi(h) = \left\{ \frac{\phi_4(4h) - \phi_4(2h)}{\phi_4(2h) - \phi_4(h)} \right\}.$$

We can show that

$$\psi(h) = 2^{n-1} + \alpha h + \beta h^2 + \gamma h^3 + \ldots\ldots . \tag{A3}$$

An approximate value for n may be obtained by performing the integration for the three step lengths $\Delta V = h_0$, $2h_0$ and $4h_0$, say, whence

$$\psi(h_0) = 2^{n-1} + \alpha h_0 + \beta h_0^2 + \gamma h_0^3 + \ldots\ldots .$$

If we also integrate using $\Delta V = 8h_0$, we may obtain the additional equation

$$\psi(2h_0) = 2^{n-1} + \alpha(2h_0) + \beta(2h_0)^2 + \gamma(2h_0)^3 + \ldots\ldots$$

A further equation of this type may be obtained for each extra integration made. In two test cases, one for each method of integration, 6 different step sizes were used; $\Delta V = ph_0$, for $p = 1, 2, 4, 8, 16$ and 32. It may be seen from the following Table that the values of n become more accurate as the number of equations of the form of equation (A3) is increased. For example, if we have four equations (and hence values for $\psi(h_0)$, $\psi(2h_0)$, $\psi(4h_0)$ and $\psi(8h_0)$), we may show that

$$\psi(0) \equiv 2^{n-1} = \frac{1}{21}\{64\,\psi(h_0) - 56\,\psi(2h_0) + 14\,\psi(4h_0) - \psi(8h_0)\} + 0(h_0^4).$$

No. of equations of type (A3)		1	2	3	4	ϕ	Value of h_0
Value of n (using Intstep)	{	4·407 4·376	4·790 4·729	4·919 4·859	4·973 4·907	θ U	} 0·005/3
Value of n (using power series)	{	3·131 3·134	3·075 3·082	3·042 3·054	3·028 3·042	θ U	} 0·00125/3

It may be deduced that $n = 5$ for the Intstep Routine, and $n = 3$ for the power series method.

LIST OF SYMBOLS

a		Speed of sound
A		Function defined in equation (7b) (used only in Section 2)
A		$a/q_{\max}$
C_p		Specific heat at constant pressure
F		Parameter indicating the amount of heat added at the wave
h		Step size
M		Mach number
n		*See* equation (19)
p		Pressure
P	=	p/p_∞
q		Velocity
Q		Heat added per unit mass, equation (7c) (used in Section 2 only)
Q	=	$q/q_{\max}$
S		Entropy rise across wave
T		Static temperature
u, v, w		Velocity components in spherical polar co-ordinates
U, V		$u/q_{\max}, v/q_{\max}$
r, θ, ϕ		Spherical polar co-ordinates
γ		Ratio of specific heats
δ		Deflection angle.
λ		*See* equation (19)
ρ		Density
$\phi(h)$		Function defined and used in Section 5.2.1 and the Appendix
$\psi(h)$		*See* Appendix

Subscripts

c	On cone surface
CJ	Chapman-Jouguet condition ($F = 1$)
s	Conditions immediately behind shock wave ($F = 2$)
w	Conditions immediately behind wave (general value of F)
∞	Free stream condition
max	*See* equation (15)
0	Where $\theta = \theta_0$ (*see* Section 4)

REFERENCES

No.	*Author(s)*	*Title, etc.*
1	G. I. Taylor and J. W. Maccoll	*Proc. Roy. Soc.*, A, Vol. 139 (p. 278), 1933.
2	T. Meyer	Mitteil über Forschungsarb. des Ver. deutsch Ingenieure, No. 62, 1908.
3	Z. Kopal (Editor)	Tables of supersonic flow around cones. M.I.T., Dept. of Elec. Eng. Center of Analysis. Technical Report No. 1, 1947.
4	J. L. Sims	Tables for supersonic flow around right circular cones at zero angle of attack. NASA SP–3004, 1964.
5	J. Maasdem and P. J. Zandbergen	A programme for the construction of a 'first characteristic' flow around a cone with or without inclination. NLR–TR G. 32, August 1963.
6	F. Walkden and J. M. Howie	A new method for calculating the supersonic flow past a body. R.A.E. T.N. Maths 89, August 1962; ARC 24350, 1962.
7	Compressible Flow Tables Panel. A.R.C.	A selection of graphs for use in calculations of compressible airflow. O.U.P., 1954.
8	W. T. Strike, Jr. and B. B. Norton, Jr.	Flow properties of an unyawed 10–deg cone for $\gamma = 1{\cdot}28$ to $1{\cdot}40$ at Mach numbers of 1·5 to 8. AEDC–TN–60–178, 1960.
9	L. H. Townend	An analysis of oblique and normal detonation waves. R.A.E. Technical Report 66081, ARC 28 317. March 1966.
10	H. W. Woolard	Analytical approximations for stationary conical detonations and deflagrations in supersonic flow. Johns Hopkins Univ. (Applied Physics Lab.) TG–446, May 1963.
11	R. A. Hord	An approximate solution for axially symmetric flow over a cone with an attached shock wave. NACA TN 3485, October 1955.

Note on Tables 1 *to* 70

The main columns of each of these Tables are headed as follows:

THETA U V Q P A^2 DENSITY

These functions represent the following non-dimensional quantities:

THETA = polar angle, in degrees

$$U = u/q_{\max}$$

$$V = v/q_{\max}$$

$$Q = q/q_{\max}$$

$$P = p/p_{\infty}$$

$$A^2 = a^2/q_{\max}^2$$

$$\text{DENSITY} = \rho/\rho_{\infty}$$

TABLE 1

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.5000	1.400	2.00	1.341641	3.16, -7	5	23.7351

Theta	U	V	Q	P	A^2	Density
5.0000	0.734380	0.000000	0.734380	1.1339	0.092137	1.0939
5.0000	0.734380	-0.000000	0.734380	1.1339	0.092137	1.0939
5.5000	0.734326	-0.012239	0.734428	1.1332	0.092123	1.0935
6.0000	0.734169	-0.023522	0.734546	1.1318	0.092088	1.0924
6.5000	0.733917	-0.034077	0.734708	1.1297	0.092041	1.0910
7.0000	0.733576	-0.044062	0.734898	1.1273	0.091985	1.0894
7.5000	0.733150	-0.053594	0.735106	1.1247	0.091924	1.0876
8.0000	0.732642	-0.062757	0.735325	1.1219	0.091859	1.0857
8.5000	0.732055	-0.071617	0.735550	1.1191	0.091793	1.0837
9.0000	0.731393	-0.080223	0.735779	1.1162	0.091726	1.0817
9.5000	0.730656	-0.088615	0.736010	1.1133	0.091658	1.0797
10.0000	0.729847	-0.096824	0.736241	1.1105	0.091590	1.0777
10.5000	0.728966	-0.104875	0.736472	1.1076	0.091522	1.0757
11.0000	0.728017	-0.112788	0.736702	1.1047	0.091454	1.0737
11.5000	0.726998	-0.120582	0.736930	1.1019	0.091387	1.0717
12.0000	0.725912	-0.128269	0.737158	1.0990	0.091320	1.0698
12.5000	0.724760	-0.135862	0.737384	1.0962	0.091253	1.0678
13.0000	0.723541	-0.143370	0.737609	1.0934	0.091187	1.0659
13.5000	0.722258	-0.150803	0.737833	1.0907	0.091120	1.0639
14.0000	0.720909	-0.158167	0.738057	1.0879	0.091055	1.0620
14.5000	0.719497	-0.165470	0.738280	1.0851	0.090989	1.0601
15.0000	0.718022	-0.172716	0.738502	1.0824	0.090923	1.0582
15.5000	0.716483	-0.179911	0.738726	1.0797	0.090857	1.0563
16.0000	0.714882	-0.187059	0.738950	1.0769	0.090791	1.0543
16.5000	0.713218	-0.194165	0.739175	1.0741	0.090724	1.0524
17.0000	0.711493	-0.201232	0.739403	1.0714	0.090657	1.0505
17.5000	0.709706	-0.208265	0.739633	1.0685	0.090589	1.0485
18.0000	0.707858	-0.215267	0.739867	1.0657	0.090519	1.0465
18.5000	0.705949	-0.222242	0.740105	1.0628	0.090449	1.0445
19.0000	0.703979	-0.229194	0.740349	1.0598	0.090377	1.0424
19.5000	0.701949	-0.236129	0.740601	1.0568	0.090302	1.0402
20.0000	0.699858	-0.243051	0.740861	1.0536	0.090225	1.0380
20.5000	0.697707	-0.249968	0.741134	1.0503	0.090144	1.0357
21.0000	0.695495	-0.256889	0.741422	1.0468	0.090059	1.0332
21.5000	0.693223	-0.263828	0.741730	1.0431	0.089967	1.0306
22.0000	0.690891	-0.270806	0.742069	1.0390	0.089867	1.0277
22.5000	0.688497	-0.277860	0.742451	1.0344	0.089753	1.0245
23.0000	0.686041	-0.285070	0.742911	1.0290	0.089617	1.0206
23.5000	0.683520	-0.292698	0.743554	1.0213	0.089426	1.0152
23.7351	0.682311	-0.296906	0.744111	1.0147	0.089260	1.0105

TABLE 2

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.5000	1.400	2.00	1.341641	3.56, -4	10	25.2882

Theta	U	V	Q	P	A^2	Density
10.0000	0.713777	0.000000	0.713777	1.4119	0.098105	1.2792
10.5000	0.713723	-0.012167	0.713827	1.4111	0.098090	1.2788
11.0000	0.713566	-0.023814	0.713963	1.4092	0.098051	1.2775
11.5000	0.713309	-0.035020	0.714168	1.4062	0.097993	1.2756
12.0000	0.712956	-0.045847	0.714428	1.4025	0.097918	1.2732
12.5000	0.712510	-0.056347	0.714734	1.3981	0.097831	1.2703
13.0000	0.711973	-0.066564	0.715078	1.3932	0.097733	1.2671
13.5000	0.711349	-0.076530	0.715454	1.3879	0.097625	1.2637
14.0000	0.710638	-0.086277	0.715856	1.3821	0.097510	1.2599
14.5000	0.709843	-0.095830	0.716283	1.3761	0.097388	1.2560
15.0000	0.708966	-0.105212	0.716730	1.3698	0.097260	1.2519
15.5000	0.708008	-0.114440	0.717197	1.3632	0.097126	1.2476
16.0000	0.706969	-0.123532	0.717681	1.3564	0.096987	1.2431
16.5000	0.705852	-0.132503	0.718181	1.3493	0.096843	1.2385
17.0000	0.704657	-0.141367	0.718697	1.3421	0.096695	1.2338
17.5000	0.703385	-0.150136	0.719229	1.3347	0.096542	1.2289
18.0000	0.702037	-0.158821	0.719777	1.3271	0.096384	1.2239
18.5000	0.700613	-0.167433	0.720342	1.3193	0.096221	1.2187
19.0000	0.699115	-0.175983	0.720924	1.3112	0.096054	1.2134
19.5000	0.697542	-0.184482	0.721525	1.3030	0.095880	1.2080
20.0000	0.695895	-0.192939	0.722146	1.2945	0.095701	1.2023
20.5000	0.694174	-0.201367	0.722791	1.2857	0.095515	1.1965
21.0000	0.692380	-0.209778	0.723462	1.2765	0.095320	1.1904
21.5000	0.690513	-0.218187	0.724164	1.2670	0.095117	1.1841
22.0000	0.688572	-0.226610	0.724903	1.2571	0.094903	1.1774
22.5000	0.686558	-0.235070	0.725685	1.2466	0.094676	1.1704
23.0000	0.684469	-0.243595	0.726524	1.2354	0.094433	1.1629
23.5000	0.682306	-0.252227	0.727434	1.2233	0.094168	1.1547
24.0000	0.680067	-0.261030	0.728442	1.2100	0.093875	1.1458
24.5001	0.677749	-0.270117	0.729594	1.1949	0.093539	1.1355
25.0000	0.675351	-0.279720	0.730987	1.1768	0.093132	1.1232
25.2882	0.673929	-0.285714	0.731992	1.1639	0.092837	1.1144

TABLE 3

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.5000	1.400	2.00	1.341641	6.40, -3	15	28.4546

Theta	U	V	Q	P	A^2	Density
15.0000	0.687667	0.000000	0.687667	1.8052	0.105423	1.5221
15.4999	0.687616	-0.011812	0.687717	1.8044	0.105409	1.5216
16.0000	0.687462	-0.023288	0.687857	1.8021	0.105371	1.5202
16.4999	0.687210	-0.034460	0.688074	1.7985	0.105311	1.5180
17.0000	0.686862	-0.045370	0.688358	1.7938	0.105233	1.5152
17.5000	0.686419	-0.056044	0.688703	1.7882	0.105138	1.5118
18.0000	0.685884	-0.066510	0.689101	1.7816	0.105028	1.5079
18.5000	0.685259	-0.076790	0.689548	1.7743	0.104905	1.5034
19.0000	0.684544	-0.086904	0.690038	1.7663	0.104769	1.4986
19.4999	0.683742	-0.096871	0.690570	1.7577	0.104623	1.4934
20.0000	0.682854	-0.106708	0.691141	1.7484	0.104465	1.4877
20.5000	0.681880	-0.116427	0.691748	1.7386	0.104297	1.4818
21.0000	0.680822	-0.126045	0.692392	1.7282	0.104119	1.4754
21.5000	0.679681	-0.135573	0.693070	1.7173	0.103931	1.4688
22.0000	0.678456	-0.145026	0.693783	1.7059	0.103733	1.4618
22.5000	0.677150	-0.154414	0.694532	1.6940	0.103525	1.4545
23.0000	0.675761	-0.163750	0.695318	1.6815	0.103307	1.4468
23.5000	0.674292	-0.173048	0.696143	1.6685	0.103077	1.4388
24.0000	0.672741	-0.182321	0.697009	1.6548	0.102836	1.4304
24.5000	0.671110	-0.191584	0.697920	1.6406	0.102582	1.4216
25.0000	0.669397	-0.200854	0.698881	1.6256	0.102313	1.4123
25.5000	0.667604	-0.210152	0.699899	1.6098	0.102028	1.4025
26.0000	0.665729	-0.219502	0.700982	1.5931	0.101725	1.3921
26.5000	0.663773	-0.228935	0.702143	1.5753	0.101399	1.3810
27.0001	0.661733	-0.238496	0.703399	1.5562	0.101046	1.3690
27.5000	0.659609	-0.248242	0.704776	1.5354	0.100658	1.3559
28.0001	0.657399	-0.258274	0.706314	1.5124	0.100224	1.3413
28.4546	0.655313	-0.267770	0.707910	1.4887	0.099773	1.3263

TABLE 4

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.5000	1.400	2.00	1.341641	2.99, -2	20	32.5809

Theta	U	V	Q	P	A^2	Density
20.0000	0.656262	0.000000	0.656262	2.3089	0.113864	1.8024
20.5000	0.656212	-0.011322	0.656310	2.3080	0.113851	1.8019
20.9999	0.656065	-0.022398	0.656447	2.3054	0.113815	1.8005
21.4999	0.655822	-0.033258	0.656665	2.3014	0.113758	1.7982
22.0000	0.655485	-0.043923	0.656955	2.2960	0.113682	1.7952
22.5000	0.655056	-0.054413	0.657312	2.2893	0.113588	1.7915
23.0000	0.654536	-0.064746	0.657730	2.2816	0.113478	1.7872
23.5000	0.653926	-0.074939	0.658206	2.2728	0.113353	1.7823
23.9999	0.653228	-0.085007	0.658736	2.2630	0.113213	1.7768
24.4999	0.652443	-0.094963	0.659318	2.2523	0.113060	1.7708
25.0000	0.651571	-0.104821	0.659949	2.2407	0.112894	1.7643
25.5000	0.650614	-0.114591	0.660628	2.2283	0.112714	1.7573
26.0000	0.649571	-0.124287	0.661355	2.2150	0.112522	1.7498
26.5000	0.648445	-0.133918	0.662129	2.2009	0.112317	1.7418
27.0000	0.647234	-0.143497	0.662951	2.1860	0.112099	1.7334
27.5000	0.645940	-0.153036	0.663821	2.1703	0.111868	1.7245
28.0000	0.644563	-0.162545	0.664742	2.1537	0.111623	1.7151
28.5000	0.643103	-0.172038	0.665717	2.1363	0.111364	1.7051
29.0000	0.641560	-0.181530	0.666748	2.1179	0.111089	1.6946
29.5000	0.639935	-0.191035	0.667841	2.0985	0.110798	1.6835
30.0000	0.638226	-0.200572	0.669001	2.0780	0.110488	1.6718
30.5000	0.636434	-0.210165	0.670237	2.0563	0.110157	1.6593
31.0000	0.634558	-0.219838	0.671560	2.0332	0.109801	1.6459
31.5001	0.632597	-0.229631	0.672985	2.0084	0.109418	1.6316
32.0001	0.630549	-0.239587	0.674533	1.9818	0.109001	1.6161
32.5000	0.628414	-0.249773	0.676233	1.9527	0.108542	1.5991
32.5809	0.628061	-0.251449	0.676526	1.9477	0.108463	1.5962

TABLE 5

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.0000	1.400	2.00	1.247219	2.21, -6	5	19.7155

Theta	U	V	Q	P	A^2	Density
5.0000	0.791042	0.000000	0.791042	1.1780	0.074850	1.1241
5.0000	0.791042	-0.000000	0.791042	1.1780	0.074850	1.1241
5.5000	0.790984	-0.013185	0.791094	1.1771	0.074834	1.1235
6.0000	0.790815	-0.025346	0.791221	1.1748	0.074794	1.1220
6.5000	0.790544	-0.036731	0.791397	1.1718	0.074738	1.1199
7.0000	0.790176	-0.047513	0.791603	1.1682	0.074673	1.1174
7.5000	0.789716	-0.057815	0.791829	1.1643	0.074601	1.1148
8.0000	0.789168	-0.067728	0.792069	1.1601	0.074525	1.1119
8.5000	0.788535	-0.077323	0.792317	1.1559	0.074447	1.1090
9.0000	0.787819	-0.086652	0.792570	1.1515	0.074367	1.1060
9.5000	0.787023	-0.095758	0.792827	1.1471	0.074285	1.1030
10.0000	0.786148	-0.104675	0.793086	1.1427	0.074203	1.0999
10.5000	0.785196	-0.113429	0.793347	1.1382	0.074120	1.0969
11.0000	0.784169	-0.122044	0.793609	1.1337	0.074037	1.0938
11.5000	0.783067	-0.130536	0.793872	1.1293	0.073953	1.0907
12.0000	0.781891	-0.138924	0.794137	1.1248	0.073869	1.0876
12.5000	0.780642	-0.147219	0.794403	1.1203	0.073785	1.0845
13.0000	0.779322	-0.155433	0.794671	1.1158	0.073700	1.0814
13.5000	0.777930	-0.163578	0.794942	1.1112	0.073614	1.0782
14.0000	0.776467	-0.171662	0.795216	1.1066	0.073526	1.0750
14.5000	0.774934	-0.179695	0.795495	1.1019	0.073437	1.0718
15.0000	0.773331	-0.187685	0.795780	1.0972	0.073347	1.0685
15.5000	0.771658	-0.195642	0.796073	1.0923	0.073254	1.0651
16.0000	0.769916	-0.203576	0.796376	1.0873	0.073157	1.0616
16.5000	0.768105	-0.211498	0.796691	1.0821	0.073057	1.0580
17.0000	0.766225	-0.219423	0.797024	1.0766	0.072951	1.0541
17.5000	0.764275	-0.227370	0.797380	1.0707	0.072837	1.0500
18.0000	0.762256	-0.235369	0.797768	1.0644	0.072713	1.0456
18.5000	0.760167	-0.243472	0.798206	1.0572	0.072573	1.0406
19.0000	0.758006	-0.251787	0.798730	1.0487	0.072406	1.0346
19.5000	0.755771	-0.260664	0.799459	1.0369	0.072173	1.0263
19.7155	0.754783	-0.265146	0.800000	1.0283	0.072000	1.0201

TABLE 6

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.0000	1.400	2.00	1.247219	1.40, -3	10	21.7148

Theta	U	V	Q	P	A^2	Density
10.0000	0.771343	0.000000	0.771343	1.5511	0.081006	1.3677
10.5000	0.771285	-0.013149	0.771397	1.5500	0.080989	1.3670
11.0000	0.771115	-0.025743	0.771545	1.5470	0.080944	1.3651
11.5000	0.770837	-0.037873	0.771767	1.5424	0.080875	1.3622
12.0000	0.770455	-0.049608	0.772051	1.5365	0.080788	1.3585
12.5000	0.769972	-0.061006	0.772385	1.5297	0.080684	1.3542
13.0000	0.769391	-0.072114	0.772764	1.5219	0.080567	1.3493
13.5000	0.768715	-0.082973	0.773180	1.5134	0.080439	1.3439
14.0000	0.767944	-0.093617	0.773629	1.5043	0.080300	1.3381
14.5000	0.767081	-0.104074	0.774109	1.4946	0.080151	1.3319
15.0000	0.766128	-0.114372	0.774618	1.4843	0.079993	1.3254
15.5000	0.765085	-0.124533	0.775154	1.4736	0.079827	1.3185
16.0000	0.763955	-0.134578	0.775718	1.4623	0.079652	1.3113
16.5000	0.762737	-0.144528	0.776309	1.4505	0.079469	1.3038
17.0000	0.761432	-0.154404	0.776930	1.4383	0.079276	1.2959
17.5000	0.760042	-0.164224	0.777582	1.4254	0.079073	1.2876
18.0000	0.758566	-0.174012	0.778269	1.4120	0.078859	1.2789
18.5000	0.757005	-0.183791	0.778997	1.3978	0.078633	1.2698
19.0000	0.755358	-0.193591	0.779772	1.3829	0.078391	1.2600
19.5000	0.753626	-0.203447	0.780604	1.3669	0.078131	1.2496
20.0000	0.751807	-0.213412	0.781511	1.3496	0.077848	1.2383
20.5000	0.749901	-0.223560	0.782515	1.3306	0.077534	1.2259
21.0000	0.747905	-0.234019	0.783662	1.3092	0.077175	1.2117
21.5001	0.745815	-0.245047	0.785040	1.2837	0.076742	1.1948
21.7148	0.744887	-0.250096	0.785751	1.2707	0.076519	1.1861

TABLE 7

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.0000	1.400	2.00	1.247219	1.75, -2	15	25.2589

Theta	U	V	Q	P	A^2	Density
15,0000	0.746247	0.000000	0.746247	2.0906	0.088623	1.6850
14,9999	0.746247	0.000002	0.746247	2.0906	0.088623	1.6850
15,5000	0.746191	-0.012822	0.746301	2.0893	0.088607	1.6842
15,9999	0.746024	-0.025279	0.746452	2.0855	0.088562	1.6821
16,4999	0.745750	-0.037422	0.746689	2.0797	0.088491	1.6787
16,9999	0.745372	-0.049293	0.747000	2.0721	0.088398	1.6743
17,5000	0.744891	-0.060927	0.747378	2.0628	0.088285	1.6689
17,9999	0.744309	-0.072354	0.747818	2.0521	0.088154	1.6627
18,5000	0.743628	-0.083605	0.748313	2.0400	0.088005	1.6558
19,0000	0.742850	-0.094703	0.748863	2.0267	0.087841	1.6480
19,5000	0.741976	-0.105671	0.749463	2.0122	0.087661	1.6396
20,0000	0.741006	-0.116532	0.750113	1.9966	0.087466	1.6305
20,5000	0.739942	-0.127306	0.750814	1.9798	0.087256	1.6207
21,0000	0.738785	-0.138016	0.751566	1.9620	0.087030	1.6103
21,5000	0.737534	-0.148682	0.752371	1.9429	0.086788	1.5991
22,0000	0.736190	-0.159329	0.753234	1.9226	0.086528	1.5871
22,5000	0.734753	-0.169984	0.754159	1.9010	0.086249	1.5744
23,0000	0.733223	-0.180679	0.755156	1.8779	0.085948	1.5607
23,5000	0.731599	-0.191453	0.756235	1.8531	0.085622	1.5459
24,0000	0.729881	-0.202358	0.757413	1.8262	0.085265	1.5299
24,5000	0.728067	-0.213468	0.758716	1.7968	0.084870	1.5122
25,0001	0.726154	-0.224901	0.760184	1.7639	0.084424	1.4924
25,2589	0.725124	-0.231002	0.761030	1.7452	0.084167	1.4811

TABLE 8

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.0000	1.400	2.00	1.247219	6.70, -2	20	29.6147

Theta	U	V	Q	P	A^2	Density
20.0000	0.715475	0.000000	0.715475	2.7909	0.097619	2.0421
20.4999	0.715421	-0.012342	0.715527	2.7894	0.097604	2.0413
21.0000	0.715260	-0.024425	0.715677	2.7851	0.097561	2.0391
21.5000	0.714995	-0.036279	0.715915	2.7783	0.097493	2.0355
21.9999	0.714627	-0.047933	0.716233	2.7692	0.097402	2.0308
22.5000	0.714159	-0.059413	0.716626	2.7580	0.097289	2.0249
23.0000	0.713591	-0.070741	0.717089	2.7449	0.097157	2.0180
23.5000	0.712924	-0.081939	0.717618	2.7299	0.097005	2.0101
24.0000	0.712161	-0.093026	0.718211	2.7132	0.096835	2.0013
24.5000	0.711301	-0.104020	0.718867	2.6947	0.096646	1.9916
25.0000	0.710346	-0.114940	0.719585	2.6746	0.096440	1.9810
25.5000	0.709295	-0.125805	0.720366	2.6529	0.096215	1.9695
26.0000	0.708150	-0.136633	0.721211	2.6294	0.095971	1.9570
26.5000	0.706911	-0.147446	0.722124	2.6042	0.095707	1.9436
27.0000	0.705577	-0.158265	0.723109	2.5772	0.095423	1.9292
27.5000	0.704148	-0.169117	0.724172	2.5483	0.095115	1.9137
28.0000	0.702625	-0.180032	0.725323	2.5171	0.094781	1.8969
28.5000	0.701006	-0.191051	0.726574	2.4835	0.094418	1.8788
29.0001	0.699290	-0.202221	0.727942	2.4471	0.094020	1.8591
29.5001	0.697475	-0.213616	0.729454	2.4071	0.093579	1.8374
29.6147	0.697046	-0.216267	0.729825	2.3974	0.093471	1.8321

TABLE 9

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.5000	1.400	2.00	1.186661	1.10, -5	5	16.9549

Theta	U	V	Q	P	A^2	Density
5.0000	0.832282	0.000000	0.832282	1.2271	0.061461	1.1574
5.0000	0.832282	0.000000	0.832282	1.2271	0.061461	1.1574
5.2500	0.832266	-0.007091	0.832296	1.2267	0.061457	1.1571
5.5000	0.832220	-0.013874	0.832336	1.2258	0.061443	1.1565
5.7500	0.832145	-0.020391	0.832395	1.2244	0.061424	1.1556
6.0000	0.832043	-0.026679	0.832470	1.2227	0.061399	1.1544
6.2500	0.831913	-0.032766	0.832558	1.2207	0.061370	1.1531
6.5000	0.831757	-0.038678	0.832656	1.2184	0.061337	1.1515
6.7500	0.831575	-0.044434	0.832762	1.2159	0.061302	1.1499
7.0000	0.831369	-0.050053	0.832875	1.2133	0.061264	1.1481
7.2500	0.831139	-0.055549	0.832993	1.2106	0.061224	1.1463
7.5000	0.830885	-0.060935	0.833116	1.2078	0.061184	1.1443
7.7500	0.830607	-0.066223	0.833243	1.2048	0.061141	1.1424
8.0000	0.830307	-0.071421	0.833373	1.2018	0.061098	1.1403
8.2500	0.829984	-0.076538	0.833506	1.1988	0.061054	1.1383
8.5000	0.829639	-0.081582	0.833641	1.1957	0.061009	1.1362
8.7500	0.829272	-0.086560	0.833778	1.1926	0.060963	1.1341
9.0000	0.828884	-0.091476	0.833916	1.1894	0.060917	1.1319
9.2500	0.828474	-0.096337	0.834056	1.1862	0.060870	1.1297
9.5000	0.828043	-0.101147	0.834198	1.1830	0.060823	1.1275
9.7500	0.827591	-0.105910	0.834341	1.1798	0.060775	1.1253
10.0000	0.827119	-0.110631	0.834485	1.1765	0.060727	1.1231
10.2500	0.826626	-0.115312	0.834630	1.1732	0.060678	1.1209
10.5000	0.826113	-0.119957	0.834777	1.1699	0.060630	1.1186
10.7500	0.825579	-0.124569	0.834924	1.1666	0.060580	1.1163
11.0000	0.825026	-0.129151	0.835073	1.1632	0.060531	1.1140
11.2500	0.824452	-0.133704	0.835224	1.1599	0.060480	1.1117
11.5000	0.823859	-0.138233	0.835375	1.1565	0.060430	1.1094
11.7500	0.823246	-0.142738	0.835529	1.1530	0.060378	1.1071
12.0000	0.822613	-0.147222	0.835684	1.1496	0.060327	1.1047
12.2500	0.821961	-0.151688	0.835841	1.1461	0.060274	1.1023
12.5000	0.821290	-0.156137	0.836000	1.1425	0.060221	1.0999
12.7500	0.820599	-0.160571	0.836161	1.1390	0.060167	1.0974
13.0000	0.819888	-0.164993	0.836325	1.1353	0.060112	1.0949
13.2500	0.819159	-0.169405	0.836492	1.1316	0.060056	1.0923
13.5000	0.818410	-0.173809	0.836663	1.1279	0.059999	1.0898
13.7500	0.817642	-0.178208	0.836837	1.1240	0.059941	1.0871
14.0000	0.816855	-0.182604	0.837016	1.1201	0.059881	1.0844
14.2500	0.816049	-0.187001	0.837200	1.1161	0.059819	1.0816
14.5000	0.815223	-0.191401	0.837391	1.1119	0.059755	1.0787
14.7500	0.814378	-0.195811	0.837588	1.1076	0.059689	1.0757
15.0000	0.813514	-0.200234	0.837794	1.1031	0.059620	1.0726
15.2500	0.812631	-0.204677	0.838011	1.0985	0.059548	1.0694
15.5000	0.811728	-0.209150	0.838240	1.0935	0.059471	1.0659
15.7500	0.810806	-0.213665	0.838486	1.0882	0.059388	1.0622
16.0000	0.809863	-0.218241	0.838754	1.0824	0.059298	1.0582
16.2500	0.808901	-0.222908	0.839052	1.0761	0.059198	1.0538
16.5000	0.807918	-0.227724	0.839398	1.0687	0.059082	1.0486
16.7500	0.806913	-0.232820	0.839830	1.0595	0.058937	1.0422
16.9549	0.806072	-0.237538	0.840344	1.0487	0.058765	1.0346

TABLE 10

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.5000	1.400	2.00	1.186661	3.97, -3	10	19.3603

Theta	U	V	Q	P	A^2	Density
10.0000	0.813470	0.000000	0.813470	1.7102	0.067653	1.4654
10.0000	0.813470	0.000000	0.813470	1.7102	0.067653	1.4654
10.2500	0.813455	-0.007014	0.813485	1.7098	0.067648	1.4652
10.5000	0.813409	-0.013869	0.813527	1.7086	0.067635	1.4644
10.7500	0.813334	-0.020580	0.813594	1.7066	0.067613	1.4633
11.0000	0.813230	-0.027161	0.813683	1.7041	0.067584	1.4617
11.2500	0.813097	-0.033623	0.813792	1.7010	0.067549	1.4598
11.5000	0.812936	-0.039976	0.813919	1.6973	0.067507	1.4575
11.7500	0.812748	-0.046230	0.814062	1.6932	0.067461	1.4550
12.0000	0.812533	-0.052393	0.814220	1.6887	0.067409	1.4522
12.2500	0.812291	-0.058473	0.814393	1.6838	0.067353	1.4492
12.5000	0.812023	-0.064476	0.814579	1.6785	0.067292	1.4460
12.7500	0.811729	-0.070409	0.814776	1.6729	0.067228	1.4425
13.0000	0.811409	-0.076277	0.814986	1.6669	0.067160	1.4389
13.2500	0.811063	-0.082087	0.815206	1.6607	0.067088	1.4350
13.5000	0.810692	-0.087843	0.815438	1.6542	0.067012	1.4310
13.7500	0.810297	-0.093550	0.815679	1.6474	0.066934	1.4268
14.0000	0.809876	-0.099212	0.815930	1.6403	0.066852	1.4224
14.2500	0.809431	-0.104835	0.816191	1.6330	0.066766	1.4179
14.5000	0.808961	-0.110421	0.816462	1.6254	0.066678	1.4132
14.7500	0.808467	-0.115975	0.816743	1.6176	0.066586	1.4083
15.0000	0.807949	-0.121501	0.817034	1.6096	0.066491	1.4033
15.2500	0.807407	-0.127004	0.817335	1.6013	0.066393	1.3981
15.5000	0.806841	-0.132486	0.817646	1.5927	0.066291	1.3928
15.7500	0.806251	-0.137952	0.817968	1.5838	0.066186	1.3873
16.0000	0.805637	-0.143407	0.818301	1.5747	0.066077	1.3816
16.2500	0.804999	-0.148855	0.818646	1.5653	0.065964	1.3756
16.5000	0.804338	-0.154301	0.819005	1.5556	0.065846	1.3695
16.7500	0.803653	-0.159751	0.819377	1.5455	0.065724	1.3632
17.0000	0.802944	-0.165209	0.819764	1.5351	0.065597	1.3566
17.2500	0.802211	-0.170684	0.820168	1.5243	0.065465	1.3498
17.5000	0.801454	-0.176184	0.820591	1.5130	0.065326	1.3426
17.7500	0.800673	-0.181717	0.821035	1.5012	0.065180	1.3352
18.0000	0.799868	-0.187296	0.821504	1.4888	0.065026	1.3273
18.2500	0.799039	-0.192937	0.822002	1.4757	0.064862	1.3190
18.5000	0.798185	-0.198659	0.822535	1.4618	0.064687	1.3101
18.7500	0.797305	-0.204490	0.823111	1.4469	0.064498	1.3005
19.0000	0.796400	-0.210470	0.823742	1.4307	0.064290	1.2900
19.2501	0.795468	-0.216663	0.824446	1.4126	0.064058	1.2784
19.3603	0.795048	-0.219487	0.824789	1.4040	0.063945	1.2728

TABLE 11

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.5000	1.400	2.00	1.186661	3.74, -2	15	23.2014

Theta	U	V	Q	P	A^2	Density
15.0000	0.789161	0.000000	0.789161	2.4223	0.075445	1.8613
14.9999	0.789161	0.000002	0.789161	2.4223	0.075445	1.8613
15.2500	0.789147	-0.006832	0.789176	2.4218	0.075440	1.8610
15.5000	0.789102	-0.013560	0.789219	2.4203	0.075427	1.8602
15.7500	0.789028	-0.020196	0.789287	2.4178	0.075405	1.8588
16.0000	0.788926	-0.026743	0.789379	2.4146	0.075376	1.8570
16.2500	0.788795	-0.033212	0.789494	2.4105	0.075340	1.8548
16.5000	0.788636	-0.039605	0.789630	2.4057	0.075297	1.8521
16.7500	0.788450	-0.045932	0.789786	2.4002	0.075248	1.8491
17.0000	0.788235	-0.052197	0.789962	2.3940	0.075192	1.8457
17.2500	0.787994	-0.058404	0.790156	2.3872	0.075131	1.8420
17.5000	0.787726	-0.064559	0.790367	2.3798	0.075064	1.8379
17.7500	0.787431	-0.070667	0.790595	2.3718	0.074992	1.8334
18.0000	0.787109	-0.076731	0.790840	2.3632	0.074914	1.8287
18.2500	0.786761	-0.082755	0.791102	2.3541	0.074832	1.8237
18.5000	0.786387	-0.088744	0.791379	2.3444	0.074744	1.8183
18.7500	0.785987	-0.094703	0.791672	2.3343	0.074651	1.8127
19.0000	0.785561	-0.100633	0.791980	2.3236	0.074553	1.8068
19.2500	0.785109	-0.106541	0.792305	2.3124	0.074451	1.8006
19.5000	0.784631	-0.112429	0.792645	2.3007	0.074343	1.7940
19.7500	0.784128	-0.118301	0.793001	2.2885	0.074230	1.7872
20.0000	0.783599	-0.124162	0.793374	2.2757	0.074111	1.7801
20.2500	0.783044	-0.130016	0.793765	2.2624	0.073988	1.7727
20.5000	0.782464	-0.135868	0.794172	2.2486	0.073858	1.7649
20.7500	0.781858	-0.141722	0.794599	2.2342	0.073722	1.7568
21.0000	0.781227	-0.147584	0.795045	2.2192	0.073581	1.7484
21.2500	0.780570	-0.153460	0.795513	2.2035	0.073432	1.7396
21.5000	0.779888	-0.159357	0.796002	2.1872	0.073276	1.7304
21.7500	0.779180	-0.165281	0.796517	2.1701	0.073112	1.7207
22.0000	0.778446	-0.171244	0.797058	2.1523	0.072940	1.7106
22.2500	0.777685	-0.177254	0.797630	2.1335	0.072757	1.6999
22.5000	0.776899	-0.183326	0.798235	2.1137	0.072564	1.6886
22.7501	0.776085	-0.189475	0.798880	2.0928	0.072358	1.6767
23.0000	0.775245	-0.195722	0.799570	2.0706	0.072138	1.6639
23.2014	0.774548	-0.200844	0.800165	2.0515	0.071947	1.6530

TABLE 12

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
3.5000	1.400	2.00	1.186661	1.23, -1	20	27.7448

Theta	U	V	Q	P	A^2	Density
20.0000	0.758712	0.000000	0.758712	3.3566	0.084871	2.2927
20.0000	0.758712	0.000001	0.758712	3.3566	0.084871	2.2927
20.2500	0.758698	-0.006582	0.758726	3.3560	0.084867	2.2924
20.5000	0.758655	-0.013090	0.758768	3.3543	0.084854	2.2916
20.7500	0.758584	-0.019532	0.758835	3.3515	0.084834	2.2902
21.0000	0.758484	-0.025911	0.758927	3.3476	0.084806	2.2883
21.2500	0.758358	-0.032230	0.759042	3.3428	0.084771	2.2860
21.5000	0.758203	-0.038497	0.759180	3.3370	0.084729	2.2831
21.7500	0.758022	-0.044715	0.759339	3.3303	0.084681	2.2799
22.0000	0.757813	-0.050887	0.759520	3.3228	0.084626	2.2762
22.2500	0.757578	-0.057018	0.759720	3.3144	0.084565	2.2721
22.5000	0.757316	-0.063110	0.759941	3.3052	0.084498	2.2676
22.7500	0.757027	-0.069168	0.760180	3.2953	0.084425	2.2627
23.0000	0.756712	-0.075195	0.760439	3.2846	0.084347	2.2575
23.2500	0.756371	-0.081194	0.760716	3.2731	0.084262	2.2518
23.5000	0.756003	-0.087168	0.761012	3.2608	0.084172	2.2458
23.7500	0.755610	-0.093121	0.761327	3.2479	0.084076	2.2394
24.0000	0.755191	-0.099056	0.761660	3.2342	0.083975	2.2327
24.2500	0.754746	-0.104976	0.762011	3.2198	0.083868	2.2256
24.5000	0.754275	-0.110885	0.762382	3.2046	0.083755	2.2181
24.7500	0.753778	-0.116786	0.762771	3.1887	0.083636	2.2102
25.0000	0.753256	-0.122683	0.763181	3.1721	0.083511	2.2020
25.2500	0.752707	-0.128579	0.763610	3.1547	0.083380	2.1933
25.5000	0.752134	-0.134479	0.764061	3.1365	0.083242	2.1843
25.7500	0.751534	-0.140386	0.764533	3.1175	0.083098	2.1748
26.0000	0.750908	-0.146306	0.765029	3.0976	0.082946	2.1649
26.2500	0.750257	-0.152245	0.765548	3.0769	0.082787	2.1546
26.5000	0.749580	-0.158207	0.766094	3.0552	0.082620	2.1437
26.7500	0.748876	-0.164200	0.766667	3.0325	0.082444	2.1323
27.0000	0.748147	-0.170232	0.767270	3.0088	0.082259	2.1204
27.2500	0.747391	-0.176311	0.767905	2.9839	0.082064	2.1078
27.5000	0.746608	-0.182448	0.768577	2.9577	0.081858	2.0946
27.7448	0.745816	-0.188526	0.769274	2.9306	0.081643	2.0809

TABLE 13

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.0000	1.400	2.00	1.145644	4.12, -5	5	14.9566

Theta	U	V	Q	P	A^2	Density
5.0000	0.862811	0.000000	0.862811	1.2810	0.051111	1.1935
5.0000	0.862811	-0.000000	0.862811	1.2810	0.051111	1.1935
5.2500	0.862795	-0.007352	0.862826	1.2806	0.051106	1.1932
5.5000	0.862748	-0.014385	0.862867	1.2793	0.051092	1.1924
5.7500	0.862670	-0.021145	0.862929	1.2775	0.051071	1.1911
6.0000	0.862563	-0.027671	0.863007	1.2751	0.051044	1.1896
6.2500	0.862429	-0.033991	0.863098	1.2724	0.051012	1.1877
6.5000	0.862267	-0.040134	0.863200	1.2693	0.050977	1.1857
6.7500	0.862079	-0.046119	0.863311	1.2659	0.050939	1.1834
7.0000	0.861865	-0.051965	0.863430	1.2624	0.050898	1.1811
7.2500	0.861625	-0.057687	0.863554	1.2587	0.050855	1.1786
7.5000	0.861361	-0.063299	0.863684	1.2548	0.050810	1.1760
7.7500	0.861073	-0.068813	0.863818	1.2508	0.050764	1.1733
8.0000	0.860761	-0.074238	0.863957	1.2467	0.050716	1.1705
8.2500	0.860425	-0.079583	0.864098	1.2425	0.050667	1.1677
8.5000	0.860067	-0.084856	0.864243	1.2382	0.050617	1.1649
8.7500	0.859685	-0.090064	0.864390	1.2338	0.050566	1.1619
9.0000	0.859281	-0.095214	0.864540	1.2294	0.050514	1.1589
9.2500	0.858854	-0.100310	0.864692	1.2249	0.050461	1.1559
9.5000	0.858406	-0.105358	0.864847	1.2204	0.050408	1.1529
9.7500	0.857935	-0.110363	0.865004	1.2158	0.050354	1.1498
10.0000	0.857442	-0.115329	0.865164	1.2111	0.050298	1.1466
10.2500	0.856928	-0.120260	0.865326	1.2064	0.050242	1.1434
10.5000	0.856393	-0.125159	0.865491	1.2016	0.050185	1.1402
10.7500	0.855836	-0.130032	0.865658	1.1968	0.050127	1.1369
11.0000	0.855258	-0.134880	0.865829	1.1918	0.050068	1.1335
11.2500	0.854659	-0.139708	0.866003	1.1868	0.050008	1.1301
11.5000	0.854039	-0.144520	0.866181	1.1817	0.049946	1.1266
11.7500	0.853398	-0.149318	0.866363	1.1765	0.049883	1.1231
12.0000	0.852736	-0.154107	0.866549	1.1712	0.049818	1.1195
12.2500	0.852053	-0.158891	0.866742	1.1657	0.049752	1.1157
12.5000	0.851350	-0.163674	0.866940	1.1600	0.049683	1.1119
12.7500	0.850625	-0.168463	0.867146	1.1542	0.049611	1.1079
13.0000	0.849879	-0.173264	0.867361	1.1482	0.049537	1.1037
13.2500	0.849113	-0.178085	0.867587	1.1418	0.049459	1.0993
13.5000	0.848325	-0.182936	0.867826	1.1351	0.049376	1.0947
13.7500	0.847516	-0.187832	0.868081	1.1280	0.049287	1.0898
14.0000	0.846686	-0.192794	0.868359	1.1203	0.049191	1.0845
14.2500	0.845834	-0.197857	0.868667	1.1118	0.049084	1.0786
14.5000	0.844959	-0.203082	0.869021	1.1021	0.048960	1.0719
14.7500	0.844061	-0.208604	0.869457	1.0902	0.048809	1.0636
14.9566	0.843300	-0.213696	0.869955	1.0767	0.048636	1.0542

TABLE 14

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.0000	1.400	2.00	1.145644	8.99, -3	10	17.7148

Theta	U	V	Q	P	A^2	Density
10.0000	0.844813	0.000000	0.844813	1.8893	0.057258	1.5712
10.0000	0.844813	-0.000000	0.844813	1.8893	0.057258	1.5712
10.2500	0.844797	-0.007284	0.844829	1.8886	0.057253	1.5709
10.5000	0.844750	-0.014405	0.844873	1.8869	0.057238	1.5698
10.7500	0.844672	-0.021379	0.844942	1.8842	0.057214	1.5682
11.0000	0.844564	-0.028221	0.845035	1.8806	0.057183	1.5661
11.2500	0.844426	-0.034943	0.845149	1.8762	0.057145	1.5635
11.5000	0.844259	-0.041557	0.845281	1.8711	0.057100	1.5604
11.7500	0.844063	-0.048073	0.845431	1.8652	0.057049	1.5569
12.0000	0.843840	-0.054501	0.845598	1.8588	0.056993	1.5531
12.2500	0.843588	-0.060848	0.845780	1.8518	0.056931	1.5489
12.5000	0.843309	-0.067123	0.845976	1.8443	0.056865	1.5444
12.7500	0.843002	-0.073332	0.846186	1.8362	0.056794	1.5396
13.0000	0.842669	-0.079484	0.846409	1.8277	0.056718	1.5344
13.2500	0.842309	-0.085583	0.846645	1.8186	0.056638	1.5290
13.5000	0.841922	-0.091636	0.846894	1.8092	0.056554	1.5234
13.7500	0.841509	-0.097649	0.847156	1.7993	0.056465	1.5174
14.0000	0.841070	-0.103627	0.847430	1.7890	0.056373	1.5112
14.2500	0.840605	-0.109577	0.847717	1.7782	0.056275	1.5047
14.5000	0.840114	-0.115503	0.848017	1.7670	0.056174	1.4979
14.7500	0.839597	-0.121413	0.848330	1.7553	0.056067	1.4908
15.0000	0.839054	-0.127313	0.848658	1.7431	0.055956	1.4834
15.2500	0.838486	-0.133209	0.849001	1.7304	0.055839	1.4757
15.5000	0.837892	-0.139108	0.849361	1.7172	0.055717	1.4676
15.7500	0.837272	-0.145020	0.849738	1.7034	0.055589	1.4592
16.0000	0.836626	-0.150953	0.850135	1.6890	0.055454	1.4504
16.2500	0.835954	-0.156920	0.850555	1.6738	0.055311	1.4410
16.5000	0.835257	-0.162935	0.851000	1.6578	0.055160	1.4312
16.7500	0.834533	-0.169014	0.851475	1.6409	0.054998	1.4207
17.0000	0.833782	-0.175183	0.851986	1.6228	0.054824	1.4095
17.2500	0.833004	-0.181473	0.852542	1.6032	0.054635	1.3974
17.5000	0.832198	-0.187933	0.853154	1.5819	0.054426	1.3841
17.7148	0.831482	-0.193675	0.853741	1.5616	0.054225	1.3714

TABLE 15

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.0000	1.400	2.00	1.145644	6.77, -2	15	21.7908

Theta	U	V	Q	P	A^2	Density
15.0000	0.821100	0.000000	0.821100	2.8007	0.065159	2.0468
15.0000	0.821100	0.000001	0.821100	2.8007	0.065159	2.0468
15.2500	0.821084	-0.007108	0.821115	2.7999	0.065154	2.0464
15.5000	0.821038	-0.014111	0.821159	2.7977	0.065140	2.0452
15.7500	0.820961	-0.021018	0.821230	2.7942	0.065116	2.0434
16.0000	0.820855	-0.027837	0.821326	2.7895	0.065085	2.0409
16.2500	0.820718	-0.034576	0.821446	2.7836	0.065045	2.0378
16.5000	0.820553	-0.041242	0.821589	2.7766	0.064998	2.0342
16.7500	0.820359	-0.047844	0.821752	2.7685	0.064945	2.0300
17.0000	0.820135	-0.054386	0.821937	2.7595	0.064884	2.0252
17.2500	0.819884	-0.060875	0.822141	2.7495	0.064817	2.0200
17.5000	0.819604	-0.067318	0.822364	2.7387	0.064743	2.0143
17.7500	0.819297	-0.073717	0.822606	2.7269	0.064664	2.0081
18.0000	0.818961	-0.080081	0.822867	2.7142	0.064578	2.0014
18.2500	0.818598	-0.086413	0.823146	2.7007	0.064486	1.9943
18.5000	0.818207	-0.092719	0.823444	2.6864	0.064388	1.9868
18.7500	0.817789	-0.099004	0.823760	2.6712	0.064284	1.9787
19.0000	0.817343	-0.105275	0.824095	2.6552	0.064174	1.9703
19.2500	0.816870	-0.111536	0.824449	2.6383	0.064057	1.9613
19.5000	0.816370	-0.117793	0.824824	2.6205	0.063933	1.9518
19.7500	0.815842	-0.124054	0.825220	2.6019	0.063802	1.9419
20.0000	0.815287	-0.130324	0.825638	2.5822	0.063665	1.9314
20.2500	0.814705	-0.136613	0.826079	2.5616	0.063519	1.9204
20.5000	0.814095	-0.142929	0.826547	2.5398	0.063364	1.9087
20.7500	0.813457	-0.149283	0.827042	2.5169	0.063200	1.8964
21.0000	0.812792	-0.155686	0.827568	2.4927	0.063026	1.8834
21.2500	0.812099	-0.162155	0.828130	2.4671	0.062840	1.8695
21.5000	0.811377	-0.168709	0.828731	2.4398	0.062641	1.8547
21.7500	0.810626	-0.175372	0.829379	2.4106	0.062426	1.8388
21.7908	0.810501	-0.176471	0.829490	2.4057	0.062389	1.8361

TABLE 16

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.0000	1.400	2.00	1.145644	1.99, -1	20	26.4851

Theta	U	V	Q	P	A^2	Density
20.0000	0.790798	0.000000	0.790798	4.0062	0.074928	2.5461
20.0000	0.790798	0.000001	0.790798	4.0062	0.074928	2.5461
20.2500	0.790783	-0.006860	0.790813	4.0053	0.074923	2.5457
20.5000	0.790739	-0.013646	0.790856	4.0028	0.074909	2.5445
20.7500	0.790664	-0.020362	0.790926	3.9986	0.074887	2.5426
21.0000	0.790561	-0.027014	0.791022	3.9929	0.074857	2.5400
21.2500	0.790429	-0.033609	0.791143	3.9858	0.074819	2.5368
21.5000	0.790268	-0.040152	0.791287	3.9773	0.074773	2.5329
21.7500	0.790078	-0.046646	0.791454	3.9675	0.074720	2.5285
22.0000	0.789861	-0.053098	0.791644	3.9563	0.074660	2.5234
22.2500	0.789615	-0.059512	0.791855	3.9440	0.074593	2.5178
22.5000	0.789341	-0.065892	0.792087	3.9304	0.074520	2.5116
22.7500	0.789040	-0.072242	0.792340	3.9156	0.074439	2.5048
23.0000	0.788711	-0.078567	0.792615	3.8996	0.074352	2.4975
23.2500	0.788354	-0.084871	0.792910	3.8824	0.074259	2.4896
23.5000	0.787970	-0.091158	0.793226	3.8641	0.074159	2.4812
23.7500	0.787559	-0.097433	0.793563	3.8446	0.074052	2.4723
24.0000	0.787120	-0.103699	0.793922	3.8240	0.073938	2.4628
24.2500	0.786654	-0.109963	0.794302	3.8021	0.073817	2.4527
24.5000	0.786161	-0.116228	0.794706	3.7791	0.073689	2.4421
24.7500	0.785640	-0.122501	0.795133	3.7547	0.073553	2.4309
25.0000	0.785092	-0.128786	0.795584	3.7291	0.073409	2.4190
25.2500	0.784516	-0.135091	0.796062	3.7022	0.073257	2.4065
25.5000	0.783913	-0.141424	0.796567	3.6738	0.073096	2.3933
25.7500	0.783282	-0.147791	0.797102	3.6439	0.072926	2.3794
26.0000	0.782623	-0.154204	0.797670	3.6123	0.072745	2.3646
26.2500	0.781936	-0.160673	0.798273	3.5790	0.072552	2.3490
26.4851	0.781264	-0.166819	0.798876	3.5459	0.072360	2.3335

TABLE 17

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.5000	1.400	2.00	1.116653	1.23, =4	5	13.4552

Theta	U	V	Q	P	A^2	Density
5.0000	0.885839	0.000000	0.885839	1.3398	0.043058	1.2323
5.0000	0.885839	-0.000000	0.885839	1.3398	0.043058	1.2323
5.2500	0.885823	-0.007548	0.885855	1.3392	0.043052	1.2319
5.5000	0.885774	-0.014771	0.885897	1.3376	0.043037	1.2309
5.7500	0.885694	-0.021716	0.885960	1.3351	0.043015	1.2293
6.0000	0.885585	-0.028424	0.886041	1.3320	0.042986	1.2272
6.2500	0.885446	-0.034925	0.886135	1.3284	0.042953	1.2249
6.5000	0.885280	-0.041247	0.886240	1.3244	0.042916	1.2222
6.7500	0.885087	-0.047412	0.886356	1.3200	0.042875	1.2193
7.0000	0.884867	-0.053439	0.886479	1.3153	0.042831	1.2162
7.2500	0.884620	-0.059343	0.886609	1.3103	0.042785	1.2129
7.5000	0.884349	-0.065139	0.886745	1.3052	0.042737	1.2095
7.7500	0.884052	-0.070839	0.886886	1.2998	0.042687	1.2060
8.0000	0.883731	-0.076453	0.887032	1.2943	0.042635	1.2023
8.2500	0.883385	-0.081990	0.887182	1.2887	0.042582	1.1986
8.5000	0.883015	-0.087459	0.887336	1.2829	0.042527	1.1947
8.7500	0.882622	-0.092867	0.887494	1.2770	0.042471	1.1908
9.0000	0.882205	-0.098221	0.887656	1.2709	0.042413	1.1867
9.2500	0.881765	-0.103528	0.887822	1.2648	0.042355	1.1826
9.5000	0.881302	-0.108793	0.887991	1.2585	0.042294	1.1784
9.7500	0.880816	-0.114022	0.888165	1.2521	0.042233	1.1741
10.0000	0.880307	-0.119220	0.888343	1.2455	0.042169	1.1697
10.2500	0.879775	-0.124393	0.888526	1.2388	0.042104	1.1652
10.5000	0.879221	-0.129547	0.888714	1.2319	0.042038	1.1606
10.7500	0.878645	-0.134686	0.888908	1.2249	0.041969	1.1559
11.0000	0.878046	-0.139818	0.889108	1.2176	0.041897	1.1510
11.2500	0.877425	-0.144948	0.889316	1.2101	0.041823	1.1459
11.5000	0.876781	-0.150086	0.889534	1.2023	0.041746	1.1406
11.7500	0.876115	-0.155239	0.889762	1.1941	0.041665	1.1351
12.0000	0.875426	-0.160422	0.890003	1.1855	0.041579	1.1292
12.2500	0.874715	-0.165650	0.890262	1.1764	0.041487	1.1230
12.5000	0.873980	-0.170946	0.890542	1.1665	0.041387	1.1163
12.7500	0.873223	-0.176347	0.890851	1.1557	0.041277	1.1088
13.0000	0.872441	-0.181917	0.891206	1.1433	0.041150	1.1004
13.2500	0.871635	-0.187792	0.891635	1.1285	0.040997	1.0902
13.4552	0.870953	-0.193112	0.892105	1.1124	0.040830	1.0790

TABLE 18

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.5000	1.400	2.00	1.116653	1.73, -2	10	16.5141

Theta	U	V	Q	P	A^2	Density
10.0000	0.868557	0.000000	0.868557	2.0885	0.049122	1.6839
10.2500	0.868541	-0.007489	0.868573	2.0877	0.049116	1.6834
10.5000	0.868492	-0.014812	0.868619	2.0854	0.049100	1.6821
10.7500	0.868412	-0.021986	0.868690	2.0817	0.049075	1.6799
11.0000	0.868301	-0.029028	0.868786	2.0768	0.049042	1.6771
11.2500	0.868159	-0.035952	0.868903	2.0707	0.049002	1.6736
11.5000	0.867987	-0.042770	0.869040	2.0637	0.048954	1.6695
11.7500	0.867786	-0.049493	0.869196	2.0557	0.048900	1.6649
12.0000	0.867555	-0.056132	0.869369	2.0468	0.048839	1.6598
12.2500	0.867296	-0.062696	0.869559	2.0372	0.048773	1.6542
12.5000	0.867008	-0.069195	0.869765	2.0267	0.048702	1.6481
12.7500	0.866692	-0.075635	0.869986	2.0155	0.048625	1.6416
13.0000	0.866348	-0.082027	0.870223	2.0036	0.048542	1.6347
13.2500	0.865976	-0.088376	0.870474	1.9910	0.048455	1.6273
13.5000	0.865577	-0.094691	0.870741	1.9777	0.048362	1.6195
13.7500	0.865150	-0.100979	0.871023	1.9636	0.048264	1.6113
14.0000	0.864696	-0.107250	0.871322	1.9489	0.048160	1.6026
14.2500	0.864214	-0.113510	0.871637	1.9334	0.048050	1.5935
14.5000	0.863705	-0.119770	0.871970	1.9170	0.047934	1.5839
14.7500	0.863169	-0.126040	0.872323	1.8999	0.047811	1.5738
15.0000	0.862605	-0.132331	0.872697	1.8818	0.047680	1.5630
15.2500	0.862014	-0.138659	0.873095	1.8626	0.047541	1.5517
15.5000	0.861395	-0.145039	0.873520	1.8423	0.047392	1.5396
15.7500	0.860748	-0.151494	0.873978	1.8207	0.047232	1.5266
16.0000	0.860073	-0.158055	0.874475	1.7973	0.047059	1.5126
16.2500	0.859369	-0.164762	0.875021	1.7719	0.046868	1.4973
16.5000	0.858635	-0.171680	0.875630	1.7439	0.046654	1.4803
16.5141	0.858593	-0.172076	0.875667	1.7422	0.046642	1.4793

TABLE 19

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.5000	1.400	2.00	1.116653	1.09, -1	15	20.7789

Theta	U	V	Q	P	A^2	Density
15.0000	0.845283	0.000000	0.845283	3.2262	0.057099	2.2377
15.0000	0.845283	0.000001	0.845283	3.2262	0.057099	2.2377
15.2500	0.845267	-0.007318	0.845299	3.2251	0.057094	2.2371
15.5000	0.845219	-0.014529	0.845344	3.2221	0.057079	2.2356
15.7500	0.845140	-0.021642	0.845417	3.2172	0.057054	2.2332
16.0000	0.845031	-0.028668	0.845517	3.2106	0.057020	2.2299
16.2500	0.844890	-0.035616	0.845641	3.2023	0.056978	2.2258
16.5000	0.844720	-0.042494	0.845788	3.1925	0.056929	2.2210
16.7500	0.844519	-0.049311	0.845958	3.1812	0.056871	2.2154
17.0000	0.844290	-0.056072	0.846149	3.1686	0.056806	2.2091
17.2500	0.844030	-0.062786	0.846362	3.1545	0.056734	2.2021
17.5000	0.843742	-0.069459	0.846596	3.1392	0.056655	2.1944
17.7500	0.843424	-0.076098	0.846850	3.1225	0.056569	2.1861
18.0000	0.843078	-0.082710	0.847125	3.1045	0.056476	2.1771
18.2500	0.842702	-0.089301	0.847421	3.0853	0.056376	2.1674
18.5000	0.842298	-0.095880	0.847738	3.0648	0.056268	2.1571
18.7500	0.841866	-0.102451	0.848077	3.0429	0.056153	2.1461
19.0000	0.841404	-0.109025	0.848438	3.0197	0.056030	2.1344
19.2500	0.840914	-0.115610	0.848824	2.9951	0.055900	2.1220
19.5000	0.840395	-0.122215	0.849235	2.9689	0.055760	2.1087
19.7500	0.839848	-0.128851	0.849674	2.9412	0.055611	2.0946
20.0000	0.839271	-0.135533	0.850144	2.9118	0.055451	2.0797
20.2500	0.838665	-0.142274	0.850647	2.8805	0.055280	2.0636
20.5000	0.838029	-0.149096	0.851189	2.8470	0.055095	2.0465
20.7500	0.837363	-0.156024	0.851775	2.8110	0.054896	2.0280
20.7789	0.837285	-0.156832	0.851846	2.8067	0.054872	2.0258

TABLE 20

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.5000	1.400	2.00	1.116653	2.92, -1	20	25.5950

Theta	U	V	Q	P	A^2	Density
20.0000	0.815030	0.000000	0.815030	4.7400	0.067145	2.7957
20.0000	0.815030	0.000000	0.815030	4.7400	0.067145	2.7957
20.2500	0.815014	-0.007071	0.815045	4.7387	0.067140	2.7952
20.5000	0.814968	-0.014065	0.815089	4.7351	0.067126	2.7937
20.7500	0.814891	-0.020989	0.815162	4.7293	0.067102	2.7913
21.0000	0.814785	-0.027850	0.815261	4.7214	0.067070	2.7879
21.2500	0.814649	-0.034654	0.815385	4.7114	0.067029	2.7837
21.5000	0.814483	-0.041408	0.815534	4.6994	0.066981	2.7786
21.7500	0.814287	-0.048117	0.815708	4.6855	0.066924	2.7728
22.0000	0.814063	-0.054786	0.815904	4.6698	0.066860	2.7661
22.2500	0.813809	-0.061422	0.816124	4.6523	0.066788	2.7587
22.5000	0.813527	-0.068029	0.816366	4.6331	0.066709	2.7506
22.7500	0.813216	-0.074612	0.816631	4.6121	0.066623	2.7417
23.0000	0.812876	-0.081176	0.816919	4.5893	0.066529	2.7320
23.2500	0.812507	-0.087728	0.817230	4.5649	0.066427	2.7216
23.5000	0.812110	-0.094273	0.817564	4.5387	0.066318	2.7104
23.7500	0.811684	-0.100816	0.817922	4.5107	0.066201	2.6985
24.0000	0.811230	-0.107365	0.818304	4.4809	0.066076	2.6857
24.2500	0.810748	-0.113924	0.818713	4.4492	0.065942	2.6721
24.5000	0.810236	-0.120503	0.819148	4.4156	0.065799	2.6577
24.7500	0.809696	-0.127110	0.819612	4.3800	0.065647	2.6424
25.0000	0.809127	-0.133754	0.820107	4.3422	0.065485	2.6261
25.2500	0.808529	-0.140446	0.820636	4.3021	0.065311	2.6087
25.5000	0.807901	-0.147201	0.821202	4.2594	0.065126	2.5902
25.5950	0.807655	-0.149786	0.821427	4.2425	0.065052	2.5829

TABLE 21

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.0000	1.400	2.00	1.095445	3.10, -4	5	12.2946

Theta	U	V	Q	P	A^2	Density
5.0000	0.903534	0.000000	0.903534	1.4034	0.036725	1.2738
5.0000	0.903534	-0.000000	0.903534	1.4034	0.036725	1.2738
5.2000	0.903523	-0.006188	0.903544	1.4029	0.036722	1.2734
5.4000	0.903491	-0.012157	0.903573	1.4015	0.036711	1.2725
5.6000	0.903438	-0.017935	0.903616	1.3994	0.036696	1.2712
5.8000	0.903366	-0.023546	0.903673	1.3967	0.036675	1.2694
6.0000	0.903274	-0.029008	0.903740	1.3934	0.036651	1.2673
6.2000	0.903163	-0.034339	0.903816	1.3898	0.036623	1.2649
6.4000	0.903034	-0.039553	0.903900	1.3857	0.036593	1.2623
6.6000	0.902887	-0.044662	0.903991	1.3814	0.036560	1.2595
6.8000	0.902723	-0.049677	0.904088	1.3767	0.036525	1.2564
7.0000	0.902541	-0.054607	0.904191	1.3718	0.036488	1.2532
7.2000	0.902342	-0.059460	0.904298	1.3667	0.036449	1.2499
7.4000	0.902126	-0.064246	0.904410	1.3614	0.036408	1.2464
7.6000	0.901893	-0.068969	0.904526	1.3559	0.036366	1.2429
7.8000	0.901644	-0.073636	0.904646	1.3503	0.036323	1.2392
8.0000	0.901379	-0.078253	0.904769	1.3445	0.036278	1.2354
8.2000	0.901098	-0.082825	0.904896	1.3386	0.036233	1.2314
8.4000	0.900801	-0.087356	0.905027	1.3325	0.036185	1.2274
8.6000	0.900488	-0.091851	0.905160	1.3262	0.036137	1.2233
8.8000	0.900160	-0.096314	0.905298	1.3199	0.036087	1.2191
9.0000	0.899816	-0.100749	0.905438	1.3133	0.036036	1.2148
9.2000	0.899456	-0.105160	0.905583	1.3067	0.035984	1.2104
9.4000	0.899082	-0.109551	0.905731	1.2999	0.035930	1.2059
9.6000	0.898692	-0.113926	0.905884	1.2929	0.035875	1.2013
9.8000	0.898286	-0.118289	0.906041	1.2857	0.035818	1.1965
10.0000	0.897866	-0.122645	0.906203	1.2783	0.035759	1.1916
10.2000	0.897430	-0.126997	0.906371	1.2707	0.035698	1.1865
10.4000	0.896979	-0.131352	0.906546	1.2629	0.035635	1.1813
10.6000	0.896513	-0.135715	0.906727	1.2547	0.035569	1.1759
10.8000	0.896032	-0.140094	0.906917	1.2462	0.035500	1.1702
11.0000	0.895535	-0.144498	0.907118	1.2373	0.035428	1.1642
11.2000	0.895023	-0.148938	0.907330	1.2279	0.035350	1.1579
11.4000	0.894495	-0.153429	0.907558	1.2179	0.035268	1.1511
11.6000	0.893952	-0.157996	0.907806	1.2070	0.035178	1.1438
11.8000	0.893392	-0.162673	0.908081	1.1951	0.035078	1.1357
12.0000	0.892816	-0.167521	0.908396	1.1815	0.034963	1.1264
12.2001	0.892222	-0.172674	0.908777	1.1652	0.034825	1.1153
12.2946	0.891935	-0.175299	0.908998	1.1558	0.034744	1.1089

TABLE 22

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.0000	1.400	2.00	1.095445	2.97, -2	10	15.6083

Theta	U	V	Q	P	A^2	Density
10.0000	0.886866	0.000000	0.886866	2.3083	0.042694	1.8022
10.2000	0.886855	-0.006132	0.886877	2.3076	0.042690	1.8018
10.4000	0.886823	-0.012153	0.886907	2.3056	0.042679	1.8007
10.6000	0.886771	-0.018075	0.886955	2.3024	0.042662	1.7989
10.8000	0.886697	-0.023907	0.887020	2.2980	0.042639	1.7965
11.0000	0.886604	-0.029656	0.887100	2.2927	0.042611	1.7935
11.2000	0.886490	-0.035331	0.887194	2.2864	0.042577	1.7900
11.4000	0.886357	-0.040939	0.887302	2.2792	0.042539	1.7859
11.6000	0.886205	-0.046487	0.887423	2.2711	0.042496	1.7814
11.8000	0.886033	-0.051981	0.887556	2.2623	0.042449	1.7765
12.0000	0.885842	-0.057426	0.887701	2.2527	0.042397	1.7711
12.2000	0.885632	-0.062828	0.887858	2.2424	0.042342	1.7653
12.4000	0.885403	-0.068192	0.888025	2.2314	0.042282	1.7591
12.6000	0.885156	-0.073523	0.888204	2.2197	0.042219	1.7525
12.8000	0.884890	-0.078827	0.888394	2.2073	0.042151	1.7455
13.0000	0.884606	-0.084107	0.888595	2.1942	0.042080	1.7381
13.2000	0.884303	-0.089370	0.888807	2.1805	0.042004	1.7303
13.4000	0.883982	-0.094621	0.889031	2.1660	0.041925	1.7222
13.6000	0.883642	-0.099865	0.889268	2.1509	0.041841	1.7135
13.8000	0.883285	-0.105108	0.889516	2.1350	0.041752	1.7045
14.0000	0.882908	-0.110357	0.889779	2.1183	0.041659	1.6950
14.2000	0.882514	-0.115618	0.890055	2.1008	0.041560	1.6850
14.4000	0.882101	-0.120901	0.890348	2.0825	0.041456	1.6744
14.6000	0.881670	-0.126215	0.890658	2.0631	0.041346	1.6633
14.8000	0.881220	-0.131571	0.890988	2.0427	0.041228	1.6515
15.0000	0.880751	-0.136984	0.891340	2.0210	0.041102	1.6390
15.2000	0.880264	-0.142473	0.891719	1.9978	0.040967	1.6255
15.4000	0.879757	-0.148064	0.892129	1.9730	0.040821	1.6111
15.6000	0.879230	-0.153790	0.892579	1.9460	0.040661	1.5953
15.6083	0.879208	-0.154030	0.892598	1.9448	0.040654	1.5946

TABLE 23

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.0000	1.400	2.00	1.095445	1.62, -1	15	20.0277

Theta	U	V	Q	P	A^2	Density
15.0000	0.863912	0.000000	0.863912	3.6991	0.050731	2.4305
15.2000	0.863901	-0.005992	0.863922	3.6982	0.050728	2.4301
15.4000	0.863870	-0.011914	0.863952	3.6956	0.050717	2.4289
15.6000	0.863818	-0.017770	0.864001	3.6913	0.050701	2.4268
15.8000	0.863746	-0.023568	0.864067	3.6854	0.050678	2.4241
16.0000	0.863654	-0.029312	0.864151	3.6781	0.050649	2.4206
16.2000	0.863541	-0.035007	0.864251	3.6693	0.050614	2.4165
16.4000	0.863409	-0.040658	0.864366	3.6592	0.050574	2.4118
16.6000	0.863257	-0.046270	0.864497	3.6478	0.050529	2.4064
16.8000	0.863086	-0.051848	0.864642	3.6351	0.050479	2.4004
17.0000	0.862895	-0.057395	0.864802	3.6211	0.050423	2.3938
17.2000	0.862686	-0.062917	0.864977	3.6060	0.050363	2.3867
17.4000	0.862456	-0.068416	0.865166	3.5896	0.050298	2.3789
17.6000	0.862208	-0.073898	0.865369	3.5721	0.050227	2.3706
17.8000	0.861940	-0.079366	0.865587	3.5534	0.050152	2.3617
18.0000	0.861654	-0.084825	0.865819	3.5334	0.050071	2.3523
18.2000	0.861348	-0.090279	0.866066	3.5123	0.049986	2.3422
18.4000	0.861024	-0.095734	0.866329	3.4900	0.049895	2.3316
18.6000	0.860680	-0.101195	0.866608	3.4663	0.049798	2.3203
18.8000	0.860317	-0.106667	0.866904	3.4414	0.049695	2.3083
19.0000	0.859935	-0.112156	0.867218	3.4151	0.049587	2.2957
19.2000	0.859534	-0.117670	0.867551	3.3873	0.049471	2.2824
19.4000	0.859114	-0.123217	0.867905	3.3580	0.049348	2.2682
19.6000	0.858674	-0.128806	0.868281	3.3270	0.049218	2.2533
19.8000	0.858214	-0.134449	0.868682	3.2942	0.049078	2.2374
20.0000	0.857735	-0.140161	0.869111	3.2592	0.048929	2.2204
20.0277	0.857667	-0.140956	0.869173	3.2542	0.048908	2.2180

TABLE 24

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.0000	1.400	2.00	1.095445	4.00, -1	20	24.9427

Theta	U	V	Q	P	A^2	Density
20.0000	0.833650	0.000000	0.833650	5.5582	0.061005	3.0370
20.0000	0.833650	-0.000001	0.833650	5.5582	0.061005	3.0370
20.2000	0.833640	-0.005793	0.833660	5.5572	0.061002	3.0366
20.4000	0.833610	-0.011535	0.833690	5.5540	0.060992	3.0354
20.6000	0.833560	-0.017230	0.833738	5.5489	0.060976	3.0334
20.8000	0.833490	-0.022882	0.833804	5.5419	0.060954	3.0307
21.0000	0.833400	-0.028496	0.833887	5.5331	0.060926	3.0272
21.2000	0.833291	-0.034074	0.833987	5.5225	0.060893	3.0231
21.4000	0.833162	-0.039619	0.834104	5.5102	0.060854	3.0182
21.6000	0.833014	-0.045137	0.834236	5.4962	0.060810	3.0127
21.8000	0.832847	-0.050630	0.834385	5.4805	0.060760	3.0066
22.0000	0.832661	-0.056100	0.834549	5.4633	0.060706	2.9999
22.2000	0.832455	-0.061552	0.834728	5.4444	0.060646	2.9925
22.4000	0.832231	-0.066989	0.834923	5.4240	0.060581	2.9844
22.6000	0.831988	-0.072413	0.835133	5.4020	0.060511	2.9758
22.8000	0.831726	-0.077828	0.835359	5.3785	0.060435	2.9665
23.0000	0.831444	-0.083238	0.835601	5.3534	0.060354	2.9566
23.2000	0.831144	-0.088645	0.835858	5.3267	0.060268	2.9461
23.4000	0.830826	-0.094053	0.836132	5.2984	0.060177	2.9349
23.6000	0.830488	-0.099467	0.836423	5.2684	0.060079	2.9231
23.8000	0.830131	-0.104891	0.836732	5.2368	0.059976	2.9105
24.0000	0.829756	-0.110329	0.837058	5.2035	0.059867	2.8973
24.2000	0.829361	-0.115785	0.837404	5.1683	0.059751	2.8833
24.4000	0.828947	-0.121267	0.837770	5.1313	0.059628	2.8685
24.6000	0.828514	-0.126779	0.838158	5.0923	0.059498	2.8529
24.8000	0.828062	-0.132330	0.838569	5.0511	0.059360	2.8364
24.9427	0.827728	-0.136317	0.838877	5.0203	0.059257	2.8241

TABLE 25

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.5000	1.400	2.00	1.079486	6.75, =4	5	11.3766

Theta	U	V	Q	P	A^2	Density
5.0000	0.917369	0.000000	0.917369	1.4717	0.031687	1.3176
5.0000	0.917369	0.000000	0.917369	1.4717	0.031687	1.3176
5.2000	0.917358	-0.006283	0.917380	1.4711	0.031683	1.3172
5.4000	0.917326	-0.012345	0.917409	1.4694	0.031672	1.3161
5.6000	0.917272	-0.018215	0.917453	1.4668	0.031656	1.3144
5.8000	0.917199	-0.023917	0.917511	1.4633	0.031635	1.3123
6.0000	0.917106	-0.029471	0.917579	1.4593	0.031610	1.3097
6.2000	0.916993	-0.034895	0.917657	1.4547	0.031581	1.3067
6.4000	0.916862	-0.040204	0.917743	1.4496	0.031550	1.3034
6.6000	0.916713	-0.045409	0.917837	1.4441	0.031515	1.2999
6.8000	0.916545	-0.050523	0.917937	1.4382	0.031478	1.2961
7.0000	0.916360	-0.055555	0.918043	1.4320	0.031440	1.2921
7.2000	0.916157	-0.060515	0.918154	1.4255	0.031399	1.2879
7.4000	0.915938	-0.065409	0.918270	1.4187	0.031356	1.2835
7.6000	0.915701	-0.070245	0.918391	1.4117	0.031312	1.2790
7.8000	0.915447	-0.075029	0.918517	1.4044	0.031265	1.2743
8.0000	0.915177	-0.079769	0.918647	1.3969	0.031218	1.2694
8.2000	0.914890	-0.084468	0.918781	1.3892	0.031168	1.2644
8.4000	0.914587	-0.089134	0.918921	1.3812	0.031117	1.2592
8.6000	0.914268	-0.093770	0.919064	1.3730	0.031064	1.2539
8.8000	0.913933	-0.098384	0.919213	1.3646	0.031009	1.2484
9.0000	0.913581	-0.102978	0.919367	1.3559	0.030953	1.2427
9.2000	0.913214	-0.107561	0.919526	1.3469	0.030894	1.2368
9.4000	0.912830	-0.112136	0.919692	1.3376	0.030833	1.2307
9.6000	0.912431	-0.116712	0.919865	1.3280	0.030770	1.2244
9.8000	0.912016	-0.121295	0.920046	1.3179	0.030703	1.2177
10.0000	0.911584	-0.125895	0.920236	1.3075	0.030633	1.2108
10.2000	0.911137	-0.130522	0.920438	1.2964	0.030559	1.2035
10.4000	0.910673	-0.135191	0.920653	1.2847	0.030480	1.1957
10.6000	0.910193	-0.139923	0.920885	1.2721	0.030394	1.1874
10.8000	0.909696	-0.144746	0.921140	1.2584	0.030300	1.1782
11.0000	0.909182	-0.149709	0.921425	1.2432	0.030195	1.1680
11.2000	0.908650	-0.154900	0.921759	1.2256	0.030072	1.1561
11.3766	0.908166	-0.159828	0.922122	1.2066	0.029938	1.1433

TABLE 26

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.5000	1.400	2.00	1.079486	4.67, -2	10	14.9069

Theta	U	V	Q	P	A^2	Density
10.0000	0.901221	0.000000	0.901221	2.5488	0.037560	1.9251
10.2000	0.901210	-0.006231	0.901232	2.5479	0.037556	1.9246
10.4000	0.901178	-0.012351	0.901262	2.5452	0.037545	1.9232
10.6000	0.901124	-0.018372	0.901311	2.5411	0.037528	1.9209
10.8000	0.901050	-0.024302	0.901377	2.5354	0.037504	1.9179
11.0000	0.900955	-0.030153	0.901459	2.5285	0.037474	1.9141
11.2000	0.900839	-0.035931	0.901556	2.5203	0.037440	1.9097
11.4000	0.900704	-0.041646	0.901666	2.5109	0.037400	1.9046
11.6000	0.900549	-0.047304	0.901790	2.5004	0.037355	1.8989
11.8000	0.900374	-0.052911	0.901927	2.4888	0.037306	1.8926
12.0000	0.900179	-0.058476	0.902077	2.4763	0.037252	1.8858
12.2000	0.899965	-0.064003	0.902238	2.4627	0.037193	1.8784
12.4000	0.899732	-0.069499	0.902413	2.4482	0.037130	1.8705
12.6000	0.899480	-0.074970	0.902599	2.4326	0.037063	1.8620
12.8000	0.899209	-0.080423	0.902798	2.4162	0.036991	1.8530
13.0000	0.898919	-0.085863	0.903010	2.3987	0.036914	1.8434
13.2000	0.898610	-0.091298	0.903236	2.3803	0.036833	1.8333
13.4000	0.898281	-0.096735	0.903475	2.3607	0.036747	1.8225
13.6000	0.897934	-0.102183	0.903730	2.3401	0.036655	1.8111
13.8000	0.897568	-0.107650	0.904001	2.3183	0.036557	1.7991
14.0000	0.897183	-0.113147	0.904289	2.2952	0.036452	1.7862
14.2000	0.896778	-0.118689	0.904598	2.2707	0.036340	1.7726
14.4000	0.896354	-0.124291	0.904930	2.2445	0.036220	1.7580
14.6000	0.895910	-0.129974	0.905289	2.2164	0.036090	1.7422
14.8000	0.895447	-0.135766	0.905680	2.1861	0.035949	1.7252
14.9069	0.895190	-0.138920	0.905905	2.1688	0.035867	1.7154

TABLE 27

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.5000	1.400	2.00	1.079486	2.25, -1	15	19.4544

Theta	U	V	Q	P	A^2	Density
15.0000	0.878497	0.000000	0.878497	4.2199	0.045648	2.6225
15.0000	0.878497	-0.000000	0.878497	4.2199	0.045648	2.6225
15.2000	0.878487	-0.006094	0.878508	4.2187	0.045645	2.6220
15.4000	0.878455	-0.012116	0.878539	4.2152	0.045634	2.6204
15.6000	0.878402	-0.018074	0.878588	4.2095	0.045617	2.6179
15.8000	0.878329	-0.023972	0.878656	4.2019	0.045593	2.6145
16.0000	0.878235	-0.029819	0.878741	4.1922	0.045563	2.6102
16.2000	0.878121	-0.035618	0.878843	4.1807	0.045527	2.6051
16.4000	0.877986	-0.041377	0.878961	4.1674	0.045486	2.5992
16.6000	0.877832	-0.047099	0.879095	4.1523	0.045439	2.5924
16.8000	0.877658	-0.052790	0.879244	4.1356	0.045386	2.5850
17.0000	0.877463	-0.058455	0.879408	4.1171	0.045328	2.5767
17.2000	0.877250	-0.064099	0.879588	4.0971	0.045265	2.5677
17.4000	0.877016	-0.069727	0.879783	4.0753	0.045196	2.5580
17.6000	0.876763	-0.075344	0.879994	4.0520	0.045122	2.5475
17.8000	0.876490	-0.080955	0.880221	4.0270	0.045042	2.5363
18.0000	0.876198	-0.086566	0.880463	4.0003	0.044957	2.5243
18.2000	0.875886	-0.092183	0.880723	3.9719	0.044865	2.5115
18.4000	0.875554	-0.097812	0.881001	3.9417	0.044768	2.4978
18.6000	0.875203	-0.103461	0.881297	3.9096	0.044663	2.4833
18.8000	0.874832	-0.109139	0.881613	3.8755	0.044552	2.4678
19.0000	0.874441	-0.114854	0.881951	3.8393	0.044432	2.4513
19.2000	0.874030	-0.120619	0.882313	3.8008	0.044305	2.4337
19.4000	0.873599	-0.126446	0.882702	3.7598	0.044167	2.4149
19.4544	0.873478	-0.128045	0.882813	3.7481	0.044128	2.4096

TABLE 28

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
5.5000	1.400	2.00	1.079486	5.21, -1	20	24.4505

Theta	U	V	Q	P	A^2	Density
20.0000	0.848198	0.000000	0.848198	6.4613	0.056112	3.2667
20.0000	0.848198	-0.000000	0.848198	6.4613	0.056112	3.2667
20.2000	0.848187	-0.005894	0.848208	6.4599	0.056109	3.2662
20.4000	0.848157	-0.011736	0.848238	6.4558	0.056098	3.2647
20.6000	0.848106	-0.017532	0.848287	6.4492	0.056082	3.2623
20.8000	0.848034	-0.023285	0.848354	6.4400	0.056059	3.2590
21.0000	0.847943	-0.029000	0.848439	6.4284	0.056030	3.2548
21.2000	0.847832	-0.034680	0.848541	6.4145	0.055996	3.2497
21.4000	0.847701	-0.040331	0.848660	6.3983	0.055955	3.2439
21.6000	0.847550	-0.045955	0.848795	6.3799	0.055909	3.2372
21.8000	0.847380	-0.051556	0.848947	6.3594	0.055858	3.2298
22.0000	0.847190	-0.057139	0.849115	6.3367	0.055801	3.2215
22.2000	0.846981	-0.062706	0.849299	6.3118	0.055738	3.2125
22.4000	0.846753	-0.068261	0.849500	6.2849	0.055670	3.2027
22.6000	0.846505	-0.073808	0.849716	6.2559	0.055596	3.1921
22.8000	0.846237	-0.079351	0.849950	6.2247	0.055517	3.1808
23.0000	0.845951	-0.084894	0.850200	6.1914	0.055432	3.1686
23.2000	0.845645	-0.090442	0.850467	6.1559	0.055341	3.1556
23.4000	0.845319	-0.095999	0.850753	6.1181	0.055244	3.1418
23.6000	0.844975	-0.101570	0.851057	6.0781	0.055140	3.1271
23.8000	0.844610	-0.107160	0.851381	6.0356	0.055030	3.1115
24.0000	0.844226	-0.112776	0.851726	5.9907	0.054913	3.0949
24.2000	0.843823	-0.118425	0.852092	5.9431	0.054788	3.0773
24.4000	0.843400	-0.124116	0.852483	5.8927	0.054654	3.0586
24.4505	0.843289	-0.125561	0.852586	5.8795	0.054619	3.0537

TABLE 29

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	2.00	1.067187	1.31, =3	5	10.6367

Theta	U	V	Q	P	A^2	Density
5.0000	0.928363	0.000000	0.928363	1.5450	0.027628	1.3639
5.2000	0.928352	-0.006358	0.928374	1.5442	0.027625	1.3634
5.4000	0.928319	-0.012494	0.928403	1.5421	0.027614	1.3621
5.6000	0.928265	-0.018438	0.928448	1.5388	0.027597	1.3600
5.8000	0.928190	-0.024214	0.928506	1.5346	0.027575	1.3573
6.0000	0.928096	-0.029844	0.928576	1.5296	0.027549	1.3542
6.2000	0.927982	-0.035346	0.928655	1.5238	0.027520	1.3505
6.4000	0.927849	-0.040735	0.928743	1.5175	0.027487	1.3465
6.6000	0.927698	-0.046023	0.928839	1.5107	0.027452	1.3422
6.8000	0.927528	-0.051224	0.928941	1.5033	0.027414	1.3375
7.0000	0.927340	-0.056346	0.929051	1.4956	0.027373	1.3326
7.2000	0.927135	-0.061400	0.929166	1.4874	0.027330	1.3274
7.4000	0.926912	-0.066394	0.929287	1.4788	0.027285	1.3219
7.6000	0.926671	-0.071335	0.929413	1.4700	0.027238	1.3163
7.8000	0.926414	-0.076232	0.929545	1.4607	0.027189	1.3103
8.0000	0.926139	-0.081090	0.929682	1.4511	0.027138	1.3042
8.2000	0.925848	-0.085917	0.929826	1.4412	0.027085	1.2978
8.4000	0.925539	-0.090719	0.929975	1.4309	0.027029	1.2912
8.6000	0.925214	-0.095504	0.930130	1.4202	0.026971	1.2843
8.8000	0.924873	-0.100279	0.930293	1.4090	0.026911	1.2771
9.0000	0.924514	-0.105053	0.930464	1.3974	0.026847	1.2695
9.2000	0.924139	-0.109834	0.930643	1.3853	0.026781	1.2617
9.4000	0.923747	-0.114634	0.930833	1.3726	0.026710	1.2533
9.6000	0.923339	-0.119467	0.931035	1.3590	0.026635	1.2445
9.8000	0.922913	-0.124351	0.931253	1.3446	0.026554	1.2351
10.0000	0.922471	-0.129314	0.931490	1.3290	0.026465	1.2248
10.2000	0.922010	-0.134394	0.931754	1.3119	0.026367	1.2135
10.4000	0.921532	-0.139661	0.932055	1.2924	0.026255	1.2006
10.6000	0.921035	-0.145257	0.932419	1.2692	0.026119	1.1852
10.6367	0.920942	-0.146340	0.932496	1.2643	0.026090	1.1819

TABLE 30

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	2.00	1.067187	6.85, -2	10	14.3521

Theta	U	V	Q	P	A^2	Density
10.0000	0.912650	0.000000	0.912650	2.8101	0.033414	2.0512
10.2000	0.912639	-0.006311	0.912661	2.8090	0.033410	2.0506
10.4000	0.912606	-0.012510	0.912692	2.8057	0.033399	2.0489
10.6000	0.912552	-0.018609	0.912742	2.8003	0.033381	2.0461
10.8000	0.912476	-0.024620	0.912809	2.7932	0.033356	2.0424
11.0000	0.912380	-0.030553	0.912892	2.7843	0.033326	2.0377
11.2000	0.912263	-0.036417	0.912990	2.7738	0.033290	2.0323
11.4000	0.912126	-0.042220	0.913103	2.7618	0.033249	2.0260
11.6000	0.911969	-0.047971	0.913229	2.7484	0.033202	2.0189
11.8000	0.911791	-0.053677	0.913370	2.7336	0.033151	2.0112
12.0000	0.911594	-0.059346	0.913524	2.7174	0.033095	2.0026
12.2000	0.911377	-0.064985	0.913691	2.6999	0.033034	1.9934
12.4000	0.911140	-0.070601	0.913871	2.6810	0.032968	1.9835
12.6000	0.910884	-0.076201	0.914066	2.6608	0.032897	1.9728
12.8000	0.910608	-0.081795	0.914274	2.6393	0.032820	1.9614
13.0000	0.910313	-0.087389	0.914498	2.6164	0.032739	1.9492
13.2000	0.909998	-0.092995	0.914737	2.5919	0.032651	1.9362
13.4000	0.909664	-0.098623	0.914994	2.5659	0.032557	1.9223
13.6000	0.909310	-0.104285	0.915270	2.5382	0.032456	1.9074
13.8000	0.908936	-0.109998	0.915567	2.5085	0.032347	1.8914
14.0000	0.908541	-0.115781	0.915889	2.4767	0.032229	1.8743
14.2000	0.908127	-0.121660	0.916240	2.4422	0.032101	1.8556
14.3521	0.907798	-0.126218	0.916531	2.4140	0.031994	1.8403

TABLE 31

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	2.00	1.067187	2.98, -1	15	19.0072

Theta	U	V	Q	P	A^2	Density
15,0000	0.890092	0.000000	0.890092	4.7886	0.041547	2.8111
15,0000	0.890092	0.000000	0.890092	4.7886	0.041547	2.8111
15,2000	0.890081	-0.006175	0.890102	4.7871	0.041544	2.8105
15,4000	0.890049	-0.012277	0.890133	4.7826	0.041532	2.8086
15,6000	0.889995	-0.018315	0.890184	4.7754	0.041515	2.8056
15,8000	0.889921	-0.024295	0.890253	4.7656	0.041490	2.8015
16,0000	0.889826	-0.030224	0.890339	4.7532	0.041459	2.7963
16,2000	0.889710	-0.036109	0.890442	4.7384	0.041422	2.7901
16,4000	0.889574	-0.041955	0.890563	4.7213	0.041380	2.7829
16,6000	0.889417	-0.047768	0.890699	4.7019	0.041331	2.7747
16,8000	0.889240	-0.053554	0.890852	4.6803	0.041277	2.7656
17,0000	0.889043	-0.059319	0.891020	4.6566	0.041217	2.7555
17,2000	0.888826	-0.065068	0.891205	4.6306	0.041151	2.7446
17,4000	0.888589	-0.070808	0.891406	4.6024	0.041079	2.7326
17,6000	0.888332	-0.076543	0.891623	4.5720	0.041002	2.7197
17,8000	0.888055	-0.082282	0.891858	4.5394	0.040918	2.7059
18,0000	0.887757	-0.088031	0.892111	4.5045	0.040827	2.6910
18,2000	0.887440	-0.093798	0.892383	4.4671	0.040730	2.6750
18,4000	0.887103	-0.099592	0.892675	4.4272	0.040626	2.6579
18,6000	0.886745	-0.105423	0.892989	4.3846	0.040514	2.6396
18,8000	0.886366	-0.111304	0.893328	4.3390	0.040393	2.6200
19,0000	0.885968	-0.117250	0.893692	4.2902	0.040263	2.5989
19,0072	0.885953	-0.117464	0.893706	4.2883	0.040258	2.5981

TABLE 32

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	2.00	1.067187	6.53, -1	20	24.0703

Theta	U	V	Q	P	A^2	Density
20.0000	0.859739	0.000000	0.859739	7.4494	0.052170	3.4827
20.2000	0.859729	-0.005973	0.859749	7.4476	0.052166	3.4821
20.4000	0.859697	-0.011895	0.859780	7.4424	0.052156	3.4804
20.6000	0.859646	-0.017771	0.859829	7.4339	0.052139	3.4775
20.8000	0.859573	-0.023604	0.859897	7.4222	0.052115	3.4736
21.0000	0.859481	-0.029401	0.859983	7.4075	0.052086	3.4687
21.2000	0.859368	-0.035164	0.860087	7.3897	0.052050	3.4628
21.4000	0.859235	-0.040899	0.860208	7.3691	0.052008	3.4558
21.6000	0.859083	-0.046609	0.860346	7.3455	0.051961	3.4480
21.8000	0.858910	-0.052299	0.860501	7.3192	0.051908	3.4391
22.0000	0.858717	-0.057973	0.860672	7.2902	0.051849	3.4294
22.2000	0.858505	-0.063635	0.860860	7.2583	0.051784	3.4187
22.4000	0.858273	-0.069289	0.861066	7.2237	0.051713	3.4070
22.6000	0.858022	-0.074940	0.861288	7.1863	0.051637	3.3944
22.8000	0.857750	-0.080592	0.861528	7.1461	0.051554	3.3809
23.0000	0.857459	-0.086250	0.861786	7.1031	0.051465	3.3663
23.2000	0.857148	-0.091919	0.862062	7.0571	0.051370	3.3507
23.4000	0.856817	-0.097606	0.862359	7.0081	0.051268	3.3341
23.6000	0.856466	-0.103316	0.862675	6.9560	0.051158	3.3163
23.8000	0.856096	-0.109057	0.863014	6.9005	0.051041	3.2974
24.0000	0.855705	-0.114838	0.863376	6.8415	0.050916	3.2773
24.0703	0.855563	-0.116879	0.863510	6.8199	0.050870	3.2699

TABLE 33

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.8000	1.400	2.00	1.052678	3.18, -3	5	9.7178

Theta	U	V	Q	P	A^2	Density
5.0000	0.941740	0.000000	0.941740	1.6723	0.022625	1.4425
5.0000	0.941740	0.000000	0.941740	1.6723	0.022625	1.4425
5.2000	0.941729	-0.006450	0.941751	1.6713	0.022621	1.4419
5.4000	0.941695	-0.012677	0.941781	1.6684	0.022610	1.4401
5.6000	0.941640	-0.018712	0.941826	1.6639	0.022593	1.4373
5.8000	0.941565	-0.024583	0.941886	1.6582	0.022570	1.4338
6.0000	0.941469	-0.030311	0.941957	1.6513	0.022544	1.4295
6.2000	0.941353	-0.035915	0.942038	1.6434	0.022513	1.4247
6.4000	0.941218	-0.041411	0.942129	1.6347	0.022479	1.4193
6.6000	0.941064	-0.046813	0.942228	1.6252	0.022441	1.4134
6.8000	0.940892	-0.052135	0.942335	1.6150	0.022401	1.4070
7.0000	0.940700	-0.057388	0.942449	1.6042	0.022358	1.4003
7.2000	0.940491	-0.062581	0.942571	1.5927	0.022312	1.3931
7.4000	0.940264	-0.067726	0.942700	1.5806	0.022264	1.3856
7.6000	0.940018	-0.072831	0.942835	1.5679	0.022212	1.3776
7.8000	0.939755	-0.077907	0.942979	1.5546	0.022158	1.3692
8.0000	0.939474	-0.082963	0.943130	1.5406	0.022101	1.3604
8.2000	0.939176	-0.088009	0.943291	1.5259	0.022041	1.3511
8.4000	0.938860	-0.093059	0.943461	1.5104	0.021976	1.3413
8.6000	0.938526	-0.098125	0.943642	1.4940	0.021908	1.3309
8.8000	0.938175	-0.103226	0.943837	1.4765	0.021834	1.3198
9.0000	0.937806	-0.108385	0.944048	1.4578	0.021755	1.3077
9.2000	0.937418	-0.113634	0.944280	1.4373	0.021667	1.2946
9.4000	0.937012	-0.119026	0.944542	1.4145	0.021568	1.2799
9.6000	0.936587	-0.124653	0.944846	1.3883	0.021453	1.2629
9.7178	0.936327	-0.128150	0.945056	1.3704	0.021374	1.2513

TABLE 34

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.8000	1.400	2.00	1.052678	1.14, =1	10	13.6780

Theta	U	V	Q	P	A^2	Density
10.0000	0.926578	0.000000	0.926578	3.2722	0.028290	2.2573
10.2000	0.926567	-0.006407	0.926589	3.2706	0.028286	2.2565
10.4000	0.926534	-0.012703	0.926621	3.2659	0.028275	2.2542
10.6000	0.926479	-0.018900	0.926671	3.2583	0.028256	2.2505
10.8000	0.926402	-0.025011	0.926740	3.2481	0.028231	2.2454
11.0000	0.926304	-0.031048	0.926824	3.2355	0.028199	2.2392
11.2000	0.926185	-0.037023	0.926925	3.2205	0.028162	2.2318
11.4000	0.926046	-0.042942	0.927041	3.2033	0.028119	2.2233
11.6000	0.925886	-0.048818	0.927172	3.1840	0.028071	2.2137
11.8000	0.925705	-0.054659	0.927317	3.1627	0.028017	2.2031
12.0000	0.925504	-0.060474	0.927478	3.1392	0.027957	2.1914
12.2000	0.925283	-0.066272	0.927653	3.1137	0.027892	2.1787
12.4000	0.925041	-0.072064	0.927844	3.0861	0.027821	2.1648
12.6000	0.924780	-0.077861	0.928052	3.0563	0.027744	2.1499
12.8000	0.924498	-0.083674	0.928277	3.0242	0.027660	2.1337
13.0000	0.924196	-0.089519	0.928521	2.9896	0.027570	2.1163
13.2000	0.923873	-0.095413	0.928787	2.9524	0.027471	2.0974
13.4000	0.923529	-0.101376	0.929077	2.9120	0.027363	2.0769
13.6000	0.923165	-0.107439	0.929396	2.8681	0.027245	2.0545
13.6780	0.923017	-0.109839	0.929529	2.8498	0.027195	2.0451

TABLE 35

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.8000	1.400	2.00	1.052678	4.32, -1	15	18.4722

Theta	U	V	Q	P	A^2	Density
15.0000	0.904192	0.000000	0.904192	5.7990	0.036488	3.1017
15.2000	0.904181	-0.006273	0.904202	5.7968	0.036484	3.1009
15.4000	0.904148	-0.012473	0.904234	5.7905	0.036472	3.0985
15.6000	0.904094	-0.018609	0.904285	5.7802	0.036454	3.0945
15.8000	0.904018	-0.024690	0.904355	5.7662	0.036428	3.0892
16.0000	0.903921	-0.030722	0.904443	5.7485	0.036396	3.0824
16.2000	0.903804	-0.036714	0.904549	5.7274	0.036358	3.0743
16.4000	0.903665	-0.042671	0.904672	5.7029	0.036314	3.0649
16.6000	0.903506	-0.048601	0.904812	5.6751	0.036263	3.0542
16.8000	0.903326	-0.054511	0.904969	5.6441	0.036206	3.0423
17.0000	0.903125	-0.060407	0.905143	5.6097	0.036143	3.0290
17.2000	0.902904	-0.066297	0.905335	5.5721	0.036074	3.0145
17.4000	0.902662	-0.072188	0.905544	5.5312	0.035998	2.9987
17.6000	0.902400	-0.078090	0.905773	5.4869	0.035915	2.9815
17.8000	0.902117	-0.084010	0.906020	5.4390	0.035825	2.9629
18.0000	0.901814	-0.089960	0.906289	5.3874	0.035728	2.9428
18.2000	0.901489	-0.095951	0.906581	5.3318	0.035622	2.9211
18.4000	0.901144	-0.101998	0.906898	5.2718	0.035507	2.8976
18.4722	0.901014	-0.104198	0.907019	5.2491	0.035463	2.8886

TABLE 36

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.8000	1.400	2.00	1.052678	8.79, -1	20	23.6199

Theta	U	V	Q	P	A^2	Density
20.0000	0.873745	0.000000	0.873745	9.2074	0.047314	3.7978
20.0000	0.873745	-0.000001	0.873745	9.2074	0.047314	3.7978
20.2000	0.873734	-0.006073	0.873755	9.2049	0.047310	3.7971
20.4000	0.873702	-0.012092	0.873786	9.1975	0.047300	3.7949
20.6000	0.873650	-0.018065	0.873837	9.1855	0.047282	3.7914
20.8000	0.873576	-0.023997	0.873906	9.1691	0.047258	3.7865
21.0000	0.873482	-0.029893	0.873994	9.1483	0.047227	3.7804
21.2000	0.873368	-0.035758	0.874099	9.1232	0.047190	3.7730
21.4000	0.873233	-0.041597	0.874223	9.0940	0.047147	3.7644
21.6000	0.873077	-0.047415	0.874364	9.0608	0.047098	3.7546
21.8000	0.872902	-0.053217	0.874522	9.0235	0.047042	3.7435
22.0000	0.872706	-0.059007	0.874698	8.9822	0.046981	3.7313
22.2000	0.872490	-0.064790	0.874892	8.9370	0.046913	3.7178
22.4000	0.872253	-0.070572	0.875104	8.8877	0.046839	3.7032
22.6000	0.871997	-0.076358	0.875334	8.8343	0.046758	3.6873
22.8000	0.871720	-0.082154	0.875583	8.7767	0.046671	3.6701
23.0000	0.871423	-0.087966	0.875852	8.7148	0.046577	3.6516
23.2000	0.871106	-0.093801	0.876142	8.6485	0.046475	3.6317
23.4000	0.870769	-0.099667	0.876454	8.5775	0.046366	3.6104
23.6000	0.870410	-0.105574	0.876790	8.5015	0.046248	3.5875
23.6199	0.870374	-0.106165	0.876824	8.4937	0.046236	3.5852

TABLE 37

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
7.0000	1.400	2.00	1.049781	3.86, -3	5	9.5271

Theta	U	V	Q	P	A^2	Density
5.0000	0.944468	0.000000	0.944468	1.7061	0.021596	1.4630
5.1000	0.944465	-0.003265	0.944471	1.7058	0.021595	1.4628
5.2500	0.944450	-0.008050	0.944484	1.7044	0.021590	1.4619
5.4000	0.944423	-0.012714	0.944509	1.7019	0.021581	1.4604
5.5500	0.944384	-0.017272	0.944542	1.6984	0.021568	1.4583
5.7000	0.944333	-0.021733	0.944583	1.6942	0.021553	1.4557
5.8500	0.944270	-0.026109	0.944631	1.6892	0.021535	1.4526
6.0000	0.944196	-0.030408	0.944685	1.6835	0.021514	1.4491
6.1500	0.944111	-0.034638	0.944746	1.6773	0.021491	1.4453
6.3000	0.944015	-0.038807	0.944812	1.6705	0.021466	1.4411
6.4500	0.943908	-0.042920	0.944883	1.6632	0.021439	1.4366
6.6000	0.943790	-0.046983	0.944959	1.6554	0.021411	1.4318
6.7500	0.943662	-0.051002	0.945039	1.6472	0.021380	1.4267
6.9000	0.943523	-0.054982	0.945124	1.6386	0.021348	1.4214
7.0500	0.943374	-0.058928	0.945213	1.6296	0.021315	1.4158
7.2000	0.943214	-0.062844	0.945306	1.6202	0.021279	1.4100
7.3500	0.943045	-0.066734	0.945403	1.6104	0.021243	1.4039
7.5000	0.942865	-0.070603	0.945505	1.6002	0.021204	1.3975
7.6500	0.942675	-0.074455	0.945611	1.5896	0.021164	1.3909
7.8000	0.942475	-0.078295	0.945722	1.5786	0.021122	1.3840
7.9500	0.942265	-0.082128	0.945838	1.5672	0.021078	1.3769
8.1000	0.942045	-0.085958	0.945959	1.5553	0.021032	1.3694
8.2500	0.941815	-0.089791	0.946086	1.5429	0.020984	1.3616
8.4000	0.941575	-0.093634	0.946219	1.5299	0.020934	1.3534
8.5500	0.941325	-0.097494	0.946360	1.5163	0.020880	1.3448
8.7000	0.941065	-0.101381	0.946510	1.5020	0.020824	1.3357
8.8500	0.940794	-0.105306	0.946669	1.4868	0.020763	1.3260
9.0000	0.940513	-0.109285	0.946841	1.4705	0.020698	1.3157
9.1500	0.940222	-0.113341	0.947028	1.4530	0.020627	1.3044
9.3000	0.939920	-0.117505	0.947236	1.4337	0.020549	1.2920
9.4500	0.939606	-0.121835	0.947472	1.4119	0.020459	1.2780
9.5271	0.939441	-0.124156	0.947609	1.3994	0.020407	1.2699

TABLE 38

M	γ	F	q_{max}/q_∞	S	θ_c	θ_S
7.0000	1.400	2.00	1.049781	1.27, -1	10	13.5405

Theta	U	V	Q	P	A^2	Density
10.0000	0.929421	0.000000	0.929421	3.3962	0.027235	2.3092
10.0500	0.929420	-0.001617	0.929421	3.3961	0.027235	2.3092
10.2000	0.929409	-0.006427	0.929432	3.3945	0.027231	2.3084
10.3500	0.929386	-0.011173	0.929454	3.3909	0.027223	2.3067
10.5000	0.929351	-0.015862	0.929486	3.3856	0.027211	2.3041
10.6500	0.929303	-0.020500	0.929530	3.3786	0.027195	2.3007
10.8000	0.929244	-0.025092	0.929582	3.3701	0.027175	2.2965
10.9500	0.929172	-0.029643	0.929645	3.3600	0.027152	2.2916
11.1000	0.929089	-0.034158	0.929716	3.3485	0.027126	2.2860
11.2500	0.928993	-0.038640	0.929796	3.3356	0.027096	2.2797
11.4000	0.928886	-0.043094	0.929885	3.3214	0.027063	2.2728
11.5500	0.928768	-0.047525	0.929983	3.3059	0.027026	2.2652
11.7000	0.928637	-0.051937	0.930089	3.2891	0.026987	2.2570
11.8500	0.928496	-0.056332	0.930203	3.2709	0.026944	2.2481
12.0000	0.928342	-0.060717	0.930326	3.2515	0.026899	2.2385
12.1500	0.928178	-0.065094	0.930458	3.2309	0.026850	2.2284
12.3000	0.928002	-0.069469	0.930598	3.2089	0.026797	2.2175
12.4500	0.927814	-0.073847	0.930748	3.1855	0.026742	2.2060
12.6000	0.927615	-0.078232	0.930908	3.1608	0.026682	2.1937
12.7500	0.927404	-0.082631	0.931078	3.1346	0.026619	2.1807
12.9000	0.927182	-0.087050	0.931260	3.1068	0.026551	2.1669
13.0500	0.926949	-0.091497	0.931453	3.0774	0.026479	2.1522
13.2000	0.926703	-0.095982	0.931660	3.0461	0.026402	2.1366
13.3500	0.926446	-0.100515	0.931883	3.0128	0.026319	2.1198
13.5000	0.926177	-0.105112	0.932122	2.9771	0.026230	2.1019
13.5405	0.926102	-0.106365	0.932190	2.9671	0.026204	2.0968

TABLE 39

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
7.0000	1.400	2.00	1.049781	4.69, -1	15	18.3643

Theta	U	V	Q	P	A^2	Density
15.0000	0.907064	0.000000	0.907064	6.0710	0.035447	3.1716
15.0000	0.907064	-0.000000	0.907064	6.0710	0.035447	3.1716
15.1500	0.907058	-0.004727	0.907070	6.0696	0.035445	3.1711
15.3000	0.907039	-0.009412	0.907088	6.0657	0.035438	3.1697
15.4500	0.907008	-0.014058	0.907117	6.0593	0.035428	3.1673
15.6000	0.906966	-0.018670	0.907158	6.0506	0.035413	3.1640
15.7500	0.906911	-0.023250	0.907209	6.0395	0.035394	3.1599
15.9000	0.906844	-0.027803	0.907270	6.0262	0.035372	3.1549
16.0500	0.906765	-0.032332	0.907341	6.0108	0.035346	3.1492
16.2000	0.906675	-0.036838	0.907423	5.9933	0.035317	3.1426
16.3500	0.906572	-0.041327	0.907514	5.9737	0.035284	3.1352
16.5000	0.906458	-0.045799	0.907614	5.9520	0.035247	3.1271
16.6500	0.906332	-0.050260	0.907725	5.9283	0.035207	3.1182
16.8000	0.906195	-0.054710	0.907845	5.9027	0.035163	3.1086
16.9500	0.906046	-0.059155	0.907975	5.8750	0.035116	3.0982
17.1000	0.905885	-0.063596	0.908115	5.8453	0.035065	3.0870
17.2500	0.905713	-0.068037	0.908265	5.8136	0.035011	3.0750
17.4000	0.905529	-0.072482	0.908425	5.7798	0.034953	3.0622
17.5500	0.905333	-0.076935	0.908597	5.7438	0.034890	3.0486
17.7000	0.905126	-0.081399	0.908779	5.7057	0.034824	3.0341
17.8500	0.904907	-0.085879	0.908973	5.6653	0.034754	3.0188
18.0000	0.904677	-0.090381	0.909180	5.6225	0.034678	3.0025
18.1500	0.904434	-0.094910	0.909400	5.5772	0.034598	2.9852
18.3000	0.904180	-0.099472	0.909635	5.5292	0.034513	2.9668
18.3643	0.904067	-0.101440	0.909740	5.5078	0.034475	2.9586

TABLE 40

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
7.0000	1.400	2.00	1.049781	9.38, -1	20	23.5298

Theta	U	V	Q	P	A^2	Density
20.0000	0.876593	0.000000	0.876593	9.6810	0.046317	3.8707
20.1000	0.876590	-0.003053	0.876596	9.6803	0.046316	3.8705
20.2500	0.876576	-0.007606	0.876609	9.6768	0.046311	3.8695
20.4000	0.876551	-0.012131	0.876635	9.6704	0.046302	3.8676
20.5500	0.876513	-0.016629	0.876671	9.6611	0.046290	3.8650
20.7000	0.876464	-0.021104	0.876718	9.6491	0.046273	3.8616
20.8500	0.876403	-0.025558	0.876775	9.6344	0.046253	3.8574
21.0000	0.876330	-0.029992	0.876843	9.6171	0.046229	3.8524
21.1500	0.876245	-0.034409	0.876921	9.5972	0.046202	3.8467
21.3000	0.876150	-0.038811	0.877009	9.5748	0.046171	3.8403
21.4500	0.876042	-0.043201	0.877107	9.5498	0.046137	3.8331
21.6000	0.875923	-0.047579	0.877215	9.5224	0.046099	3.8253
21.7500	0.875793	-0.051949	0.877333	9.4926	0.046058	3.8167
21.9000	0.875651	-0.056313	0.877460	9.4603	0.046013	3.8074
22.0500	0.875498	-0.060672	0.877598	9.4255	0.045964	3.7974
22.2000	0.875334	-0.065028	0.877746	9.3883	0.045912	3.7867
22.3500	0.875158	-0.069385	0.877904	9.3486	0.045857	3.7753
22.5000	0.874970	-0.073744	0.878073	9.3065	0.045798	3.7631
22.6500	0.874772	-0.078108	0.878252	9.2618	0.045735	3.7502
22.8000	0.874561	-0.082480	0.878442	9.2144	0.045668	3.7365
22.9500	0.874340	-0.086862	0.878644	9.1645	0.045597	3.7220
23.1000	0.874107	-0.091258	0.878857	9.1118	0.045522	3.7067
23.2500	0.873862	-0.095670	0.879083	9.0563	0.045442	3.6906
23.4000	0.873606	-0.100104	0.879322	8.9978	0.045358	3.6735
23.5298	0.873374	-0.103962	0.879540	8.9447	0.045282	3.6580

TABLE 41

M	γ	F	q_{max}/q_∞	S	θ_c	θ_s
8.0000	1.400	2.00	1.038328	8.89, =3	5	8.7444

Theta	U	V	Q	P	A^2	Density
5.0000	0.955457	0.000000	0.955457	1.8872	0.017420	1.5700
5.1000	0.955454	-0.003303	0.955460	1.8868	0.017419	1.5698
5.2500	0.955439	-0.008145	0.955474	1.8848	0.017414	1.5686
5.4000	0.955411	-0.012866	0.955498	1.8813	0.017405	1.5665
5.5500	0.955372	-0.017482	0.955531	1.8764	0.017392	1.5636
5.7000	0.955320	-0.022006	0.955573	1.8704	0.017376	1.5600
5.8500	0.955256	-0.026446	0.955622	1.8633	0.017357	1.5558
6.0000	0.955181	-0.030814	0.955678	1.8553	0.017336	1.5510
6.1500	0.955095	-0.035117	0.955740	1.8464	0.017312	1.5457
6.3000	0.954998	-0.039364	0.955809	1.8367	0.017286	1.5399
6.4500	0.954889	-0.043562	0.955882	1.8263	0.017258	1.5337
6.6000	0.954770	-0.047717	0.955961	1.8151	0.017228	1.5270
6.7500	0.954639	-0.051835	0.956045	1.8032	0.017195	1.5198
6.9000	0.954498	-0.055924	0.956135	1.7907	0.017161	1.5123
7.0500	0.954346	-0.059988	0.956230	1.7775	0.017125	1.5043
7.2000	0.954184	-0.064034	0.956330	1.7636	0.017086	1.4959
7.3500	0.954011	-0.068068	0.956436	1.7490	0.017046	1.4870
7.5000	0.953828	-0.072097	0.956549	1.7336	0.017003	1.4777
7.6500	0.953634	-0.076128	0.956667	1.7174	0.016957	1.4678
7.8000	0.953429	-0.080170	0.956794	1.7003	0.016909	1.4574
7.9500	0.953214	-0.084234	0.956928	1.6823	0.016858	1.4463
8.1000	0.952988	-0.088331	0.957073	1.6630	0.016802	1.4344
8.2500	0.952751	-0.092479	0.957229	1.6424	0.016743	1.4217
8.4000	0.952504	-0.096700	0.957400	1.6201	0.016677	1.4079
8.5500	0.952245	-0.101029	0.957589	1.5955	0.016605	1.3926
8.7000	0.951975	-0.105518	0.957805	1.5680	0.016522	1.3754
8.7444	0.951892	-0.106889	0.957875	1.5590	0.016495	1.3698

TABLE 42

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.0000	1.400	2.00	1.038328	2.06, -1	10	12.9855

Theta	U	V	Q	P	A^2	Density
10.0000	0.940871	0.000000	0.940871	4.0677	0.022952	2.5684
10.0500	0.940871	-0.001638	0.940872	4.0675	0.022952	2.5684
10.2000	0.940860	-0.006506	0.940882	4.0651	0.022948	2.5673
10.3500	0.940836	-0.011312	0.940904	4.0599	0.022940	2.5649
10.5000	0.940801	-0.016062	0.940938	4.0521	0.022927	2.5614
10.6500	0.940752	-0.020764	0.940982	4.0420	0.022911	2.5568
10.8000	0.940692	-0.025421	0.941035	4.0295	0.022890	2.5512
10.9500	0.940619	-0.030041	0.941099	4.0147	0.022867	2.5445
11.1000	0.940535	-0.034629	0.941172	3.9979	0.022839	2.5369
11.2500	0.940438	-0.039190	0.941254	3.9789	0.022808	2.5283
11.4000	0.940330	-0.043729	0.941346	3.9579	0.022774	2.5188
11.5500	0.940209	-0.048250	0.941446	3.9349	0.022736	2.5083
11.7000	0.940077	-0.052761	0.941556	3.9099	0.022694	2.4969
11.8500	0.939933	-0.057265	0.941676	3.8829	0.022649	2.4845
12.0000	0.939777	-0.061768	0.941805	3.8538	0.022601	2.4712
12.1500	0.939609	-0.066277	0.941944	3.8225	0.022548	2.4569
12.3000	0.939430	-0.070798	0.942094	3.7891	0.022492	2.4415
12.4500	0.939239	-0.075340	0.942256	3.7533	0.022431	2.4251
12.6000	0.939035	-0.079912	0.942430	3.7151	0.022365	2.4074
12.7500	0.938820	-0.084523	0.942617	3.6740	0.022294	2.3884
12.9000	0.938593	-0.089188	0.942821	3.6300	0.022218	2.3679
12.9855	0.938458	-0.091876	0.942944	3.6034	0.022171	2.3555

TABLE 43

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.0000	1.400	2.00	1.038328	6.66, -1	15	17.9339

Theta	U	V	Q	P	A^2	Density
15.0000	0.918613	0.000000	0.918613	7.5473	0.031230	3.5024
15.1500	0.918607	-0.004787	0.918620	7.5454	0.031228	3.5018
15.3000	0.918588	-0.009532	0.918638	7.5397	0.031221	3.4999
15.4500	0.918557	-0.014239	0.918668	7.5305	0.031210	3.4969
15.6000	0.918514	-0.018912	0.918708	7.5178	0.031195	3.4927
15.7500	0.918458	-0.023556	0.918760	7.5017	0.031176	3.4873
15.9000	0.918390	-0.028173	0.918822	7.4825	0.031153	3.4809
16.0500	0.918311	-0.032769	0.918895	7.4601	0.031126	3.4735
16.2000	0.918219	-0.037345	0.918978	7.4345	0.031096	3.4650
16.3500	0.918115	-0.041907	0.919071	7.4060	0.031062	3.4555
16.5000	0.917999	-0.046456	0.919174	7.3744	0.031024	3.4449
16.6500	0.917872	-0.050998	0.919288	7.3397	0.030982	3.4334
16.8000	0.917732	-0.055535	0.919411	7.3021	0.030937	3.4208
16.9500	0.917581	-0.060072	0.919545	7.2614	0.030887	3.4072
17.1000	0.917418	-0.064613	0.919690	7.2176	0.030834	3.3925
17.2500	0.917243	-0.069161	0.919847	7.1707	0.030776	3.3767
17.4000	0.917056	-0.073723	0.920014	7.1205	0.030715	3.3598
17.5500	0.916857	-0.078302	0.920194	7.0668	0.030648	3.3417
17.7000	0.916646	-0.082906	0.920387	7.0097	0.030577	3.3224
17.8500	0.916423	-0.087541	0.920594	6.9487	0.030501	3.3017
17.9339	0.916292	-0.090151	0.920717	6.9129	0.030456	3.2895

TABLE 44

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.0000	1.400	2.00	1.038328	1.24	20	23.1726

Theta	U	V	Q	P	A^2	Density
20.0000	0.888031	0.000000	0.888031	12.2539	0.042280	4.2004
20.1000	0.888028	-0.003093	0.888034	12.2530	0.042279	4.2002
20.2500	0.888014	-0.007706	0.888048	12.2480	0.042274	4.1989
20.4000	0.887988	-0.012290	0.888073	12.2388	0.042265	4.1967
20.5500	0.887950	-0.016849	0.888110	12.2256	0.042252	4.1935
20.7000	0.887900	-0.021384	0.888157	12.2085	0.042235	4.1893
20.8500	0.887838	-0.025899	0.888216	12.1876	0.042215	4.1841
21.0000	0.887764	-0.030396	0.888285	12.1629	0.042190	4.1781
21.1500	0.887679	-0.034877	0.888364	12.1345	0.042162	4.1711
21.3000	0.887582	-0.039344	0.888453	12.1024	0.042130	4.1632
21.4500	0.887473	-0.043801	0.888553	12.0668	0.042095	4.1545
21.6000	0.887352	-0.048249	0.888663	12.0276	0.042056	4.1448
21.7500	0.887220	-0.052691	0.888784	11.9849	0.042013	4.1343
21.9000	0.887077	-0.057129	0.888914	11.9385	0.041966	4.1229
22.0500	0.886921	-0.061566	0.889055	11.8886	0.041916	4.1106
22.2000	0.886754	-0.066005	0.889207	11.8351	0.041862	4.0973
22.3500	0.886576	-0.070447	0.889370	11.7779	0.041804	4.0832
22.5000	0.886385	-0.074897	0.889544	11.7170	0.041742	4.0681
22.6500	0.886183	-0.079357	0.889729	11.6523	0.041676	4.0520
22.8000	0.885970	-0.083831	0.889927	11.5836	0.041606	4.0350
22.9500	0.885744	-0.088323	0.890137	11.5109	0.041531	4.0168
23.1000	0.885507	-0.092836	0.890360	11.4339	0.041452	3.9976
23.1726	0.885388	-0.095031	0.890474	11.3951	0.041411	3.9879

TABLE 45

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.6000	1.400	2.00	1.033249	1.35, =2	5	8.3797

Theta	U	V	Q	P	A^2	Density
5.0000	0.960442	0.000000	0.960442	2.0056	0.015510	1.6376
5.1000	0.960439	-0.003319	0.960445	2.0051	0.015509	1.6373
5.2000	0.960430	-0.006579	0.960453	2.0036	0.015506	1.6365
5.3000	0.960416	-0.009783	0.960466	2.0014	0.015501	1.6352
5.4000	0.960396	-0.012936	0.960483	1.9984	0.015494	1.6334
5.5000	0.960371	-0.016043	0.960505	1.9946	0.015486	1.6312
5.6000	0.960340	-0.019107	0.960530	1.9902	0.015476	1.6287
5.7000	0.960304	-0.022133	0.960559	1.9852	0.015465	1.6257
5.8000	0.960263	-0.025123	0.960592	1.9796	0.015453	1.6225
5.9000	0.960217	-0.028080	0.960627	1.9735	0.015439	1.6189
6.0000	0.960165	-0.031008	0.960666	1.9669	0.015424	1.6150
6.1000	0.960108	-0.033909	0.960707	1.9598	0.015408	1.6109
6.2000	0.960047	-0.036785	0.960751	1.9523	0.015391	1.6064
6.3000	0.959980	-0.039639	0.960798	1.9443	0.015373	1.6017
6.4000	0.959908	-0.042473	0.960848	1.9359	0.015354	1.5968
6.5000	0.959832	-0.045290	0.960900	1.9271	0.015334	1.5916
6.6000	0.959750	-0.048090	0.960954	1.9178	0.015313	1.5861
6.7000	0.959664	-0.050878	0.961012	1.9082	0.015291	1.5804
6.8000	0.959573	-0.053654	0.961072	1.8982	0.015268	1.5745
6.9000	0.959477	-0.056420	0.961134	1.8877	0.015244	1.5683
7.0000	0.959376	-0.059180	0.961199	1.8769	0.015219	1.5619
7.1000	0.959270	-0.061934	0.961267	1.8656	0.015193	1.5552
7.2000	0.959160	-0.064687	0.961338	1.8539	0.015166	1.5482
7.3000	0.959044	-0.067439	0.961412	1.8418	0.015137	1.5409
7.4000	0.958924	-0.070194	0.961490	1.8291	0.015107	1.5333
7.5000	0.958799	-0.072955	0.961571	1.8159	0.015076	1.5255
7.6000	0.958670	-0.075725	0.961656	1.8022	0.015044	1.5172
7.7000	0.958535	-0.078509	0.961745	1.7879	0.015009	1.5086
7.8000	0.958395	-0.081311	0.961839	1.7729	0.014973	1.4995
7.9000	0.958251	-0.084137	0.961938	1.7571	0.014935	1.4900
8.0000	0.958102	-0.086994	0.962043	1.7405	0.014895	1.4799
8.1000	0.957947	-0.089891	0.962156	1.7228	0.014851	1.4692
8.2000	0.957788	-0.092842	0.962277	1.7039	0.014805	1.4576
8.3000	0.957623	-0.095862	0.962409	1.6835	0.014754	1.4451
8.3797	0.957488	-0.098334	0.962524	1.6659	0.014709	1.4343

TABLE 46

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.6000	1.400	2.00	1.033249	2.62, -1	10	12.7330

Theta	U	V	Q	P	A^2	Density
10.0000	0.946063	0.000000	0.946063	4.5118	0.020993	2.7219
10.1000	0.946060	-0.003286	0.946066	4.5110	0.020992	2.7215
10.2000	0.946052	-0.006542	0.946074	4.5086	0.020989	2.7205
10.3000	0.946037	-0.009771	0.946088	4.5048	0.020984	2.7188
10.4000	0.946017	-0.012974	0.946106	4.4994	0.020977	2.7166
10.5000	0.945992	-0.016154	0.946130	4.4928	0.020968	2.7137
10.6000	0.945961	-0.019312	0.946158	4.4848	0.020957	2.7102
10.7000	0.945925	-0.022452	0.946191	4.4755	0.020944	2.7062
10.8000	0.945883	-0.025573	0.946228	4.4649	0.020930	2.7016
10.9000	0.945835	-0.028679	0.946270	4.4531	0.020915	2.6965
11.0000	0.945783	-0.031771	0.946316	4.4401	0.020897	2.6909
11.1000	0.945725	-0.034851	0.946366	4.4260	0.020878	2.6848
11.2000	0.945661	-0.037920	0.946421	4.4107	0.020857	2.6782
11.3000	0.945592	-0.040980	0.946480	4.3943	0.020835	2.6710
11.4000	0.945518	-0.044033	0.946543	4.3767	0.020811	2.6634
11.5000	0.945438	-0.047080	0.946610	4.3580	0.020786	2.6553
11.6000	0.945354	-0.050123	0.946681	4.3381	0.020759	2.6466
11.7000	0.945263	-0.053165	0.946757	4.3171	0.020730	2.6375
11.8000	0.945168	-0.056207	0.946838	4.2950	0.020700	2.6278
11.9000	0.945067	-0.059250	0.946923	4.2717	0.020667	2.6176
12.0000	0.944961	-0.062298	0.947013	4.2471	0.020633	2.6068
12.1000	0.944850	-0.065352	0.947107	4.2213	0.020598	2.5955
12.2000	0.944733	-0.068416	0.947207	4.1943	0.020560	2.5836
12.3000	0.944611	-0.071491	0.947312	4.1658	0.020520	2.5711
12.4000	0.944484	-0.074581	0.947424	4.1360	0.020478	2.5579
12.5000	0.944351	-0.077689	0.947541	4.1046	0.020433	2.5441
12.6000	0.944212	-0.080821	0.947665	4.0717	0.020386	2.5295
12.7000	0.944068	-0.083980	0.947796	4.0369	0.020336	2.5140
12.7330	0.944020	-0.085028	0.947841	4.0251	0.020319	2.5088

TABLE 47

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.6000	1.400	2.00	1.033249	7.93, -1	15	17.7410

Theta	U	V	Q	P	A^2	Density
15.0000	0.923837	-0.000000	0.923837	8.5265	0.029305	3.6849
15.0000	0.923837	0.000000	0.923837	8.5265	0.029305	3.6849
15.1000	0.923834	-0.003214	0.923840	8.5254	0.029304	3.6845
15.2000	0.923826	-0.006409	0.923848	8.5223	0.029301	3.6836
15.3000	0.923812	-0.009586	0.923861	8.5173	0.029296	3.6820
15.4000	0.923792	-0.012747	0.923880	8.5102	0.029289	3.6798
15.5000	0.923767	-0.015892	0.923904	8.5013	0.029280	3.6771
15.6000	0.923737	-0.019023	0.923933	8.4905	0.029270	3.6737
15.7000	0.923701	-0.022141	0.923966	8.4780	0.029257	3.6699
15.8000	0.923659	-0.025247	0.924004	8.4636	0.029243	3.6654
15.9000	0.923613	-0.028343	0.924047	8.4475	0.029227	3.6604
16.0000	0.923561	-0.031430	0.924095	8.4297	0.029210	3.6549
16.1000	0.923503	-0.034508	0.924147	8.4102	0.029190	3.6489
16.2000	0.923440	-0.037579	0.924204	8.3890	0.029169	3.6423
16.3000	0.923372	-0.040645	0.924266	8.3661	0.029146	3.6352
16.4000	0.923298	-0.043705	0.924332	8.3416	0.029122	3.6276
16.5000	0.923219	-0.046762	0.924403	8.3154	0.029096	3.6194
16.6000	0.923135	-0.049817	0.924478	8.2875	0.029068	3.6108
16.7000	0.923045	-0.052870	0.924558	8.2580	0.029038	3.6016
16.8000	0.922950	-0.055924	0.924643	8.2268	0.029007	3.5919
16.9000	0.922850	-0.058979	0.924733	8.1939	0.028974	3.5816
17.0000	0.922745	-0.062037	0.924828	8.1593	0.028939	3.5708
17.1000	0.922634	-0.065099	0.924927	8.1229	0.028902	3.5594
17.2000	0.922517	-0.068166	0.925032	8.0848	0.028863	3.5475
17.3000	0.922396	-0.071241	0.925143	8.0448	0.028822	3.5349
17.4000	0.922269	-0.074326	0.925259	8.0029	0.028779	3.5218
17.5000	0.922136	-0.077421	0.925381	7.9591	0.028734	3.5080
17.6000	0.921998	-0.080530	0.925509	7.9133	0.028687	3.4936
17.7000	0.921855	-0.083654	0.925643	7.8654	0.028637	3.4784
17.7410	0.921795	-0.084938	0.925700	7.8451	0.028616	3.4720

TABLE 48

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
8.6000	1.400	2.00	1.033249	1.43	20	23.0138

Theta	U	V	Q	P	A^2	Density
20.0000	0.893195	0.000000	0.893195	13.9618	0.040441	4.3724
20.1000	0.893192	-0.003109	0.893197	13.9606	0.040440	4.3721
20.2000	0.893184	-0.006206	0.893205	13.9572	0.040437	4.3713
20.3000	0.893170	-0.009289	0.893219	13.9515	0.040432	4.3701
20.4000	0.893151	-0.012360	0.893237	13.9436	0.040426	4.3683
20.5000	0.893127	-0.015420	0.893260	13.9335	0.040417	4.3660
20.6000	0.893098	-0.018469	0.893288	13.9213	0.040407	4.3633
20.7000	0.893063	-0.021509	0.893322	13.9070	0.040395	4.3601
20.8000	0.893022	-0.024540	0.893360	13.8907	0.040382	4.3564
20.9000	0.892977	-0.027562	0.893402	13.8724	0.040366	4.3523
21.0000	0.892926	-0.030577	0.893450	13.8520	0.040350	4.3478
21.1000	0.892870	-0.033585	0.893502	13.8297	0.040331	4.3428
21.2000	0.892809	-0.036588	0.893558	13.8054	0.040311	4.3373
21.3000	0.892743	-0.039585	0.893620	13.7791	0.040289	4.3314
21.4000	0.892671	-0.042578	0.893686	13.7509	0.040265	4.3251
21.5000	0.892594	-0.045567	0.893756	13.7208	0.040240	4.3183
21.6000	0.892512	-0.048553	0.893831	13.6887	0.040213	4.3111
21.7000	0.892424	-0.051538	0.893911	13.6547	0.040185	4.3034
21.8000	0.892332	-0.054520	0.893996	13.6188	0.040154	4.2954
21.9000	0.892234	-0.057503	0.894085	13.5809	0.040122	4.2868
22.0000	0.892131	-0.060485	0.894179	13.5411	0.040089	4.2778
22.1000	0.892023	-0.063469	0.894278	13.4993	0.040053	4.2684
22.2000	0.891910	-0.066455	0.894382	13.4556	0.040016	4.2585
22.3000	0.891791	-0.069443	0.894491	13.4098	0.039977	4.2482
22.4000	0.891667	-0.072436	0.894605	13.3621	0.039937	4.2374
22.5000	0.891538	-0.075433	0.894724	13.3122	0.039894	4.2261
22.6000	0.891404	-0.078436	0.894848	13.2603	0.039849	4.2143
22.7000	0.891264	-0.081447	0.894978	13.2062	0.039803	4.2020
22.8000	0.891120	-0.084466	0.895114	13.1499	0.039754	4.1892
22.9000	0.890970	-0.087494	0.895255	13.0913	0.039704	4.1759
23.0000	0.890814	-0.090534	0.895403	13.0304	0.039651	4.1620
23.0138	0.890792	-0.090955	0.895424	13.0218	0.039643	4.1600

TABLE 49

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
9.0000	1.400	2.00	1.030402	1.73, -2	5	8.1696

Theta	U	V	Q	P	A^2	Density
5.0000	0.963270	0.000000	0.963270	2.0885	0.014422	1.6839
5.0000	0.963270	0.000001	0.963270	2.0885	0.014422	1.6839
5.1000	0.963267	-0.003329	0.963273	2.0880	0.014421	1.6836
5.2000	0.963258	-0.006598	0.963281	2.0864	0.014418	1.6826
5.3000	0.963244	-0.009812	0.963294	2.0838	0.014413	1.6812
5.4000	0.963224	-0.012976	0.963312	2.0804	0.014406	1.6792
5.5000	0.963199	-0.016094	0.963333	2.0762	0.014398	1.6768
5.6000	0.963168	-0.019169	0.963359	2.0712	0.014388	1.6739
5.7000	0.963132	-0.022206	0.963388	2.0656	0.014377	1.6707
5.8000	0.963091	-0.025209	0.963420	2.0593	0.014364	1.6670
5.9000	0.963044	-0.028180	0.963456	2.0524	0.014350	1.6630
6.0000	0.962992	-0.031123	0.963495	2.0449	0.014335	1.6587
6.1000	0.962935	-0.034039	0.963537	2.0369	0.014319	1.6540
6.2000	0.962873	-0.036933	0.963581	2.0283	0.014302	1.6491
6.3000	0.962806	-0.039805	0.963629	2.0193	0.014284	1.6438
6.4000	0.962734	-0.042659	0.963679	2.0097	0.014265	1.6382
6.5000	0.962657	-0.045497	0.963732	1.9997	0.014244	1.6324
6.6000	0.962576	-0.048321	0.963788	1.9891	0.014223	1.6262
6.7000	0.962489	-0.051133	0.963846	1.9781	0.014200	1.6198
6.8000	0.962397	-0.053937	0.963907	1.9666	0.014177	1.6131
6.9000	0.962301	-0.056734	0.963972	1.9547	0.014152	1.6061
7.0000	0.962199	-0.059527	0.964039	1.9422	0.014126	1.5987
7.1000	0.962093	-0.062318	0.964109	1.9292	0.014099	1.5911
7.2000	0.961982	-0.065111	0.964183	1.9156	0.014070	1.5831
7.3000	0.961865	-0.067908	0.964260	1.9015	0.014041	1.5747
7.4000	0.961744	-0.070714	0.964341	1.8867	0.014009	1.5660
7.5000	0.961619	-0.073532	0.964426	1.8712	0.013977	1.5568
7.6000	0.961488	-0.076367	0.964516	1.8550	0.013942	1.5472
7.7000	0.961352	-0.079225	0.964611	1.8380	0.013905	1.5370
7.8000	0.961211	-0.082114	0.964712	1.8200	0.013866	1.5262
7.9000	0.961065	-0.085042	0.964821	1.8008	0.013824	1.5147
8.0000	0.960914	-0.088023	0.964938	1.7804	0.013779	1.5024
8.1000	0.960758	-0.091072	0.965065	1.7582	0.013730	1.4890
8.1696	0.960646	-0.093247	0.965161	1.7416	0.013693	1.4790

TABLE 50

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
9.0000	1.400	2.00	1.030402	3.03, -1	10	12.5894

Theta	U	V	Q	P	A^2	Density
10.0000	0.949006	0.000000	0.949006	4.8252	0.019877	2.8226
10.0000	0.949006	0.000000	0.949006	4.8252	0.019877	2.8226
10.1000	0.949003	-0.003297	0.949009	4.8242	0.019876	2.8222
10.2000	0.948995	-0.006563	0.949017	4.8216	0.019873	2.8211
10.3000	0.948980	-0.009802	0.949031	4.8172	0.019868	2.8193
10.4000	0.948960	-0.013016	0.949050	4.8111	0.019861	2.8168
10.5000	0.948935	-0.016207	0.949073	4.8035	0.019852	2.8136
10.6000	0.948904	-0.019377	0.949102	4.7944	0.019841	2.8098
10.7000	0.948867	-0.022528	0.949135	4.7838	0.019829	2.8053
10.8000	0.948825	-0.025662	0.949172	4.7718	0.019814	2.8003
10.9000	0.948778	-0.028780	0.949214	4.7584	0.019798	2.7947
11.0000	0.948725	-0.031886	0.949261	4.7436	0.019781	2.7885
11.1000	0.948666	-0.034980	0.949311	4.7275	0.019762	2.7817
11.2000	0.948603	-0.038065	0.949366	4.7100	0.019741	2.7744
11.3000	0.948534	-0.041142	0.949425	4.6913	0.019718	2.7664
11.4000	0.948459	-0.044212	0.949489	4.6712	0.019694	2.7580
11.5000	0.948379	-0.047279	0.949557	4.6498	0.019668	2.7490
11.6000	0.948294	-0.050343	0.949629	4.6271	0.019641	2.7393
11.7000	0.948204	-0.053407	0.949706	4.6030	0.019612	2.7292
11.8000	0.948108	-0.056474	0.949788	4.5776	0.019581	2.7184
11.9000	0.948006	-0.059544	0.949875	4.5507	0.019548	2.7070
12.0000	0.947900	-0.062621	0.949966	4.5225	0.019513	2.6950
12.1000	0.947788	-0.065708	0.950063	4.4927	0.019476	2.6823
12.2000	0.947670	-0.068807	0.950165	4.4614	0.019437	2.6689
12.3000	0.947548	-0.071922	0.950273	4.4285	0.019396	2.6548
12.4000	0.947419	-0.075056	0.950388	4.3938	0.019353	2.6400
12.5000	0.947286	-0.078214	0.950509	4.3572	0.019306	2.6243
12.5894	0.947161	-0.081064	0.950624	4.3228	0.019263	2.6095

TABLE 51

M	γ	F	q_{max}/q_∞	S	θ_c	θ_s
9.0000	1.400	2.00	1.030402	8.81, -1	15	17.6322

Theta	U	V	Q	P	A^2	Density
15.0000	0.926794	0.000000	0.926794	9.2183	0.028211	3.7996
15.0000	0.926794	-0.000000	0.926794	9.2183	0.028211	3.7996
15.1000	0.926791	-0.003225	0.926796	9.2171	0.028210	3.7993
15.2000	0.926782	-0.006430	0.926805	9.2136	0.028207	3.7982
15.3000	0.926768	-0.009617	0.926818	9.2078	0.028202	3.7965
15.4000	0.926749	-0.012788	0.926837	9.1999	0.028195	3.7942
15.5000	0.926724	-0.015944	0.926861	9.1898	0.028186	3.7912
15.6000	0.926693	-0.019085	0.926890	9.1776	0.028175	3.7876
15.7000	0.926657	-0.022214	0.926923	9.1634	0.028163	3.7834
15.8000	0.926616	-0.025332	0.926962	9.1472	0.028148	3.7786
15.9000	0.926569	-0.028439	0.927005	9.1290	0.028132	3.7733
16.0000	0.926516	-0.031538	0.927053	9.1088	0.028115	3.7673
16.1000	0.926459	-0.034629	0.927106	9.0867	0.028095	3.7608
16.2000	0.926396	-0.037713	0.927163	9.0627	0.028074	3.7537
16.3000	0.926327	-0.040792	0.927225	9.0368	0.028051	3.7460
16.4000	0.926253	-0.043867	0.927291	9.0090	0.028026	3.7378
16.5000	0.926174	-0.046939	0.927363	8.9793	0.028000	3.7290
16.6000	0.926089	-0.050009	0.927439	8.9477	0.027972	3.7196
16.7000	0.925999	-0.053079	0.927519	8.9142	0.027942	3.7096
16.8000	0.925904	-0.056150	0.927605	8.8787	0.027910	3.6991
16.9000	0.925803	-0.059223	0.927696	8.8413	0.027876	3.6880
17.0000	0.925697	-0.062300	0.927791	8.8020	0.027841	3.6762
17.1000	0.925586	-0.065383	0.927892	8.7606	0.027803	3.6639
17.2000	0.925469	-0.068473	0.927999	8.7171	0.027764	3.6509
17.3000	0.925347	-0.071572	0.928111	8.6715	0.027722	3.6372
17.4000	0.925219	-0.074682	0.928228	8.6237	0.027678	3.6229
17.5000	0.925086	-0.077805	0.928352	8.5737	0.027632	3.6079
17.6000	0.924948	-0.080944	0.928483	8.5212	0.027584	3.5921
17.6322	0.924902	-0.081957	0.928526	8.5038	0.027568	3.5868

TABLE 52

M	γ	F	q_{max}/q_∞	S	θ_c	θ_s
9.0000	1.400	2.00	1.030402	1.55	20	22.9245

Theta	U	V	Q	P	A^2	Density
20.0000	0.896116	0.000000	0.896116	15.1686	0.039395	4.4772
20.0000	0.896116	-0.000001	0.896116	15.1686	0.039395	4.4772
20.1000	0.896113	-0.003122	0.896118	15.1673	0.039394	4.4769
20.2000	0.896105	-0.006228	0.896126	15.1634	0.039392	4.4761
20.3000	0.896091	-0.009322	0.896140	15.1570	0.039387	4.4747
20.4000	0.896072	-0.012403	0.896158	15.1482	0.039380	4.4728
20.5000	0.896048	-0.015473	0.896181	15.1368	0.039372	4.4705
20.6000	0.896018	-0.018533	0.896210	15.1232	0.039362	4.4676
20.7000	0.895983	-0.021583	0.896243	15.1071	0.039350	4.4642
20.8000	0.895943	-0.024624	0.896281	15.0888	0.039336	4.4603
20.9000	0.895897	-0.027657	0.896324	15.0682	0.039321	4.4560
21.0000	0.895846	-0.030683	0.896372	15.0453	0.039304	4.4511
21.1000	0.895790	-0.033703	0.896424	15.0202	0.039285	4.4458
21.2000	0.895729	-0.036716	0.896481	14.9929	0.039264	4.4400
21.3000	0.895662	-0.039725	0.896542	14.9634	0.039242	4.4338
21.4000	0.895590	-0.042730	0.896609	14.9317	0.039219	4.4271
21.5000	0.895513	-0.045731	0.896680	14.8978	0.039193	4.4199
21.6000	0.895430	-0.048730	0.896755	14.8617	0.039166	4.4123
21.7000	0.895343	-0.051727	0.896836	14.8235	0.039137	4.4042
21.8000	0.895250	-0.054724	0.896921	14.7831	0.039107	4.3956
21.9000	0.895152	-0.057720	0.897011	14.7405	0.039074	4.3865
22.0000	0.895048	-0.060717	0.897105	14.6956	0.039040	4.3770
22.1000	0.894940	-0.063715	0.897205	14.6486	0.039005	4.3670
22.2000	0.894826	-0.066716	0.897309	14.5993	0.038967	4.3565
22.3000	0.894707	-0.069721	0.897419	14.5477	0.038928	4.3455
22.4000	0.894582	-0.072731	0.897534	14.4938	0.038887	4.3340
22.5000	0.894453	-0.075746	0.897654	14.4376	0.038843	4.3220
22.6000	0.894318	-0.078768	0.897780	14.3789	0.038798	4.3094
22.7000	0.894178	-0.081798	0.897911	14.3178	0.038751	4.2963
22.8000	0.894033	-0.084837	0.898049	14.2542	0.038702	4.2827
22.9000	0.893882	-0.087887	0.898192	14.1880	0.038650	4.2684
22.9245	0.893844	-0.088637	0.898228	14.1713	0.038637	4.2649

TABLE 53

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
10.0000	1.400	2.00	1.024695	2.98, -2	5	7.7341

Theta	U	V	Q	P	A^2	Density
5.0000	0.969016	0.000000	0.969016	2.3104	0.012202	1.8033
5.1000	0.969013	-0.003349	0.969019	2.3096	0.012201	1.8029
5.2000	0.969004	-0.006639	0.969027	2.3075	0.012197	1.8017
5.3000	0.968990	-0.009873	0.969040	2.3042	0.012192	1.7999
5.4000	0.968970	-0.013058	0.969058	2.2996	0.012185	1.7973
5.5000	0.968944	-0.016198	0.969080	2.2940	0.012177	1.7942
5.6000	0.968913	-0.019298	0.969105	2.2875	0.012167	1.7905
5.7000	0.968877	-0.022362	0.969135	2.2799	0.012156	1.7863
5.8000	0.968835	-0.025393	0.969168	2.2716	0.012143	1.7816
5.9000	0.968788	-0.028395	0.969204	2.2623	0.012129	1.7765
6.0000	0.968736	-0.031371	0.969244	2.2523	0.012113	1.7708
6.1000	0.968679	-0.034324	0.969287	2.2415	0.012097	1.7648
6.2000	0.968616	-0.037257	0.969333	2.2300	0.012079	1.7583
6.3000	0.968549	-0.040174	0.969381	2.2178	0.012060	1.7514
6.4000	0.968476	-0.043076	0.969434	2.2048	0.012040	1.7441
6.5000	0.968398	-0.045967	0.969489	2.1911	0.012018	1.7364
6.6000	0.968316	-0.048850	0.969547	2.1767	0.011996	1.7282
6.7000	0.968228	-0.051728	0.969609	2.1616	0.011972	1.7196
6.8000	0.968135	-0.054604	0.969674	2.1457	0.011947	1.7106
6.9000	0.968037	-0.057482	0.969742	2.1290	0.011920	1.7010
7.0000	0.967934	-0.060366	0.969815	2.1115	0.011892	1.6910
7.1000	0.967826	-0.063259	0.969892	2.0930	0.011862	1.6804
7.2000	0.967714	-0.066169	0.969973	2.0736	0.011830	1.6693
7.3000	0.967595	-0.069100	0.970060	2.0530	0.011797	1.6574
7.4000	0.967472	-0.072060	0.970152	2.0312	0.011761	1.6449
7.5000	0.967344	-0.075060	0.970252	2.0080	0.011722	1.6314
7.6000	0.967210	-0.078112	0.970359	1.9831	0.011681	1.6169
7.7000	0.967071	-0.081234	0.970477	1.9561	0.011635	1.6011
7.7341	0.967023	-0.082319	0.970520	1.9463	0.011618	1.5954

TABLE 54

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
10.0000	1.400	2.00	1.024695	4.15, -1	10	12.2972

Theta	U	V	Q	P	A^2	Density
10.0000	0.954978	0.000000	0.954978	5.6693	0.017603	3.0672
10.0000	0.954978	0.000000	0.954978	5.6693	0.017603	3.0672
10.1000	0.954975	-0.003317	0.954981	5.6681	0.017602	3.0668
10.2000	0.954967	-0.006605	0.954989	5.6645	0.017599	3.0654
10.3000	0.954952	-0.009865	0.955003	5.6586	0.017594	3.0631
10.4000	0.954932	-0.013101	0.955022	5.6505	0.017587	3.0599
10.5000	0.954906	-0.016314	0.955046	5.6403	0.017577	3.0560
10.6000	0.954875	-0.019507	0.955074	5.6280	0.017567	3.0512
10.7000	0.954838	-0.022683	0.955108	5.6137	0.017554	3.0457
10.8000	0.954796	-0.025843	0.955146	5.5975	0.017539	3.0394
10.9000	0.954748	-0.028989	0.955188	5.5794	0.017523	3.0324
11.0000	0.954695	-0.032125	0.955235	5.5594	0.017505	3.0246
11.1000	0.954636	-0.035251	0.955287	5.5376	0.017485	3.0162
11.2000	0.954572	-0.038370	0.955343	5.5139	0.017464	3.0069
11.3000	0.954502	-0.041484	0.955403	5.4884	0.017441	2.9970
11.4000	0.954427	-0.044595	0.955468	5.4610	0.017416	2.9863
11.5000	0.954346	-0.047706	0.955538	5.4318	0.017389	2.9749
11.6000	0.954260	-0.050819	0.955613	5.4007	0.017361	2.9627
11.7000	0.954169	-0.053936	0.955692	5.3677	0.017330	2.9498
11.8000	0.954072	-0.057060	0.955777	5.3326	0.017298	2.9360
11.9000	0.953970	-0.060195	0.955867	5.2955	0.017264	2.9214
12.0000	0.953862	-0.063344	0.955963	5.2563	0.017227	2.9059
12.1000	0.953749	-0.066511	0.956065	5.2147	0.017188	2.8895
12.2000	0.953630	-0.069700	0.956174	5.1708	0.017146	2.8720
12.2972	0.953509	-0.072825	0.956286	5.1255	0.017103	2.8541

TABLE 55

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
10.0000	1.400	2.00	1.024695	1.11	15	17.4126

Theta	U	V	Q	P	A^2	Density
15.0000	0.932783	0.000000	0.932783	11.0844	0.025983	4.0628
15.0000	0.932783	-0.000000	0.932783	11.0844	0.025983	4.0628
15.1000	0.932780	-0.003246	0.932786	11.0828	0.025982	4.0624
15.2000	0.932772	-0.006472	0.932794	11.0782	0.025979	4.0612
15.3000	0.932757	-0.009680	0.932808	11.0706	0.025974	4.0592
15.4000	0.932738	-0.012872	0.932827	11.0601	0.025967	4.0565
15.5000	0.932713	-0.016049	0.932851	11.0467	0.025958	4.0530
15.6000	0.932682	-0.019213	0.932880	11.0306	0.025947	4.0488
15.7000	0.932646	-0.022364	0.932914	11.0118	0.025934	4.0438
15.8000	0.932604	-0.025505	0.932952	10.9903	0.025920	4.0382
15.9000	0.932556	-0.028637	0.932996	10.9661	0.025904	4.0318
16.0000	0.932504	-0.031760	0.933044	10.9394	0.025886	4.0248
16.1000	0.932446	-0.034877	0.933098	10.9100	0.025866	4.0171
16.2000	0.932382	-0.037988	0.933156	10.8781	0.025844	4.0087
16.3000	0.932313	-0.041096	0.933218	10.8437	0.025821	3.9996
16.4000	0.932239	-0.044201	0.933286	10.8067	0.025796	3.9899
16.5000	0.932159	-0.047304	0.933358	10.7671	0.025768	3.9794
16.6000	0.932073	-0.050408	0.933436	10.7250	0.025740	3.9683
16.7000	0.931983	-0.053513	0.933518	10.6802	0.025709	3.9565
16.8000	0.931887	-0.056622	0.933605	10.6328	0.025676	3.9439
16.9000	0.931785	-0.059736	0.933698	10.5827	0.025642	3.9306
17.0000	0.931678	-0.062856	0.933796	10.5299	0.025605	3.9166
17.1000	0.931566	-0.065985	0.933900	10.4742	0.025566	3.9018
17.2000	0.931448	-0.069126	0.934009	10.4157	0.025525	3.8862
17.3000	0.931324	-0.072279	0.934125	10.3541	0.025482	3.8698
17.4000	0.931195	-0.075448	0.934247	10.2894	0.025437	3.8525
17.4126	0.931179	-0.075849	0.934263	10.2810	0.025431	3.8503

TABLE 56

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
10.0000	1.400	2.00	1.024695	1.86	20	22.7455

Theta	U	V	Q	P	A^2	Density
20.0000	0.902024	0.000000	0.902024	18.4255	0.037270	4.7083
20.1000	0.902022	-0.003141	0.902027	18.4238	0.037269	4.7080
20.2000	0.902013	-0.006268	0.902035	18.4188	0.037267	4.7071
20.3000	0.902000	-0.009382	0.902049	18.4104	0.037262	4.7056
20.4000	0.901981	-0.012484	0.902067	18.3989	0.037255	4.7035
20.5000	0.901956	-0.015575	0.902091	18.3842	0.037247	4.7008
20.6000	0.901926	-0.018656	0.902119	18.3664	0.037236	4.6975
20.7000	0.901891	-0.021727	0.902153	18.3455	0.037224	4.6937
20.8000	0.901850	-0.024790	0.902191	18.3216	0.037210	4.6893
20.9000	0.901804	-0.027844	0.902234	18.2948	0.037195	4.6844
21.0000	0.901753	-0.030893	0.902282	18.2650	0.037177	4.6790
21.1000	0.901697	-0.033935	0.902335	18.2323	0.037158	4.6730
21.2000	0.901635	-0.036972	0.902392	18.1966	0.037138	4.6665
21.3000	0.901568	-0.040005	0.902455	18.1581	0.037115	4.6594
21.4000	0.901495	-0.043034	0.902522	18.1168	0.037091	4.6518
21.5000	0.901417	-0.046060	0.902593	18.0726	0.037065	4.6437
21.6000	0.901334	-0.049085	0.902670	18.0255	0.037037	4.6351
21.7000	0.901246	-0.052109	0.902751	17.9755	0.037008	4.6259
21.8000	0.901152	-0.055133	0.902837	17.9226	0.036977	4.6162
21.9000	0.901054	-0.058158	0.902929	17.8669	0.036944	4.6059
22.0000	0.900949	-0.061185	0.903025	17.8082	0.036909	4.5951
22.1000	0.900840	-0.064215	0.903126	17.7465	0.036873	4.5837
22.2000	0.900725	-0.067249	0.903232	17.6819	0.036834	4.5718
22.3000	0.900605	-0.070288	0.903344	17.6141	0.036794	4.5593
22.4000	0.900480	-0.073334	0.903461	17.5433	0.036752	4.5462
22.5000	0.900349	-0.076386	0.903584	17.4693	0.036707	4.5325
22.6000	0.900213	-0.079448	0.903712	17.3921	0.036661	4.5181
22.7000	0.900072	-0.082520	0.903847	17.3115	0.036612	4.5032
22.7455	0.900006	-0.083921	0.903910	17.2737	0.036589	4.4962

TABLE 57

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	1.00	1.500799	6.67, -3	10	31.6390

Theta	U	V	Q	P	A^2	Density
10.0000	0.633673	0.000000	0.633673	1.2936	0.119692	1.1996
10.0000	0.633673	0.000000	0.633673	1.2936	0.119692	1.1996
10.5000	0.633626	-0.010800	0.633718	1.2932	0.119680	1.1993
11.0000	0.633486	-0.021135	0.633839	1.2920	0.119650	1.1985
11.5000	0.633258	-0.031070	0.634020	1.2903	0.119604	1.1974
12.0000	0.632945	-0.040659	0.634249	1.2881	0.119546	1.1959
12.5000	0.632549	-0.049947	0.634518	1.2855	0.119477	1.1942
13.0000	0.632074	-0.058970	0.634819	1.2826	0.119401	1.1923
13.5000	0.631521	-0.067759	0.635145	1.2795	0.119318	1.1902
14.0000	0.630892	-0.076340	0.635494	1.2762	0.119230	1.1880
14.5000	0.630189	-0.084735	0.635860	1.2727	0.119136	1.1857
15.0000	0.629413	-0.092964	0.636242	1.2691	0.119039	1.1833
15.5000	0.628567	-0.101041	0.636636	1.2653	0.118939	1.1808
16.0000	0.627650	-0.108983	0.637042	1.2615	0.118836	1.1782
16.5000	0.626665	-0.116801	0.637457	1.2576	0.118730	1.1756
17.0000	0.625612	-0.124506	0.637881	1.2536	0.118622	1.1729
17.5000	0.624492	-0.132107	0.638313	1.2495	0.118511	1.1702
18.0000	0.623307	-0.139614	0.638751	1.2454	0.118399	1.1675
18.5000	0.622056	-0.147034	0.639197	1.2412	0.118286	1.1646
19.0000	0.620741	-0.154373	0.639648	1.2369	0.118170	1.1618
19.5000	0.619362	-0.161639	0.640106	1.2326	0.118053	1.1589
20.0000	0.617920	-0.168836	0.640571	1.2283	0.117934	1.1560
20.5000	0.616415	-0.175971	0.641041	1.2239	0.117813	1.1531
21.0000	0.614849	-0.183047	0.641518	1.2195	0.117691	1.1501
21.5000	0.613221	-0.190070	0.642002	1.2150	0.117567	1.1470
22.0000	0.611531	-0.197045	0.642493	1.2104	0.117441	1.1440
22.5000	0.609782	-0.203974	0.642992	1.2058	0.117312	1.1408
23.0000	0.607972	-0.210862	0.643500	1.2011	0.117182	1.1377
23.5000	0.606102	-0.217714	0.644017	1.1963	0.117048	1.1344
24.0000	0.604172	-0.224533	0.644545	1.1915	0.116912	1.1311
24.5000	0.602183	-0.231325	0.645085	1.1865	0.116773	1.1278
25.0000	0.600135	-0.238092	0.645639	1.1814	0.116630	1.1243
25.5000	0.598027	-0.244842	0.646207	1.1762	0.116483	1.1208
26.0000	0.595861	-0.251578	0.646794	1.1709	0.116332	1.1171
26.5000	0.593636	-0.258308	0.647400	1.1654	0.116175	1.1134
27.0000	0.591353	-0.265039	0.648031	1.1596	0.116011	1.1095
27.5000	0.589011	-0.271782	0.648690	1.1537	0.115840	1.1054
28.0000	0.586609	-0.278548	0.649384	1.1474	0.115660	1.1011
28.5000	0.584149	-0.285353	0.650120	1.1408	0.115469	1.0965
29.0000	0.581629	-0.292221	0.650911	1.1337	0.115263	1.0917
29.5000	0.579048	-0.299186	0.651774	1.1259	0.115038	1.0864
30.0000	0.576406	-0.306303	0.652737	1.1174	0.114787	1.0804
30.5000	0.573702	-0.313677	0.653855	1.1074	0.114495	1.0736
31.0000	0.570930	-0.321553	0.655254	1.0951	0.114128	1.0650
31.5002	0.568084	-0.330990	0.657476	1.0756	0.113545	1.0514
31.6390	0.567278	-0.336203	0.659421	1.0587	0.113033	1.0396

TABLE 58

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	1.25	1.500687	5.75, -3	10	31.5678

Theta	U	V	Q	P	A^2	Density
10.0000	0.633744	0.000000	0.633744	1.2934	0.119674	1.1998
10.5000	0.633696	-0.010802	0.633788	1.2930	0.119663	1.1995
11.0000	0.633556	-0.021137	0.633909	1.2918	0.119632	1.1987
11.5000	0.633328	-0.031073	0.634090	1.2901	0.119586	1.1976
12.0000	0.633015	-0.040663	0.634320	1.2879	0.119528	1.1961
12.5000	0.632620	-0.049952	0.634589	1.2853	0.119459	1.1944
13.0000	0.632144	-0.058976	0.634889	1.2825	0.119383	1.1925
13.5000	0.631591	-0.067766	0.635216	1.2794	0.119300	1.1904
14.0000	0.630962	-0.076348	0.635564	1.2760	0.119212	1.1882
14.5000	0.630259	-0.084745	0.635931	1.2725	0.119118	1.1859
15.0000	0.629483	-0.092974	0.636312	1.2689	0.119021	1.1835
15.5000	0.628637	-0.101053	0.636707	1.2652	0.118921	1.1810
16.0000	0.627720	-0.108996	0.637113	1.2613	0.118817	1.1784
16.5000	0.626735	-0.116814	0.637528	1.2574	0.118712	1.1758
17.0000	0.625682	-0.124520	0.637952	1.2534	0.118603	1.1731
17.5000	0.624562	-0.132123	0.638384	1.2493	0.118493	1.1704
18.0000	0.623376	-0.139630	0.638822	1.2452	0.118381	1.1677
18.5000	0.622125	-0.147051	0.639268	1.2410	0.118267	1.1648
19.0000	0.620810	-0.154391	0.639720	1.2368	0.118152	1.1620
19.5000	0.619430	-0.161658	0.640178	1.2325	0.118035	1.1591
20.0000	0.617988	-0.168856	0.640642	1.2281	0.117916	1.1562
20.5000	0.616484	-0.175992	0.641112	1.2237	0.117795	1.1532
21.0000	0.614917	-0.183070	0.641590	1.2193	0.117673	1.1503
21.5000	0.613289	-0.190094	0.642074	1.2148	0.117548	1.1472
22.0000	0.611599	-0.197069	0.642565	1.2102	0.117422	1.1441
22.5000	0.609849	-0.203999	0.643064	1.2056	0.117294	1.1410
23.0000	0.608039	-0.210888	0.643572	1.2009	0.117163	1.1378
23.5000	0.606169	-0.217741	0.644090	1.1961	0.117030	1.1346
24.0000	0.604239	-0.224562	0.644618	1.1913	0.116894	1.1313
24.5000	0.602249	-0.231354	0.645158	1.1863	0.116754	1.1279
25.0000	0.600201	-0.238123	0.645712	1.1812	0.116611	1.1245
25.5000	0.598093	-0.244873	0.646281	1.1760	0.116464	1.1210
26.0000	0.595927	-0.251611	0.646867	1.1707	0.116313	1.1173
26.5000	0.593702	-0.258343	0.647474	1.1652	0.116155	1.1135
27.0000	0.591418	-0.265075	0.648105	1.1594	0.115992	1.1096
27.5000	0.589075	-0.271820	0.648765	1.1535	0.115821	1.1055
28.0000	0.586674	-0.278587	0.649459	1.1472	0.115641	1.1012
28.5000	0.584213	-0.285394	0.650196	1.1405	0.115449	1.0967
29.0000	0.581693	-0.292265	0.650988	1.1334	0.115243	1.0918
29.5000	0.579112	-0.299232	0.651851	1.1257	0.115018	1.0865
30.0000	0.576469	-0.306353	0.652817	1.1171	0.114766	1.0805
30.5000	0.573764	-0.313733	0.653937	1.1072	0.114473	1.0737
31.0000	0.570992	-0.321618	0.655340	1.0948	0.114106	1.0651
31.5002	0.568146	-0.331099	0.657584	1.0751	0.113517	1.0514
31.5678	0.567754	-0.332894	0.658152	1.0702	0.113367	1.0479

TABLE 59

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	1.50	1.500468	3.93, -3	10	31.4434

Theta	U	V	Q	P	A^2	Density
10.0000	0.633881	0.000000	0.633881	1.2931	0.119639	1.2002
10.0000	0.633881	0.000000	0.633881	1.2931	0.119639	1.2002
10.5000	0.633833	-0.010804	0.633925	1.2927	0.119628	1.1999
11.0000	0.633694	-0.021142	0.634046	1.2916	0.119597	1.1992
11.5000	0.633466	-0.031080	0.634228	1.2898	0.119551	1.1980
12.0000	0.633152	-0.040672	0.634457	1.2876	0.119493	1.1965
12.5000	0.632757	-0.049963	0.634726	1.2850	0.119425	1.1948
13.0000	0.632281	-0.058989	0.635027	1.2822	0.119348	1.1929
13.5000	0.631728	-0.067781	0.635354	1.2791	0.119265	1.1909
14.0000	0.631099	-0.076365	0.635702	1.2757	0.119177	1.1886
14.5000	0.630395	-0.084763	0.636069	1.2722	0.119083	1.1863
15.0000	0.629620	-0.092995	0.636450	1.2686	0.118986	1.1839
15.5000	0.628773	-0.101076	0.636845	1.2649	0.118886	1.1814
16.0000	0.627856	-0.109020	0.637251	1.2610	0.118782	1.1788
16.5000	0.626870	-0.116841	0.637666	1.2571	0.118676	1.1762
17.0000	0.625817	-0.124548	0.638090	1.2531	0.118568	1.1735
17.5000	0.624697	-0.132153	0.638522	1.2490	0.118458	1.1708
18.0000	0.623511	-0.139662	0.638961	1.2449	0.118346	1.1680
18.5000	0.622260	-0.147085	0.639407	1.2407	0.118232	1.1652
19.0000	0.620944	-0.154427	0.639859	1.2364	0.118116	1.1624
19.5000	0.619565	-0.161696	0.640317	1.2321	0.117999	1.1595
20.0000	0.618122	-0.168896	0.640781	1.2278	0.117880	1.1566
20.5000	0.616617	-0.176033	0.641252	1.2234	0.117759	1.1536
21.0000	0.615050	-0.183113	0.641729	1.2190	0.117637	1.1506
21.5000	0.613421	-0.190139	0.642214	1.2145	0.117512	1.1476
22.0000	0.611731	-0.197116	0.642705	1.2099	0.117386	1.1445
22.5000	0.609981	-0.204048	0.643205	1.2053	0.117258	1.1414
23.0000	0.608170	-0.210940	0.643713	1.2006	0.117127	1.1382
23.5000	0.606300	-0.217795	0.644231	1.1958	0.116993	1.1350
24.0000	0.604369	-0.224617	0.644760	1.1909	0.116857	1.1317
24.5000	0.602379	-0.231412	0.645300	1.1860	0.116718	1.1283
25.0000	0.600330	-0.238183	0.645854	1.1809	0.116574	1.1248
25.5000	0.598222	-0.244936	0.646424	1.1757	0.116427	1.1213
26.0000	0.596055	-0.251676	0.647011	1.1703	0.116275	1.1176
26.5000	0.593830	-0.258410	0.647618	1.1648	0.116118	1.1138
27.0000	0.591545	-0.265146	0.648250	1.1590	0.115954	1.1099
27.5000	0.589202	-0.271893	0.648910	1.1530	0.115783	1.1058
28.0000	0.586800	-0.278664	0.649606	1.1468	0.115603	1.1015
28.5000	0.584338	-0.285475	0.650344	1.1401	0.115411	1.0970
29.0000	0.581817	-0.292350	0.651137	1.1330	0.115204	1.0921
29.5000	0.579235	-0.299323	0.652003	1.1252	0.114978	1.0867
30.0000	0.576592	-0.306451	0.652971	1.1166	0.114726	1.0808
30.5000	0.573886	-0.313842	0.654096	1.1066	0.114432	1.0738
31.0001	0.571113	-0.321749	0.655509	1.0942	0.114062	1.0652
31.4434	0.568593	-0.329995	0.657415	1.0774	0.113561	1.0535

TABLE 60

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	1.75	1.500229	1.95, -3	10	31.3187

Theta	U	V	Q	P	A^2	Density
10.0000	0.634030	0.000000	0.634030	1.2928	0.119601	1.2007
10.0000	0.634030	0.000000	0.634030	1.2928	0.119601	1.2007
10.5000	0.633983	-0.010806	0.634075	1.2924	0.119590	1.2004
11.0000	0.633843	-0.021147	0.634196	1.2912	0.119559	1.1996
11.5000	0.633615	-0.031087	0.634377	1.2895	0.119513	1.1985
12.0000	0.633302	-0.040682	0.634607	1.2873	0.119455	1.1970
12.5000	0.632906	-0.049975	0.634876	1.2847	0.119387	1.1953
13.0000	0.632430	-0.059003	0.635177	1.2818	0.119310	1.1934
13.5000	0.631877	-0.067797	0.635503	1.2787	0.119227	1.1913
14.0000	0.631247	-0.076384	0.635852	1.2754	0.119138	1.1891
14.5000	0.630544	-0.084784	0.636219	1.2719	0.119045	1.1868
15.0000	0.629768	-0.093018	0.636600	1.2683	0.118948	1.1844
15.5000	0.628921	-0.101100	0.636995	1.2645	0.118847	1.1819
16.0000	0.628004	-0.109047	0.637401	1.2607	0.118744	1.1793
16.5000	0.627018	-0.116869	0.637817	1.2567	0.118638	1.1767
17.0000	0.625965	-0.124579	0.638241	1.2527	0.118530	1.1740
17.5000	0.624844	-0.132186	0.638673	1.2487	0.118419	1.1712
18.0000	0.623658	-0.139697	0.639112	1.2445	0.118307	1.1685
18.5000	0.622406	-0.147122	0.639558	1.2403	0.118193	1.1657
19.0000	0.621090	-0.154466	0.640010	1.2361	0.118077	1.1628
19.5000	0.619711	-0.161737	0.640468	1.2318	0.117960	1.1599
20.0000	0.618268	-0.168939	0.640933	1.2274	0.117841	1.1570
20.5000	0.616762	-0.176078	0.641404	1.2230	0.117720	1.1540
21.0000	0.615195	-0.183160	0.641882	1.2186	0.117598	1.1510
21.5000	0.613566	-0.190188	0.642366	1.2141	0.117473	1.1480
22.0000	0.611875	-0.197167	0.642858	1.2095	0.117347	1.1449
22.5000	0.610124	-0.204102	0.643358	1.2049	0.117218	1.1418
23.0000	0.608313	-0.210995	0.643867	1.2002	0.117087	1.1386
23.5000	0.606442	-0.217853	0.644385	1.1954	0.116954	1.1353
24.0000	0.604511	-0.224678	0.644914	1.1905	0.116817	1.1320
24.5000	0.602521	-0.231475	0.645455	1.1856	0.116678	1.1286
25.0000	0.600471	-0.238248	0.646009	1.1805	0.116534	1.1252
25.5000	0.598363	-0.245004	0.646579	1.1753	0.116387	1.1216
26.0000	0.596195	-0.251746	0.647167	1.1699	0.116235	1.1180
26.5000	0.593969	-0.258483	0.647775	1.1643	0.116077	1.1142
27.0000	0.591684	-0.265222	0.648408	1.1586	0.115914	1.1103
27.5000	0.589340	-0.271973	0.649069	1.1526	0.115742	1.1062
28.0000	0.586937	-0.278747	0.649765	1.1463	0.115561	1.1018
28.5000	0.584475	-0.285563	0.650505	1.1397	0.115369	1.0973
29.0000	0.581953	-0.292442	0.651300	1.1325	0.115162	1.0923
29.5000	0.579370	-0.299422	0.652168	1.1247	0.114935	1.0870
30.0000	0.576726	-0.306558	0.653139	1.1161	0.114682	1.0810
30.5000	0.574019	-0.313961	0.654270	1.1060	0.114386	1.0740
31.0001	0.571245	-0.321890	0.655693	1.0935	0.114013	1.0653
31.3187	0.569439	-0.327601	0.656950	1.0824	0.113683	1.0576

TABLE 61

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	2.00	1.500000	5.74, -5	10	31.2061

Theta	U	V	Q	P	A^2	Density
10.0000	0.634173	0.000000	0.634173	1.2925	0.119565	1.2011
10.5000	0.634126	-0.010809	0.634218	1.2921	0.119554	1.2008
11.0000	0.633986	-0.021151	0.634339	1.2909	0.119523	1.2001
11.5000	0.633758	-0.031094	0.634520	1.2892	0.119477	1.1989
12.0000	0.633444	-0.040691	0.634750	1.2870	0.119419	1.1975
12.5000	0.633048	-0.049986	0.635019	1.2844	0.119350	1.1957
13.0000	0.632572	-0.059017	0.635320	1.2815	0.119274	1.1938
13.5000	0.632019	-0.067813	0.635647	1.2784	0.119191	1.1918
14.0000	0.631389	-0.076401	0.635995	1.2751	0.119102	1.1895
14.5000	0.630686	-0.084803	0.636362	1.2716	0.119009	1.1872
15.0000	0.629910	-0.093039	0.636744	1.2680	0.118911	1.1848
15.5000	0.629063	-0.101124	0.637139	1.2642	0.118811	1.1823
16.0000	0.628145	-0.109072	0.637545	1.2604	0.118707	1.1797
16.5000	0.627159	-0.116897	0.637961	1.2564	0.118601	1.1771
17.0000	0.626105	-0.124608	0.638385	1.2524	0.118493	1.1744
17.5000	0.624985	-0.132217	0.638817	1.2483	0.118383	1.1717
18.0000	0.623798	-0.139730	0.639256	1.2442	0.118270	1.1689
18.5000	0.622546	-0.147157	0.639702	1.2400	0.118156	1.1661
19.0000	0.621230	-0.154503	0.640155	1.2358	0.118040	1.1632
19.5000	0.619850	-0.161776	0.640613	1.2315	0.117923	1.1603
20.0000	0.618407	-0.168980	0.641078	1.2271	0.117804	1.1574
20.5000	0.616901	-0.176121	0.641549	1.2227	0.117683	1.1544
21.0000	0.615333	-0.183205	0.642027	1.2182	0.117560	1.1514
21.5000	0.613703	-0.190235	0.642512	1.2137	0.117436	1.1484
22.0000	0.612013	-0.197216	0.643004	1.2092	0.117309	1.1453
22.5000	0.610261	-0.204153	0.643504	1.2045	0.117181	1.1421
23.0000	0.608450	-0.211049	0.644013	1.1998	0.117049	1.1390
23.5000	0.606578	-0.217908	0.644532	1.1950	0.116916	1.1357
24.0000	0.604647	-0.224735	0.645061	1.1902	0.116779	1.1324
24.5000	0.602656	-0.231534	0.645602	1.1852	0.116640	1.1290
25.0000	0.600606	-0.238311	0.646157	1.1801	0.116496	1.1255
25.5000	0.598497	-0.245068	0.646728	1.1749	0.116349	1.1220
26.0000	0.596328	-0.251814	0.647316	1.1695	0.116196	1.1183
26.5000	0.594102	-0.258554	0.647925	1.1639	0.116039	1.1145
27.0000	0.591816	-0.265295	0.648558	1.1582	0.115874	1.1106
27.5000	0.589471	-0.272049	0.649220	1.1522	0.115703	1.1065
28.0000	0.587068	-0.278827	0.649918	1.1459	0.115521	1.1021
28.5000	0.584605	-0.285647	0.650659	1.1392	0.115329	1.0976
29.0000	0.582082	-0.292531	0.651455	1.1321	0.115121	1.0926
29.5000	0.579499	-0.299516	0.652326	1.1243	0.114894	1.0872
30.0000	0.576854	-0.306660	0.653300	1.1156	0.114640	1.0812
30.5000	0.574146	-0.314075	0.654436	1.1055	0.114343	1.0742
31.0001	0.571370	-0.322026	0.655870	1.0928	0.113967	1.0654
31.2061	0.570206	-0.325633	0.656637	1.0861	0.113766	1.0607

TABLE 62

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	1.00	1.527686	2.19, =1	20	41.4195

Theta	U	V	Q	P	A^2	Density
20.0000	0.556175	0.000000	0.556175	1.9559	0.138134	1.5168
20.5000	0.556133	-0.009594	0.556216	1.9555	0.138125	1.5165
21.0000	0.556008	-0.018978	0.556332	1.9542	0.138099	1.5158
21.5000	0.555803	-0.028169	0.556516	1.9522	0.138058	1.5147
22.0000	0.555517	-0.037185	0.556760	1.9495	0.138004	1.5132
22.5000	0.555154	-0.046040	0.557060	1.9462	0.137937	1.5114
23.0000	0.554714	-0.054748	0.557409	1.9424	0.137859	1.5093
23.5000	0.554199	-0.063321	0.557805	1.9380	0.137771	1.5069
24.0000	0.553609	-0.071769	0.558242	1.9332	0.137673	1.5042
24.5000	0.552947	-0.080102	0.558718	1.9280	0.137567	1.5013
25.0000	0.552212	-0.088328	0.559231	1.9224	0.137452	1.4982
25.5000	0.551405	-0.096455	0.559778	1.9164	0.137330	1.4948
26.0000	0.550529	-0.104401	0.560357	1.9101	0.137200	1.4913
26.5000	0.549582	-0.112443	0.560967	1.9034	0.137063	1.4876
27.0000	0.548566	-0.120316	0.561606	1.8964	0.136920	1.4837
27.5000	0.547482	-0.128116	0.562273	1.8892	0.136770	1.4796
28.0000	0.546330	-0.135850	0.562967	1.8816	0.136614	1.4754
28.5000	0.545111	-0.143522	0.563689	1.8738	0.136451	1.4710
29.0000	0.543826	-0.151138	0.564437	1.8657	0.136282	1.4665
29.5000	0.542474	-0.158701	0.565211	1.8573	0.136107	1.4618
30.0000	0.541056	-0.166218	0.566012	1.8487	0.135926	1.4569
30.5000	0.539573	-0.173692	0.566840	1.8398	0.135739	1.4519
31.0000	0.538025	-0.181128	0.567695	1.8306	0.135544	1.4467
31.5000	0.536412	-0.188531	0.568578	1.8211	0.135344	1.4414
32.0000	0.534734	-0.195906	0.569491	1.8114	0.135136	1.4358
32.5000	0.532992	-0.203258	0.570434	1.8013	0.134921	1.4301
33.0000	0.531187	-0.210592	0.571409	1.7909	0.134698	1.4242
33.5000	0.529317	-0.217915	0.572419	1.7802	0.134467	1.4181
34.0000	0.527383	-0.225232	0.573465	1.7691	0.134228	1.4118
34.5000	0.525386	-0.232550	0.574552	1.7576	0.133978	1.4053
35.0000	0.523325	-0.239878	0.575682	1.7457	0.133718	1.3985
35.5000	0.521199	-0.247224	0.576861	1.7333	0.133446	1.3914
36.0000	0.519010	-0.254601	0.578094	1.7204	0.133161	1.3840
36.5000	0.516755	-0.262021	0.579389	1.7069	0.132862	1.3762
37.0000	0.514436	-0.269501	0.580754	1.6927	0.132545	1.3680
37.5000	0.512051	-0.277062	0.582203	1.6777	0.132208	1.3593
38.0000	0.509600	-0.284732	0.583751	1.6617	0.131847	1.3501
38.5000	0.507082	-0.292550	0.585420	1.6445	0.131457	1.3401
39.0000	0.504494	-0.300572	0.587246	1.6259	0.131029	1.3292
39.5000	0.501835	-0.308885	0.589278	1.6052	0.130550	1.3171
40.0000	0.499101	-0.317640	0.591606	1.5817	0.130001	1.3033
40.5001	0.496288	-0.327139	0.594409	1.5535	0.129336	1.2867
41.0001	0.493387	-0.338231	0.598189	1.5159	0.128434	1.2644
41.4195	0.490864	-0.355681	0.606182	1.4379	0.126509	1.2175

TABLE 63

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.0000	1.400	2.00	1.500000	9.96, -3	20	37.7959

Theta	U	V	Q	P	A^2	Density
20.0000	0.574075	0.000000	0.574075	1.9115	0.134087	1.5840
20.4998	0.574032	-0.009900	0.574117	1.9110	0.134078	1.5837
21.0000	0.573903	-0.019589	0.574237	1.9097	0.134050	1.5829
21.4999	0.573691	-0.029076	0.574427	1.9075	0.134007	1.5816
21.9999	0.573396	-0.038385	0.574680	1.9046	0.133949	1.5799
22.4999	0.573021	-0.047531	0.574989	1.9011	0.133877	1.5778
22.9999	0.572567	-0.056526	0.575351	1.8969	0.133794	1.5753
23.4999	0.572035	-0.065384	0.575760	1.8923	0.133700	1.5726
23.9999	0.571426	-0.074117	0.576213	1.8871	0.133596	1.5695
24.5000	0.570742	-0.082733	0.576707	1.8815	0.133482	1.5662
25.0000	0.569983	-0.091242	0.577239	1.8754	0.133359	1.5626
25.5000	0.569150	-0.099652	0.577808	1.8690	0.133228	1.5587
26.0000	0.568244	-0.107972	0.578410	1.8621	0.133088	1.5546
26.5000	0.567265	-0.116207	0.579046	1.8549	0.132941	1.5503
27.0000	0.566216	-0.124366	0.579713	1.8474	0.132787	1.5458
27.4999	0.565095	-0.132455	0.580411	1.8395	0.132625	1.5411
27.9999	0.563904	-0.140479	0.581139	1.8313	0.132456	1.5362
28.4999	0.562643	-0.148445	0.581896	1.8228	0.132279	1.5311
29.0000	0.561313	-0.156359	0.582684	1.8140	0.132096	1.5258
29.5000	0.559914	-0.164225	0.583501	1.8048	0.131905	1.5203
30.0000	0.558447	-0.172048	0.584349	1.7954	0.131707	1.5146
30.5000	0.556912	-0.179836	0.585228	1.7856	0.131502	1.5087
31.0000	0.555308	-0.187594	0.586139	1.7755	0.131288	1.5026
31.5000	0.553638	-0.195327	0.587084	1.7650	0.131067	1.4963
32.0000	0.551899	-0.203043	0.588064	1.7542	0.130836	1.4897
32.5000	0.550094	-0.210746	0.589082	1.7429	0.130597	1.4829
33.0000	0.548221	-0.218446	0.590140	1.7313	0.130347	1.4758
33.5000	0.546281	-0.226150	0.591242	1.7192	0.130087	1.4685
34.0000	0.544274	-0.233869	0.592392	1.7067	0.129814	1.4608
34.5001	0.542199	-0.241613	0.593596	1.6936	0.129529	1.4528
35.0000	0.540057	-0.249394	0.594860	1.6799	0.129228	1.4443
35.5001	0.537846	-0.257232	0.596194	1.6655	0.128911	1.4355
36.0001	0.535567	-0.265146	0.597607	1.6502	0.128573	1.4261
36.5002	0.533218	-0.273163	0.599115	1.6341	0.128212	1.4161
37.0000	0.530799	-0.281315	0.600738	1.6168	0.127823	1.4054
37.5000	0.528308	-0.289661	0.602506	1.5980	0.127397	1.3937
37.7959	0.526799	-0.294722	0.603637	1.5861	0.127124	1.3863

TABLE 64

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	1.00	1.082918	7.10, -1	10	16.2338

Theta	U	V	Q	P	A^2	Density
10.0000	0.896260	0.000000	0.896260	2.9049	0.039343	1.7489
10.2000	0.896250	-0.006197	0.896271	2.9039	0.039340	1.7485
10.4000	0.896217	-0.012283	0.896301	2.9011	0.039329	1.7473
10.6000	0.896164	-0.018269	0.896350	2.8966	0.039311	1.7453
10.8000	0.896090	-0.024165	0.896416	2.8906	0.039288	1.7427
11.0000	0.895995	-0.029981	0.896497	2.8831	0.039259	1.7395
11.2000	0.895881	-0.035723	0.896593	2.8742	0.039224	1.7357
11.4000	0.895746	-0.041400	0.896702	2.8642	0.039185	1.7314
11.6000	0.895592	-0.047019	0.896825	2.8529	0.039141	1.7265
11.8000	0.895418	-0.052587	0.896961	2.8405	0.039092	1.7211
12.0000	0.895225	-0.058109	0.897108	2.8271	0.039039	1.7153
12.2000	0.895012	-0.063591	0.897268	2.8125	0.038982	1.7090
12.4000	0.894781	-0.069039	0.897440	2.7970	0.038920	1.7022
12.6000	0.894530	-0.074460	0.897624	2.7805	0.038854	1.6950
12.8000	0.894261	-0.079858	0.897819	2.7629	0.038784	1.6874
13.0000	0.893973	-0.085240	0.898027	2.7443	0.038709	1.6793
13.2000	0.893666	-0.090611	0.898248	2.7247	0.038630	1.6707
13.4000	0.893340	-0.095979	0.898481	2.7041	0.038546	1.6617
13.6000	0.892996	-0.101350	0.898729	2.6823	0.038457	1.6521
13.8000	0.892633	-0.106732	0.898991	2.6594	0.038363	1.6420
14.0000	0.892251	-0.112134	0.899269	2.6351	0.038263	1.6313
14.2000	0.891850	-0.117566	0.899565	2.6096	0.038156	1.6200
14.4000	0.891430	-0.123041	0.899881	2.5824	0.038043	1.6079
14.6000	0.890991	-0.128575	0.900220	2.5536	0.037921	1.5951
14.8000	0.890532	-0.134188	0.900585	2.5227	0.037789	1.5813
15.0000	0.890054	-0.139906	0.900982	2.4894	0.037646	1.5663
15.2000	0.889555	-0.145767	0.901419	2.4532	0.037489	1.5500
15.4000	0.889036	-0.151829	0.901907	2.4131	0.037313	1.5319
15.6000	0.888495	-0.158185	0.902466	2.3677	0.037111	1.5113
15.8000	0.887931	-0.165014	0.903134	2.3143	0.036870	1.4868
16.0000	0.887342	-0.172748	0.904001	2.2463	0.036557	1.4555
16.2000	0.886722	-0.183591	0.905528	2.1296	0.036004	1.4011
16.2338	0.886612	-0.188820	0.906496	2.0579	0.035653	1.3672

TABLE 65

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
6.0000	1.400	1.00	1.158709	2.70	20	29.8684

Theta	U	V	Q	P	A^2	Density
20.0000	0.769820	0.000000	0.769820	8.1373	0.081475	2.0664
20.0000	0.769820	-0.000000	0.769820	8.1373	0.081475	2.0664
20.2000	0.769811	-0.005350	0.769830	8.1363	0.081472	2.0662
20.4000	0.769783	-0.010651	0.769857	8.1334	0.081464	2.0656
20.6000	0.769737	-0.015906	0.769901	8.1286	0.081450	2.0648
20.8000	0.769672	-0.021119	0.769962	8.1221	0.081432	2.0636
21.0000	0.769589	-0.026293	0.770038	8.1139	0.081408	2.0621
21.2000	0.769489	-0.031429	0.770130	8.1040	0.081380	2.0603
21.4000	0.769370	-0.036531	0.770237	8.0926	0.081347	2.0582
21.6000	0.769234	-0.041601	0.770358	8.0796	0.081310	2.0559
21.8000	0.769080	-0.046640	0.770493	8.0652	0.081268	2.0533
22.0000	0.768908	-0.051651	0.770641	8.0493	0.081223	2.0504
22.2000	0.768719	-0.056636	0.770803	8.0320	0.081173	2.0472
22.4000	0.768513	-0.061597	0.770977	8.0134	0.081119	2.0438
22.6000	0.768289	-0.066536	0.771165	7.9934	0.081061	2.0402
22.8000	0.768048	-0.071454	0.771365	7.9721	0.080999	2.0363
23.0000	0.767790	-0.076355	0.771578	7.9495	0.080934	2.0322
23.2000	0.767515	-0.081238	0.771803	7.9257	0.080864	2.0278
23.4000	0.767223	-0.086107	0.772040	7.9006	0.080791	2.0232
23.6000	0.766914	-0.090963	0.772290	7.8742	0.080714	2.0184
23.8000	0.766588	-0.095808	0.772552	7.8466	0.080633	2.0133
24.0000	0.766245	-0.100643	0.772827	7.8177	0.080548	2.0080
24.2000	0.765886	-0.105472	0.773114	7.7876	0.080459	2.0025
24.4000	0.765509	-0.110294	0.773414	7.7562	0.080366	1.9968
24.6000	0.765116	-0.115114	0.773727	7.7235	0.080269	1.9907
24.8000	0.764705	-0.119932	0.774053	7.6896	0.080168	1.9845
25.0000	0.764278	-0.124751	0.774393	7.6543	0.080063	1.9780
25.2000	0.763834	-0.129573	0.774746	7.6177	0.079954	1.9712
25.4000	0.763374	-0.134401	0.775115	7.5797	0.079839	1.9642
25.6000	0.762896	-0.139237	0.775498	7.5403	0.079721	1.9569
25.8000	0.762402	-0.144085	0.775897	7.4993	0.079597	1.9493
26.0000	0.761890	-0.148946	0.776313	7.4569	0.079468	1.9414
26.2000	0.761362	-0.153826	0.776746	7.4128	0.079333	1.9332
26.4000	0.760816	-0.158728	0.777197	7.3670	0.079193	1.9247
26.6000	0.760254	-0.163655	0.777669	7.3194	0.079046	1.9158
26.8000	0.759674	-0.168614	0.778161	7.2699	0.078893	1.9065
27.0000	0.759076	-0.173609	0.778676	7.2183	0.078733	1.8968
27.2000	0.758462	-0.178648	0.779217	7.1644	0.078564	1.8867
27.4000	0.757829	-0.183737	0.779785	7.1080	0.078387	1.8761
27.6000	0.757179	-0.188888	0.780383	7.0489	0.078200	1.8649
27.8000	0.756510	-0.194110	0.781016	6.9867	0.078003	1.8532
28.0000	0.755823	-0.199419	0.781689	6.9211	0.077793	1.8407
28.2000	0.755118	-0.204832	0.782406	6.8514	0.077568	1.8275
28.4000	0.754393	-0.210374	0.783177	6.7771	0.077327	1.8133
28.6000	0.753649	-0.216075	0.784012	6.6971	0.077065	1.7980
28.8000	0.752885	-0.221982	0.784928	6.6102	0.076778	1.7813
29.0000	0.752099	-0.228163	0.785946	6.5143	0.076458	1.7628
29.2000	0.751291	-0.234729	0.787106	6.4061	0.076093	1.7418
29.4000	0.750460	-0.241884	0.788478	6.2796	0.075660	1.7172
29.6000	0.749601	-0.250098	0.790222	6.1211	0.075110	1.6861
29.8000	0.748710	-0.261245	0.792979	5.8757	0.074237	1.6375
29.8684	0.748395	-0.270772	0.795872	5.6249	0.073318	1.5873

TABLE 66

M	γ	F	q_{max}/q_∞	S	θ_c	θ_s
10.0000	1.400	1.00	1.047992	2.07	10	14.7488

Theta	U	V	Q	P	A^2	Density
10.0000	0.928759	0.000000	0.928759	6.0544	0.027481	2.0059
10.1000	0.928756	-0.003226	0.928762	6.0536	0.027480	2.0058
10.2000	0.928748	-0.006422	0.928770	6.0513	0.027477	2.0052
10.3000	0.928734	-0.009591	0.928783	6.0475	0.027472	2.0043
10.4000	0.928714	-0.012733	0.928801	6.0423	0.027466	2.0031
10.5000	0.928689	-0.015851	0.928824	6.0357	0.027457	2.0015
10.6000	0.928659	-0.018945	0.928852	6.0278	0.027447	1.9996
10.7000	0.928623	-0.022019	0.928884	6.0186	0.027435	1.9975
10.8000	0.928582	-0.025073	0.928920	6.0083	0.027421	1.9950
10.9000	0.928535	-0.028109	0.928961	5.9967	0.027406	1.9923
11.0000	0.928484	-0.031128	0.929005	5.9841	0.027390	1.9893
11.1000	0.928427	-0.034131	0.929054	5.9703	0.027372	1.9860
11.2000	0.928365	-0.037119	0.929106	5.9554	0.027352	1.9825
11.3000	0.928297	-0.040095	0.929163	5.9395	0.027331	1.9787
11.4000	0.928225	-0.043059	0.929223	5.9225	0.027309	1.9746
11.5000	0.928147	-0.046012	0.929287	5.9045	0.027285	1.9703
11.6000	0.928064	-0.048956	0.929354	5.8855	0.027260	1.9658
11.7000	0.927976	-0.051891	0.929426	5.8654	0.027234	1.9610
11.8000	0.927883	-0.054819	0.929501	5.8444	0.027206	1.9560
11.9000	0.927785	-0.057742	0.929580	5.8224	0.027176	1.9507
12.0000	0.927681	-0.060660	0.929663	5.7994	0.027146	1.9452
12.1000	0.927573	-0.063574	0.929749	5.7753	0.027113	1.9394
12.2000	0.927459	-0.066486	0.929840	5.7503	0.027080	1.9334
12.3000	0.927341	-0.069398	0.929934	5.7242	0.027045	1.9272
12.4000	0.927217	-0.072311	0.930033	5.6971	0.027008	1.9206
12.5000	0.927088	-0.075225	0.930135	5.6689	0.026970	1.9138
12.6000	0.926955	-0.078144	0.930243	5.6396	0.026930	1.9068
12.7000	0.926816	-0.081068	0.930354	5.6092	0.026888	1.8994
12.8000	0.926672	-0.084000	0.930471	5.5775	0.026845	1.8918
12.9000	0.926522	-0.086941	0.930593	5.5447	0.026799	1.8838
13.0000	0.926368	-0.089894	0.930720	5.5106	0.026752	1.8755
13.1000	0.926209	-0.092861	0.930852	5.4750	0.026703	1.8669
13.2000	0.926044	-0.095846	0.930991	5.4381	0.026651	1.8579
13.3000	0.925874	-0.098851	0.931136	5.3995	0.026597	1.8484
13.4000	0.925699	-0.101880	0.931288	5.3593	0.026540	1.8386
13.5000	0.925518	-0.104939	0.931449	5.3173	0.026481	1.8283
13.6000	0.925333	-0.108032	0.931618	5.2732	0.026418	1.8174
13.7000	0.925141	-0.111165	0.931796	5.2268	0.026351	1.8060
13.8000	0.924945	-0.114348	0.931986	5.1779	0.026280	1.7939
13.9000	0.924742	-0.117589	0.932188	5.1260	0.026205	1.7811
14.0000	0.924534	-0.120903	0.932406	5.0707	0.026124	1.7673
14.1000	0.924320	-0.124308	0.932641	5.0113	0.026036	1.7525
14.2000	0.924100	-0.127827	0.932899	4.9468	0.025940	1.7364
14.3000	0.923874	-0.131500	0.933185	4.8758	0.025833	1.7185
14.4000	0.923641	-0.135385	0.933510	4.7961	0.025712	1.6984
14.5000	0.923401	-0.139591	0.933892	4.7036	0.025569	1.6750
14.6000	0.923153	-0.144355	0.934372	4.5893	0.025390	1.6458
14.7000	0.922896	-0.150506	0.935088	4.4221	0.025122	1.6027
14.7488	0.922766	-0.157323	0.936081	4.1974	0.024750	1.5441

TABLE 67

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
10.0000	1.400	1.00	1.128624	4.83	20	28.9577

Theta	U	V	Q	P	A^2	Density
20.0000	0.793651	0.000000	0.793651	20.5101	0.074024	2.1752
20.2000	0.793641	-0.005515	0.793660	20.5072	0.074021	2.1750
20.4000	0.793612	-0.010980	0.793688	20.4986	0.074012	2.1743
20.6000	0.793564	-0.016399	0.793734	20.4845	0.073997	2.1733
20.8000	0.793498	-0.021776	0.793796	20.4653	0.073977	2.1718
21.0000	0.793412	-0.027113	0.793876	20.4410	0.073952	2.1700
21.2000	0.793308	-0.032412	0.793970	20.4118	0.073922	2.1677
21.4000	0.793186	-0.037678	0.794081	20.3780	0.073887	2.1652
21.6000	0.793045	-0.042912	0.794206	20.3397	0.073847	2.1623
21.8000	0.792887	-0.048118	0.794345	20.2970	0.073803	2.1590
22.0000	0.792710	-0.053296	0.794499	20.2499	0.073754	2.1555
22.2000	0.792515	-0.058451	0.794667	20.1987	0.073701	2.1516
22.4000	0.792302	-0.063583	0.794849	20.1434	0.073643	2.1473
22.6000	0.792071	-0.068696	0.795044	20.0840	0.073581	2.1428
22.8000	0.791822	-0.073791	0.795253	20.0206	0.073515	2.1380
23.0000	0.791556	-0.078871	0.795475	19.9533	0.073444	2.1328
23.2000	0.791271	-0.083938	0.795711	19.8820	0.073369	2.1274
23.4000	0.790970	-0.088994	0.795960	19.8068	0.073289	2.1217
23.6000	0.790650	-0.094042	0.796223	19.7277	0.073206	2.1156
23.8000	0.790313	-0.099084	0.796500	19.6447	0.073118	2.1092
24.0000	0.789958	-0.104122	0.796791	19.5577	0.073025	2.1026
24.2000	0.789586	-0.109159	0.797096	19.4667	0.072928	2.0956
24.4000	0.789196	-0.114197	0.797416	19.3716	0.072826	2.0882
24.6000	0.788789	-0.119240	0.797751	19.2723	0.072719	2.0806
24.8000	0.788364	-0.124290	0.798101	19.1687	0.072607	2.0726
25.0000	0.787921	-0.129351	0.798468	19.0606	0.072490	2.0643
25.2000	0.787461	-0.134426	0.798852	18.9480	0.072367	2.0555
25.4000	0.786983	-0.139519	0.799254	18.8305	0.072239	2.0464
25.6000	0.786487	-0.144634	0.799675	18.7079	0.072104	2.0369
25.8000	0.785973	-0.149777	0.800117	18.5800	0.071963	2.0269
26.0000	0.785441	-0.154953	0.800580	18.4463	0.071814	2.0165
26.2000	0.784891	-0.160169	0.801067	18.3065	0.071658	2.0056
26.4000	0.784323	-0.165431	0.801579	18.1600	0.071494	1.9941
26.6000	0.783736	-0.170749	0.802121	18.0061	0.071320	1.9820
26.8000	0.783131	-0.176135	0.802694	17.8441	0.071137	1.9693
27.0000	0.782506	-0.181600	0.803302	17.6730	0.070941	1.9558
27.2000	0.781863	-0.187163	0.803952	17.4916	0.070732	1.9414
27.4000	0.781200	-0.192844	0.804650	17.2981	0.070508	1.9260
27.6000	0.780516	-0.198673	0.805405	17.0903	0.070265	1.9095
27.8000	0.779812	-0.204689	0.806229	16.8653	0.069999	1.8915
28.0000	0.779087	-0.210950	0.807141	16.6183	0.069705	1.8717
28.2000	0.778339	-0.217548	0.808170	16.3425	0.069372	1.8494
28.4000	0.777568	-0.224639	0.809367	16.0256	0.068985	1.8237
28.6000	0.776770	-0.232546	0.810832	15.6427	0.068510	1.7925
28.8000	0.775942	-0.242187	0.812860	15.1229	0.067852	1.7497
28.9577	0.775260	-0.257867	0.817021	14.0908	0.066495	1.6636

TABLE 68

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
2.2473	1.405	2.00	1.406345	1.02, -7	5	26.5445

Theta	U	V	Q	P	A^2	Density
5.0000	0.699991	0.000000	0.699991	1.1140	0.103277	1.0798
5.0000	0.699991	-0.000001	0.699991	1.1140	0.103277	1.0798
5.5000	0.699940	-0.011666	0.700037	1.1135	0.103265	1.0795
6.0000	0.699790	-0.022418	0.700149	1.1123	0.103233	1.0787
6.5000	0.699551	-0.032472	0.700304	1.1107	0.103189	1.0776
7.0000	0.699225	-0.041980	0.700484	1.1087	0.103138	1.0762
7.5000	0.698819	-0.051052	0.700681	1.1067	0.103082	1.0748
8.0000	0.698335	-0.059770	0.700888	1.1045	0.103023	1.0733
8.5000	0.697777	-0.068195	0.701101	1.1022	0.102963	1.0717
9.0000	0.697146	-0.076376	0.701317	1.1000	0.102901	1.0702
9.5000	0.696444	-0.084350	0.701534	1.0977	0.102840	1.0686
10.0000	0.695674	-0.092147	0.701750	1.0954	0.102778	1.0670
10.5000	0.694837	-0.099792	0.701966	1.0931	0.102717	1.0654
11.0000	0.693933	-0.107303	0.702180	1.0909	0.102656	1.0639
11.5000	0.692964	-0.114698	0.702392	1.0887	0.102596	1.0623
12.0000	0.691931	-0.121989	0.702602	1.0865	0.102536	1.0608
12.5000	0.690835	-0.129187	0.702811	1.0843	0.102477	1.0593
13.0000	0.689677	-0.136303	0.703017	1.0821	0.102418	1.0578
13.5000	0.688457	-0.143344	0.703221	1.0800	0.102360	1.0563
14.0000	0.687175	-0.150317	0.703424	1.0779	0.102302	1.0548
14.5000	0.685833	-0.157227	0.703625	1.0758	0.102245	1.0534
15.0000	0.684431	-0.164081	0.703824	1.0737	0.102188	1.0519
15.5000	0.682970	-0.170882	0.704023	1.0717	0.102131	1.0505
16.0000	0.681449	-0.177635	0.704221	1.0696	0.102075	1.0491
16.5000	0.679869	-0.184342	0.704418	1.0676	0.102019	1.0476
17.0000	0.678232	-0.191007	0.704615	1.0655	0.101962	1.0462
17.5000	0.676536	-0.197634	0.704812	1.0635	0.101906	1.0448
18.0000	0.674782	-0.204223	0.705009	1.0615	0.101850	1.0434
18.5000	0.672972	-0.210778	0.705208	1.0594	0.101793	1.0419
19.0000	0.671104	-0.217302	0.705408	1.0573	0.101736	1.0405
19.5000	0.669179	-0.223795	0.705610	1.0553	0.101678	1.0390
20.0000	0.667198	-0.230262	0.705814	1.0532	0.101620	1.0376
20.5000	0.665160	-0.236702	0.706021	1.0510	0.101561	1.0361
21.0000	0.663067	-0.243120	0.706233	1.0489	0.101500	1.0345
21.5000	0.660917	-0.249518	0.706449	1.0466	0.101438	1.0330
22.0000	0.658712	-0.255898	0.706672	1.0444	0.101375	1.0314
22.5000	0.656451	-0.262265	0.706902	1.0420	0.101309	1.0297
23.0000	0.654134	-0.268623	0.707142	1.0396	0.101240	1.0280
23.5000	0.651762	-0.274978	0.707395	1.0370	0.101168	1.0262
24.0000	0.649335	-0.281339	0.707664	1.0343	0.101090	1.0243
24.5000	0.646852	-0.287719	0.707955	1.0313	0.101007	1.0222
25.0000	0.644313	-0.294138	0.708278	1.0280	0.100914	1.0199
25.5000	0.641718	-0.300638	0.708651	1.0242	0.100807	1.0172
26.0000	0.639066	-0.307317	0.709118	1.0195	0.100673	1.0139
26.5000	0.636353	-0.314679	0.709907	1.0116	0.100447	1.0082
26.5445	0.636108	-0.315509	0.710056	1.0101	0.100404	1.0072

TABLE 69

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S^*
2.4431	1.405	2.00	1.351797	2.69, -2	20	33.0450

Theta	U	V	Q	P	A^2	Density
20.0000	0.650005	0.000000	0.650005	2.2642	0.116942	1.7752
20.4999	0.649956	-0.011213	0.650053	2.2634	0.116930	1.7747
21.0000	0.649810	-0.022185	0.650189	2.2610	0.116894	1.7734
21.4999	0.649569	-0.032937	0.650404	2.2572	0.116837	1.7712
21.9999	0.649236	-0.043498	0.650691	2.2521	0.116762	1.7684
22.5000	0.648811	-0.053884	0.651044	2.2459	0.116669	1.7649
23.0000	0.648296	-0.064112	0.651458	2.2386	0.116559	1.7609
23.4999	0.647692	-0.074199	0.651928	2.2303	0.116435	1.7562
24.0000	0.647001	-0.084161	0.652452	2.2212	0.116297	1.7511
24.4999	0.646224	-0.094008	0.653026	2.2111	0.116145	1.7455
25.0000	0.645361	-0.103755	0.653648	2.2003	0.115981	1.7394
25.5000	0.644413	-0.113411	0.654316	2.1886	0.115804	1.7328
26.0000	0.643381	-0.122989	0.655031	2.1762	0.115614	1.7258
26.5000	0.642267	-0.132500	0.655791	2.1631	0.115412	1.7184
27.0000	0.641069	-0.141953	0.656597	2.1492	0.115198	1.7105
27.5000	0.639789	-0.151359	0.657449	2.1346	0.114971	1.7022
28.0000	0.638427	-0.160731	0.658349	2.1192	0.114732	1.6935
28.5000	0.636984	-0.170078	0.659299	2.1030	0.114478	1.6842
29.0000	0.635459	-0.179414	0.660301	2.0860	0.114211	1.6745
29.5000	0.633853	-0.188751	0.661359	2.0681	0.113927	1.6643
30.0000	0.632164	-0.198107	0.662479	2.0492	0.113627	1.6535
30.5000	0.630395	-0.207498	0.663666	2.0293	0.113308	1.6421
31.0000	0.628543	-0.216947	0.664930	2.0083	0.112968	1.6299
31.5000	0.626608	-0.226481	0.666282	1.9859	0.112604	1.6170
32.0001	0.624589	-0.236137	0.667737	1.9620	0.112211	1.6031
32.5001	0.622486	-0.245960	0.669317	1.9361	0.111783	1.5880
33.0002	0.620296	-0.256023	0.671055	1.9079	0.111311	1.5715
33.0450	0.620095	-0.256941	0.671220	1.9053	0.111266	1.5700

TABLE 70

M	γ	F	q_{max}/q_∞	S	θ_C	θ_S
4.1538	1.405	2.00	1.134112	2.25, -1	20	26.1994

Theta	U	V	Q	P	A^2	Density
20.0000	0.799996	0.000000	0.799996	4.2357	0.072901	2.6181
20.0000	0.799996	0.000000	0.799996	4.2357	0.072901	2.6181
20.2500	0.799981	-0.006940	0.800011	4.2347	0.072896	2.6177
20.5000	0.799936	-0.013805	0.800055	4.2319	0.072882	2.6164
20.7500	0.799861	-0.020600	0.800126	4.2272	0.072859	2.6144
21.0000	0.799756	-0.027331	0.800223	4.2209	0.072828	2.6116
21.2500	0.799622	-0.034004	0.800345	4.2129	0.072788	2.6081
21.5000	0.799459	-0.040626	0.800491	4.2034	0.072741	2.6039
21.7500	0.799268	-0.047200	0.800660	4.1925	0.072686	2.5991
22.0000	0.799048	-0.053733	0.800852	4.1800	0.072624	2.5936
22.2500	0.798799	-0.060228	0.801066	4.1662	0.072554	2.5874
22.5000	0.798522	-0.066691	0.801302	4.1509	0.072478	2.5807
22.7500	0.798217	-0.073125	0.801559	4.1344	0.072394	2.5734
23.0000	0.797884	-0.079536	0.801838	4.1165	0.072304	2.5654
23.2500	0.797523	-0.085928	0.802139	4.0972	0.072206	2.5569
23.5000	0.797134	-0.092306	0.802461	4.0767	0.072102	2.5478
23.7500	0.796717	-0.098674	0.802805	4.0548	0.071990	2.5380
24.0000	0.796273	-0.105037	0.803171	4.0315	0.071871	2.5277
24.2500	0.795801	-0.111401	0.803560	4.0069	0.071744	2.5167
24.5000	0.795301	-0.117772	0.803974	3.9809	0.071609	2.5050
24.7500	0.794773	-0.124155	0.804412	3.9535	0.071467	2.4927
25.0000	0.794217	-0.130556	0.804876	3.9245	0.071315	2.4797
25.2500	0.793634	-0.136985	0.805369	3.8939	0.071155	2.4659
25.5000	0.793022	-0.143449	0.805892	3.8616	0.070984	2.4514
25.7500	0.792382	-0.149959	0.806447	3.8275	0.070803	2.4359
26.0000	0.791713	-0.156526	0.807038	3.7914	0.070610	2.4196
26.1994	0.791159	-0.161815	0.807537	3.7611	0.070446	2.4058

TABLE 71

Comparison with Woolard[10]

M_∞	θ_c	F	A	B	B/A
2	10	1	31·6390	31·8	1·005
		2	31·2061	30·7	0·984
	20	1	41·4195	41·3	0·997
		2	37·7959	37·4	0·990
6	20	1	29·8684	30·4	1·018
		2	24·0703	24·0	1·003
10	20	1	28·9577	29·3	1·012
		2	22·7455	22·8	1·002

A = Value of θ_w using Intstep Routine

B = Value of θ_w from Ref. 10 (Woolard)

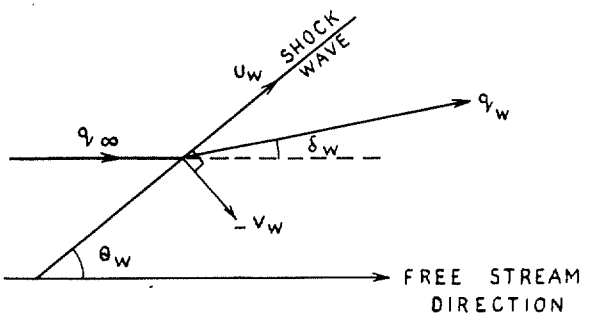

FIG. 1. Velocity components across the wave.

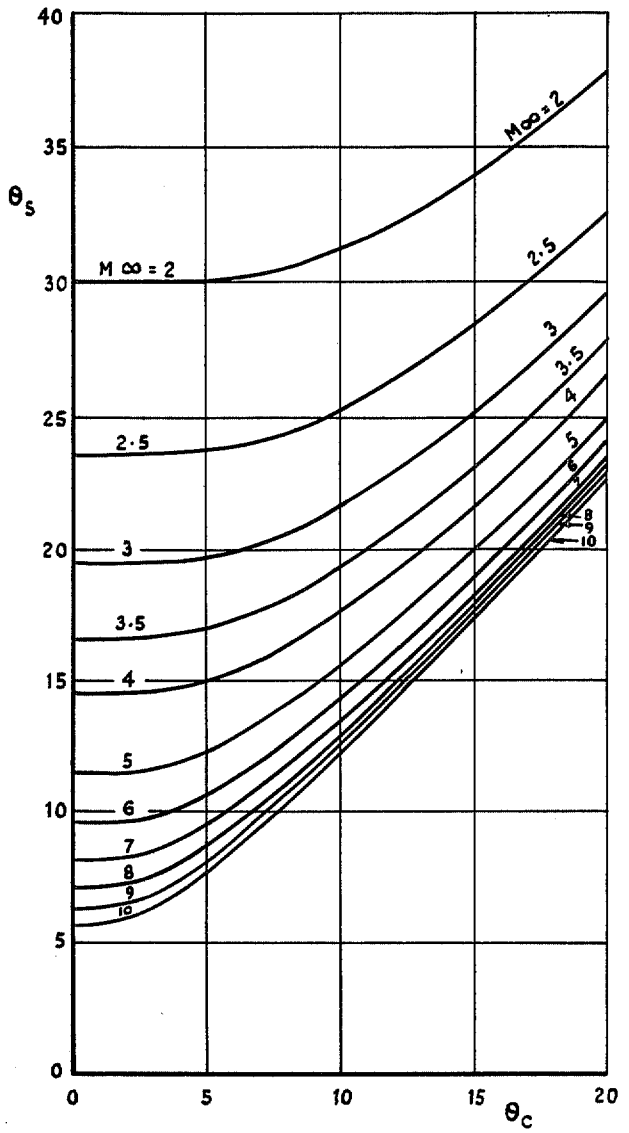

FIG. 2. Shock Angle as a function of cone angle, for various Mach numbers ($\gamma = 1{\cdot}4$).

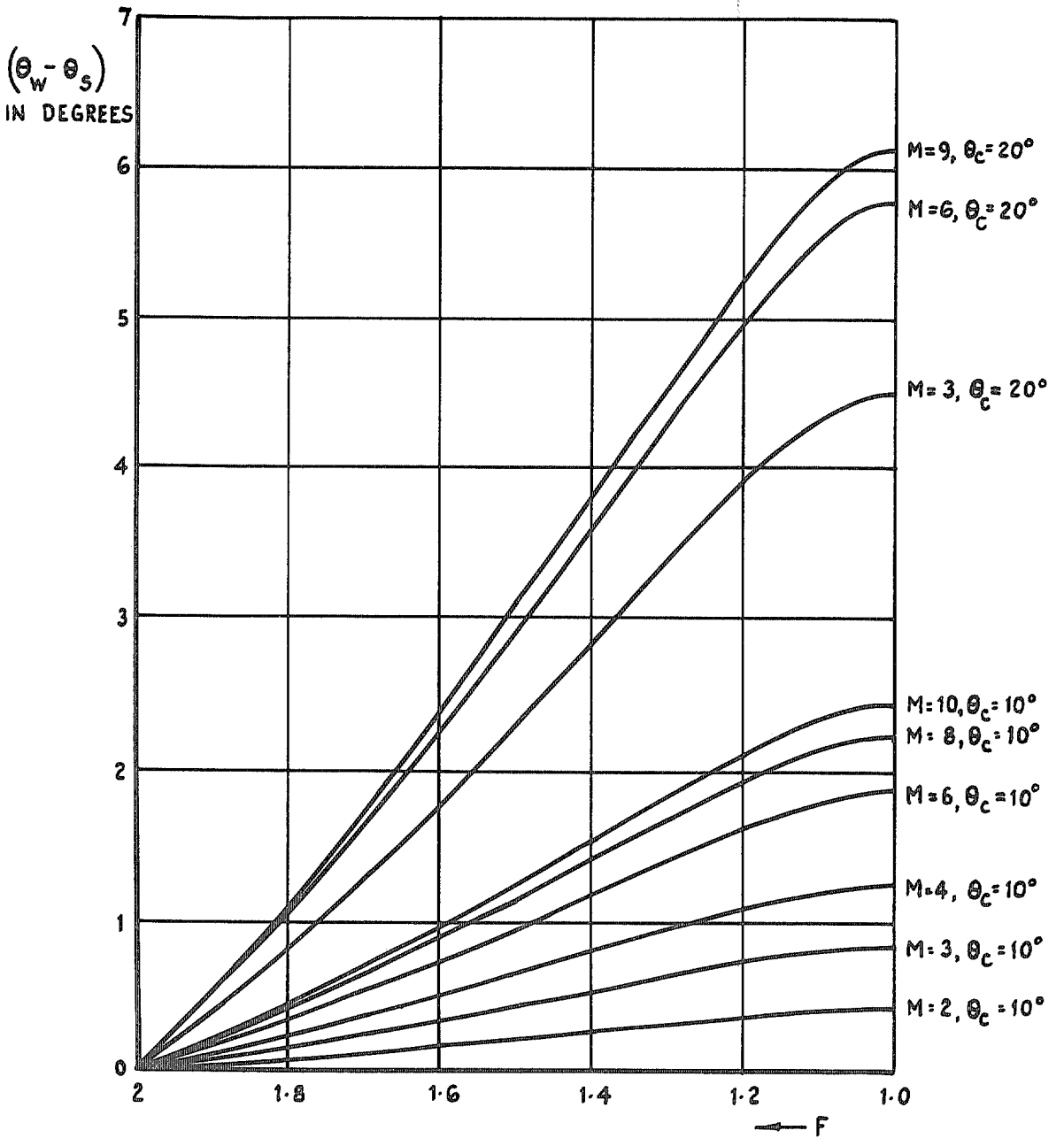

FIG. 3. $(\theta_w - \theta_s)$ as a function of F, for various cone angles and free stream Mach numbers ($\gamma = 1{\cdot}4$).

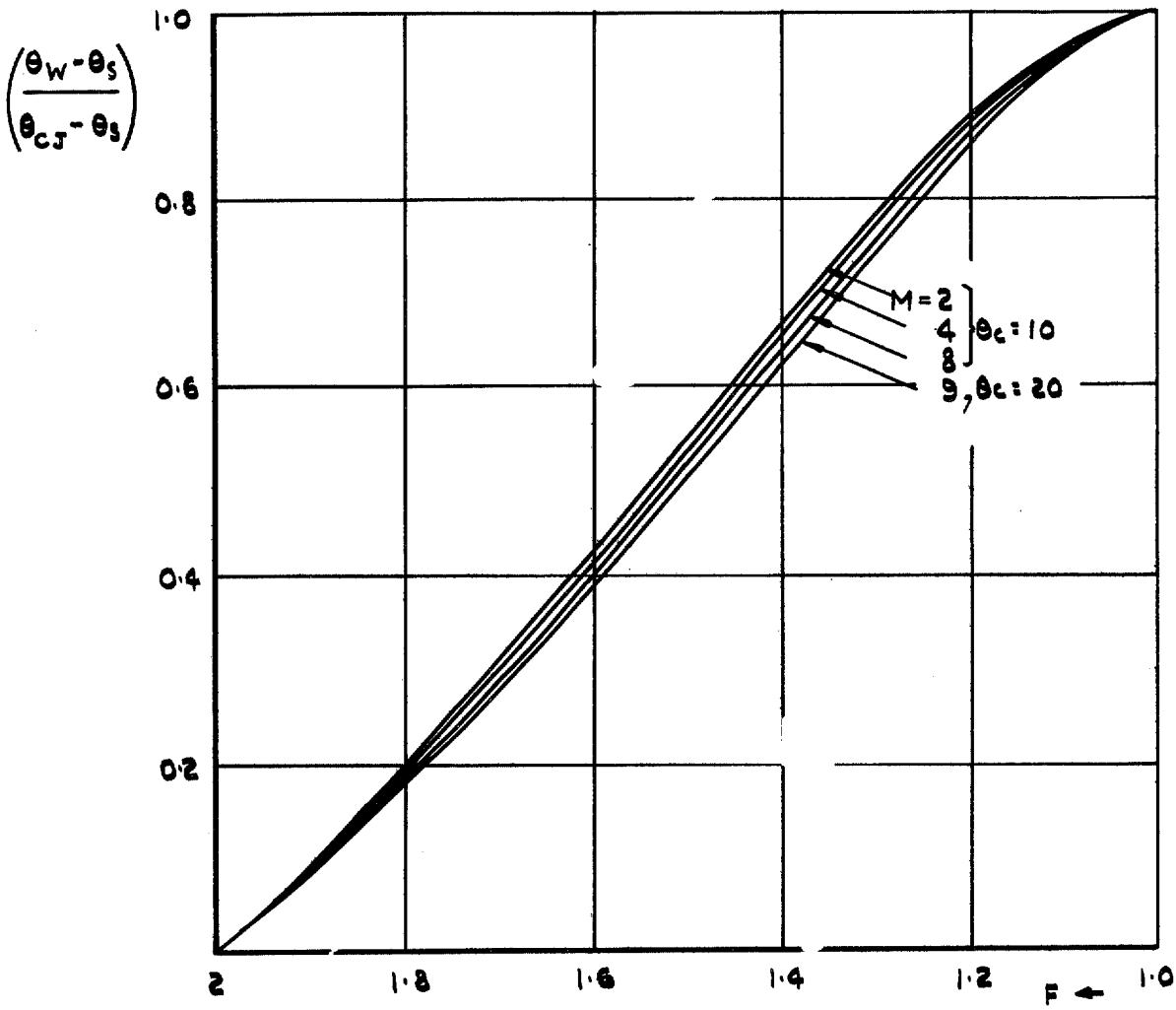

FIG. 4. $\left(\frac{\theta_w-\theta_s}{\theta_{CJ}-\theta_s}\right)$ as a function of F, for various cone angles and Mach numbers; $\gamma = 1{\cdot}4$.

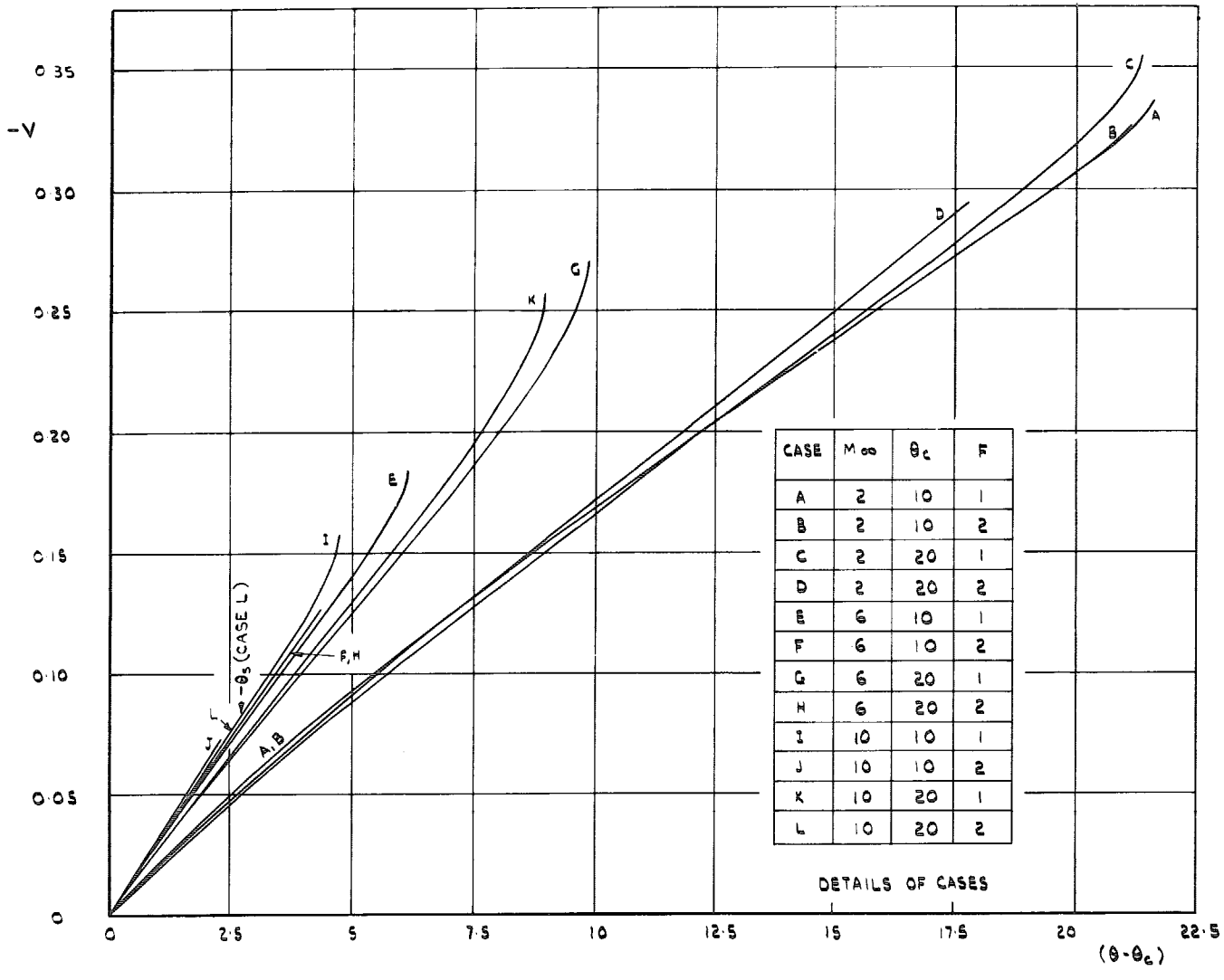

FIG. 5. V as a function of θ, for various cases in which $F = 1$ or 2.

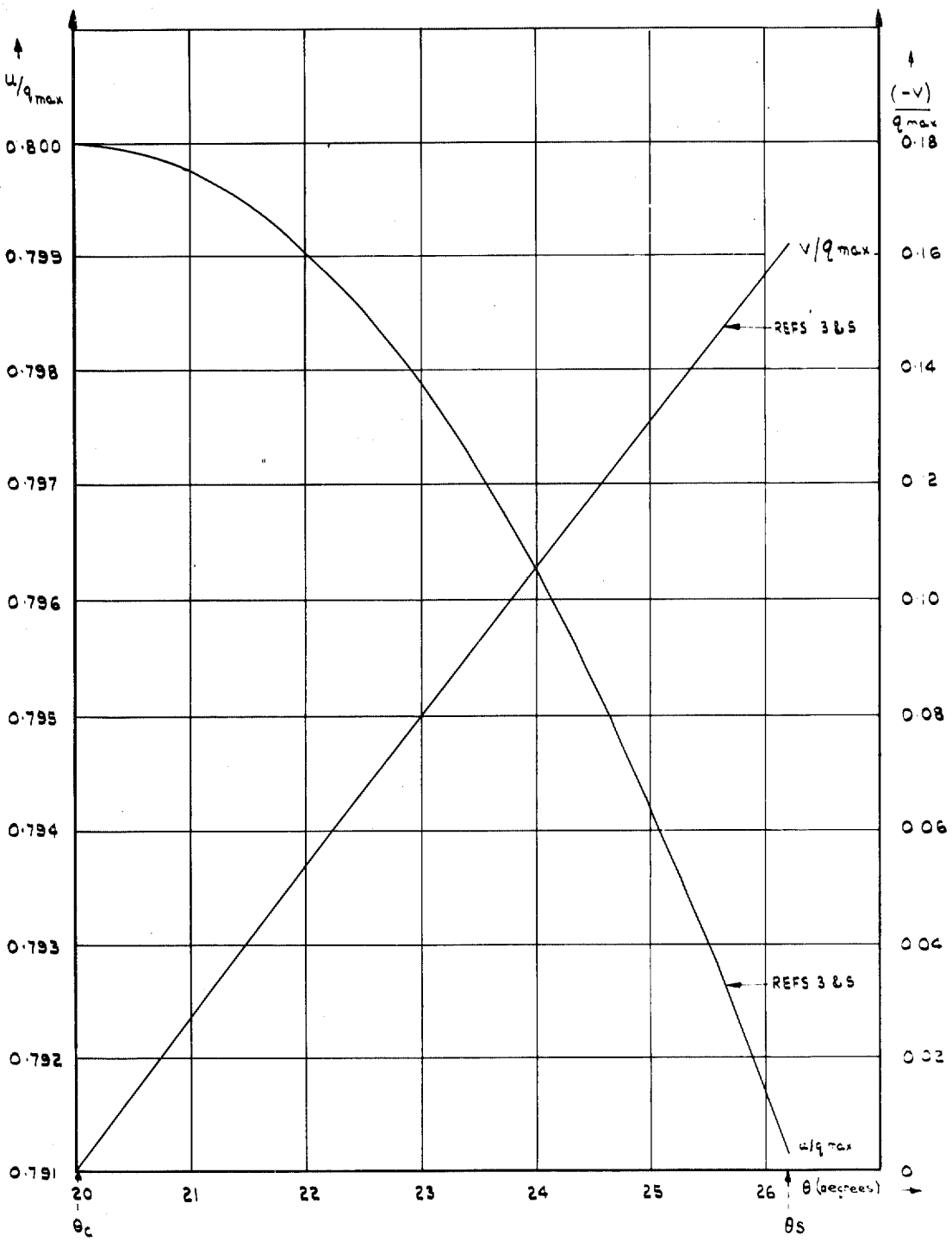

FIG. 6. Comparison of the dependence of the functions U/q_{max} and V/q_{max} upon θ, by the present method and obtained from Refs. 3 and 5 ($\gamma = 1{\cdot}405$, $M_\infty = 4{\cdot}1538$, $\theta_c = 20$, $F = 2$).

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