ENGINEERING TRIPOS PART IIA

Friday 29 April 2011 9:00 to 12:00

Module 3A3

FLUID MECHANICS II

*Answer not more than **five** questions.*

All questions carry the same number of marks.

*The **approximate** number of marks allocated to each part of a question is indicated in the right margin.*

Attachments: Compressible Flow Data Book (38 pages).

STATIONERY REQUIREMENTS
Single-sided script paper.

SPECIAL REQUIREMENTS
Engineering Data Book.
CUED approved calculator allowed.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

Final version

1 Figure 1a shows a half-cone intake on the side of a high-speed aircraft fuselage.

(a) Briefly explain the purpose of the slot labelled in Fig. 1a. [10%]

(b) The aircraft flies at a Mach number $M_\infty = 2.00$. At this speed the simple half-cone forms a shock system focused on the cowl lip at C. Approximating the *conical* flow to a two-dimensional planar flow, shown in Fig. 1b, draw a detailed and carefully labelled sketch of the shock system in the plane ABC. [20%]

(c) Calculate the static pressure rise and the pressure recovery given by:

$$\frac{p_s}{p_\infty} \quad \text{and} \quad \frac{p_{0s}}{p_{0\infty}}$$

respectively, where s denotes conditions downstream of the two-dimensional shock system. [20%]

(d) The actual *conical* intake shown in Fig. 1a has a pressure recovery of 90%. Explain the difference from the two-dimensional planar flow approximation by considering the pressure along a streamline entering the intake. [20%]

(e) Sketch *two* possible two-dimensional shock systems, together with the streamline attached to the cowl lip at C, as the aircraft progressively decelerates from $M_\infty = 2.00$. Comment on the likely impact on pressure recovery. [20%]

(f) Briefly discuss the relative decline in the use of conical intakes, in preference for cantilevered two-dimensional planar ramp intakes, in aircraft design. [10%]

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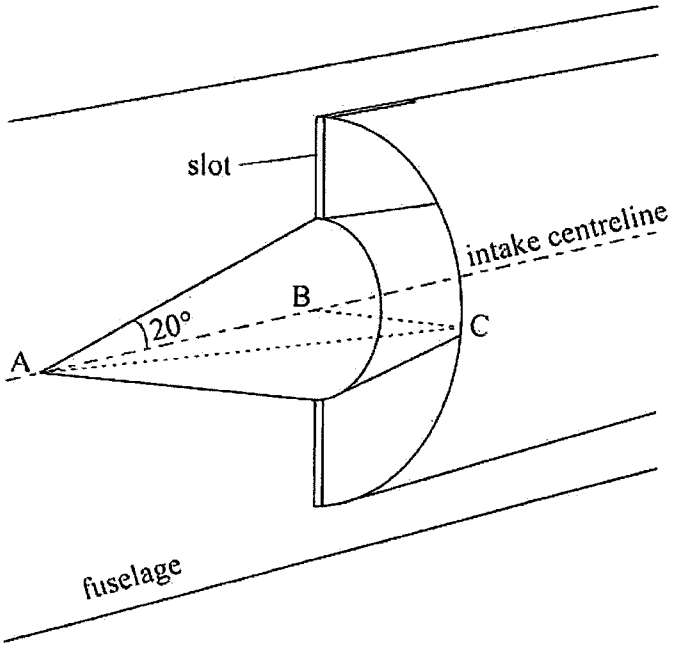
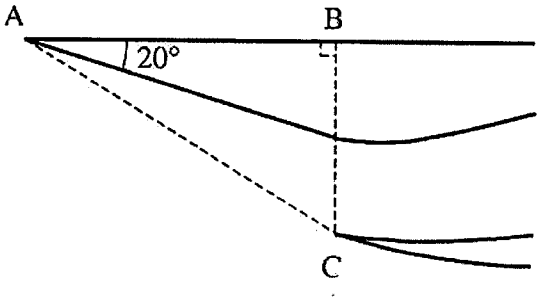


(a) Three-dimensional conical intake.



(b) Two-dimensional planar intake.

Fig. 1

2 (a) Carefully explain why the density ratio across an *oblique* shock tends to:

$$\frac{\rho_2}{\rho_1} = \frac{\gamma+1}{\gamma-1}$$

as the upstream Mach number M_1 tends to infinity. The ratio of specific heat capacities is γ and the downstream conditions are denoted by subscript 2. [20%]

(b) Derive a functional relationship between the deflection angle θ and the shock angle β for this case. [25%]

(c) Sketch the function derived in part (b) and show that $\theta_{max} = 45.6°$ for dry air. At what value of β does this occur? [30%]

(d) Comment carefully on the possible solutions for the Mach number M_2 immediately downstream of the shock when $M_1 = 1.95$ and $\theta = 22°$. [15%]

(e) Explain what in practice will determine the actual flow for the conditions in part (c). [10%]

3 (a) Show that for an infinitesimal amplitude, isentropic pressure wave in a stationary perfect gas, the speed of sound a is given by:

$$a^2 = \left(\frac{\partial p}{\partial \rho}\right)_s$$

where p is the pressure, ρ is the density and s is the specific entropy of the gas. [25%]

(b) A long cylinder of constant cross-sectional area has a frictionless piston that is initially at rest at $x=0$. On the right-hand side of the piston ($x>0$) the cylinder contains stationary air at a pressure of 150 kPa. The piston is accelerated smoothly to the left and reaches a constant final velocity.

(i) Draw and label an x-t diagram to illustrate the process. [20%]

(ii) For the case where the final absolute temperature of the air in contact with the right-hand side of the piston is 75% of the value in the initial undisturbed state, determine the final velocity of the piston in terms of the speed of sound in the initial undisturbed state. [25%]

(iii) For the case where the final velocity of the piston is equal to the local speed of sound, determine the pressure of the air in contact with the right-hand side of the piston. [30%]

You may assume that for a right-running wave of infinitesimal amplitude, the Riemann invariant is:

$$V - \frac{2a}{\gamma - 1} = constant$$

where V is the velocity of the gas and γ is the ratio of the specific heat capacities for the gas.

4 An aeroengine afterburner, shown in Fig. 2, consists of a cylindrical duct of constant cross-sectional area A followed by a convergent nozzle with variable exit area A_N. Both the duct and the nozzle are frictionless and there are no shocks within the afterburner. The flow can be treated as a perfect gas with the ratio of specific heat capacities $\gamma = 1.333$ and with the specific heat capacity at constant pressure $c_p = 1149\ \mathrm{J\,kg^{-1}\,K^{-1}}$.

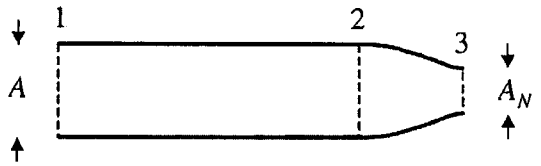


Fig. 2

The inlet stagnation temperature is $T_{01} = 600\ \mathrm{K}$, the inlet stagnation pressure is $p_{01} = 3\ \mathrm{bar}$ and the static pressure downstream of the nozzle is $1\ \mathrm{bar}$. Further, it is required that both with and without heat addition the inlet Mach number is $M_1 = 0.4$.

(a) For the case of no heat addition:

(i) calculate the required nozzle area ratio A_N/A; [20%]

(ii) calculate the specific impulse at the nozzle exit; [10%]

(iii) sketch the shock pattern downstream of the nozzle exit. [10%]

(b) For the case when the afterburner is operating, heat is added uniformly along the duct between locations 1 and 2 at a rate of 300 kJ per kg of air flowing:

(i) calculate the required nozzle area ratio A_N/A; [30%]

(ii) calculate the specific impulse at the nozzle exit; [10%]

(iii) calculate the static pressure at the nozzle exit (upstream of any shock system that is present). [20%]

Note: specific impulse = $F/\dot{m}$ where F = impulse function and $\dot{m}$ = mass flow rate.

5 (a) Show that the Froude number, Fr_1, upstream of a stationary hydraulic jump is given by:

$$(Fr_1)^2 = \frac{1}{2}\frac{h_2}{h_1}\left(\frac{h_2}{h_1}+1\right)$$

where h_1 and h_2 are the uniform depths of the water upstream and downstream of the hydraulic jump. [30%]

(b) Water flows under a sluice gate into a channel of uniform cross-sectional area. The depth of water a short distance downstream of the gate is 0.8 m and the flow velocity is $2.3\,\mathrm{m\,s^{-1}}$. The sluice gate is raised slowly at a uniform speed to a new height, and a fully-developed hydraulic jump is found to occur some distance downstream, travelling with a velocity of $6\,\mathrm{m\,s^{-1}}$. Calculate the new depth and velocity of the flow downstream of the sluice gate. [40%]

(c) It takes 20 seconds to raise the sluice gate as described in part (b). Draw and label an *x-t* diagram to show the motion of the relevant waves and fluid particle paths. Find the distance downstream of the sluice gate of the point at which the hydraulic jump becomes fully developed. [30%]

6 The behaviour of the local streamwise velocity component $u(x,y)$ in a boundary layer can be calculated using the differential equation:

$$U\frac{\partial u}{\partial x} = \mu\frac{\partial^2 u}{\partial y^2}$$

where x is the streamwise coordinate, y is the coordinate normal to the wall, μ is the dynamic viscosity and U is a constant corresponding to the convection speed just outside the boundary layer.

(a) Discretise this equation on a uniform Cartesian mesh using first-order forward differencing in x and second-order centred differencing in y. [30%]

(b) The solution is to be marched forward in x. Using discrete perturbation analysis, or otherwise, find the maximum stable increment Δx for the marching process. [40%]

(c) Explain the limitations of this solution method in practice, and suggest possible alternative approaches. [30%]

7 *Note that part (a) of this question is not related to parts (b) and (c).*

(a) A quadrilateral cell from a two-dimensional finite-volume mesh is defined by the vertices (0,0), (3,-2), (3,4) and (-1,2). All distances are in millimetres. The velocity component u in the x-direction takes values of $15\,\mathrm{m\,s^{-1}}$, $10\,\mathrm{m\,s^{-1}}$, $8\,\mathrm{m\,s^{-1}}$ and $12\,\mathrm{m\,s^{-1}}$ at each of these vertices respectively. The velocity component v in the y-direction is zero at all vertices, and the density ρ is equal to $1.2\,\mathrm{kg\,m^{-3}}$ at all vertices.

(i) Calculate the area of the cell. [10%]

(ii) Determine the mass flow rate out of the cell, using the trapezium rule to evaluate the integrals on each face of the cell. [30%]

(iii) Find the rate of change of density in the cell. [10%]

(b) Show that Euler's work equation can be re-written as:

$$h_0^{rel} - \tfrac{1}{2} r^2 \Omega^2 = h_0 - r\Omega v = constant$$

where h_0, h_0^{rel} are the absolute and relative stagnation enthalpies respectively, r is the radius, Ω the angular velocity and v is the (absolute) tangential velocity. State the conditions under which the above relationships can be applied. [20%]

(c) A radial inflow water turbine operates at 500 rpm. The impeller has an inlet radius of 1.9 m and a mean outlet radius of 0.6 m. At the design operating conditions, the relative stagnation pressure is 60.0 bar at the impeller inlet and is 14.7 bar at the outlet. The pressure at outlet is 7.4 bar. Assuming that water is an incompressible fluid with density $1000\,\mathrm{kg\,m^{-3}}$, calculate the (relative) stagnation pressure loss coefficient for the impeller. [30%]

8 An axial flow compressor has no inlet guide vane, the mean radius of the first rotor blade is 0.3 m and the axial velocity at the mean radius is constant. At the design operating point the flow coefficient is 0.6 and the stage loading coefficient is 0.45 (both defined at the mean radius). The inlet stagnation temperature is 300 K and the inlet stagnation pressure is 1.0 bar.

(a) The Mach number of the flow entering the compressor is 0.4 and there is no swirl upstream of the first rotor blade. Calculate the axial velocity (at the mean radius) and the required rotational speed of the compressor. [20%]

(b) Calculate the tangential velocity downstream of the first rotor blade along with the absolute flow angle and the absolute stagnation temperature (all at the mean radius). [20%]

(c) If the compression process through the first rotor has a total-to-total isentropic efficiency of 93% calculate the absolute stagnation pressure at the rotor exit. [15%]

(d) The hub-to-tip ratio at the exit of the first rotor is 0.68 . Calculate the mass flow rate at the design operating point. [20%]

(e) The variation of the tangential velocity at the exit of the first rotor satisfies the *free-vortex* distribution (radius × absolute tangential velocity is a constant). Explain why this is a common choice in the design of turbomachinery. [10%]

(f) By calculating the absolute tangential velocity at the hub and tip radii at the exit of the first rotor blade, determine the rotor exit relative flow angles at the hub, mean and tip radii. [15%]

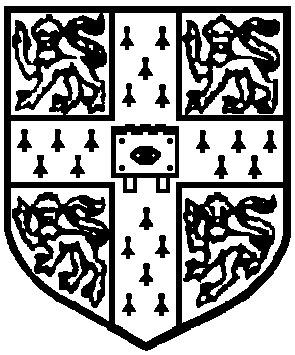
You may assume that the working fluid has the same properties as air:
$\gamma = 1.4$, $R = 287\ \mathrm{J\,kg^{-1}\,K^{-1}}$ and $c_p = 1005\ \mathrm{J\,kg^{-1}\,K^{-1}}$

END OF PAPER

Compressible Flow Data Book

for Part II of the Engineering Tripos

2009 Edition



Cambridge University Engineering Department

PERFECT GAS RELATIONS FOR COMPRESSIBLE FLOW

Ratios of stagnation to static quantities

$$\frac{T}{T_0} = \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-1}$$

$$\frac{p}{p_0} = \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{\gamma}{\gamma - 1}}$$

$$\frac{\rho}{\rho_0} = \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{1}{\gamma - 1}}$$

Notes:

(1) $T_0 = const.$ in adiabatic flow with no shaft work

(2) If flow is isentropic, $p_0 = const.$ and $\rho_0 = const.$ when $T_0 = const.$

Mach number relations (see tables)

$$\frac{V}{\sqrt{c_p T_0}} = \sqrt{\gamma - 1}\, M \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{1}{2}}$$

$$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0} = \frac{\gamma}{\sqrt{\gamma - 1}} M \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{1}{2}\left(\frac{\gamma + 1}{\gamma - 1}\right)}$$

$$\frac{\dot{m}\sqrt{c_p T_0}}{A p} = \frac{\gamma}{\sqrt{\gamma - 1}} M \left(1 + \frac{\gamma - 1}{2} M^2\right)^{\frac{1}{2}}$$

$$\frac{F}{\dot{m}\sqrt{c_p T_0}} = \frac{\sqrt{\gamma - 1}}{\gamma} \frac{1 + \gamma M^2}{M} \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{1}{2}} \quad \text{where} \quad F = \left(p + \rho V^2\right) A$$

$$\frac{\frac{1}{2}\rho V^2}{p_0} = \frac{1}{2} \gamma M^2 \left(1 + \frac{\gamma - 1}{2} M^2\right)^{-\frac{\gamma}{\gamma - 1}}$$

ONE-DIMENSIONAL FLOW OF A PERFECT GAS

Isentropic flow

$$\frac{A}{A^*} = \frac{1}{M}\left\{\frac{2}{\gamma+1}\left(1+\frac{\gamma-1}{2}M^2\right)\right\}^{\frac{1}{2}\left(\frac{\gamma+1}{\gamma-1}\right)}$$

Adiabatic constant area flow

$$\frac{4c_f L_{\max}}{D} = \frac{1-M^2}{\gamma M^2} + \frac{\gamma+1}{2\gamma}\ln\left(\frac{(\gamma+1)M^2}{2\left(1+\frac{\gamma-1}{2}M^2\right)}\right)$$

Normal shock waves in perfect gases

$$VV_s = a^{*2}$$

$$M_s = \left(\frac{1+\frac{\gamma-1}{2}M^2}{\gamma M^2 - \frac{\gamma-1}{2}}\right)^{\frac{1}{2}}$$

$$\frac{p_{0s}}{p_0} = \left(\frac{\frac{\gamma+1}{2}M^2}{1+\frac{\gamma-1}{2}M^2}\right)^{\frac{\gamma}{\gamma-1}}\left(\frac{2\gamma}{\gamma+1}M^2 - \frac{\gamma-1}{\gamma+1}\right)^{\frac{1}{1-\gamma}}$$

$$\frac{p_s}{p} = 1 + \frac{2\gamma}{\gamma+1}\left(M^2-1\right)$$

$$\frac{p_{0s}}{p} = \left(\frac{\gamma+1}{2}M^2\right)^{\frac{\gamma}{\gamma-1}}\left(\frac{2\gamma}{\gamma+1}M^2 - \frac{\gamma-1}{\gamma+1}\right)^{\frac{1}{1-\gamma}}$$

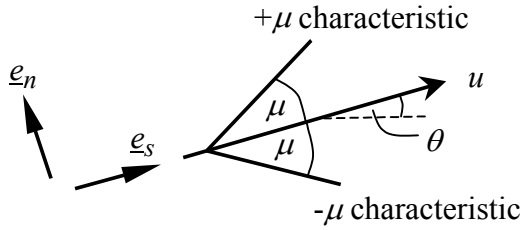
$$\frac{T_s}{T} = \frac{\gamma-1}{(\gamma+1)^2}\frac{2}{M^2}\left(1+\frac{\gamma-1}{2}M^2\right)\left(\frac{2\gamma}{\gamma-1}M^2 - 1\right)$$

$$\frac{\rho_s}{\rho} = \frac{(\gamma+1)M^2}{2\left(1+\frac{\gamma-1}{2}M^2\right)}$$

TWO DIMENSIONAL SUPERSONIC FLOW

Method of Characteristics for 2-D supersonic flow

Applicable to adiabatic (h_0 = constant)), isentropic flow



Mach Number $M = u/c$

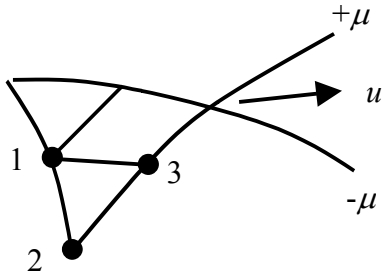
Mach angle $\mu = \sin^{-1}\left(\frac{1}{M}\right)$

Prandtl-Meyer function $\nu = \int_1^M \sqrt{M^2 - 1}\,\frac{du}{u}$

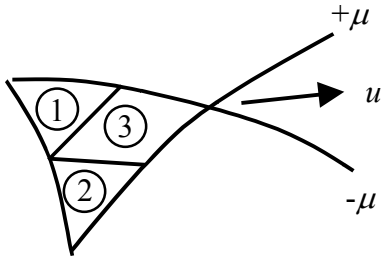
$$\nu = \sqrt{\frac{\gamma+1}{\gamma-1}}\tan^{-1}\sqrt{\frac{\gamma-1}{\gamma+1}\left(M^2-1\right)} - \tan^{-1}\sqrt{M^2-1} \quad \text{for a perfect gas}$$

Calculations

Lattice Method



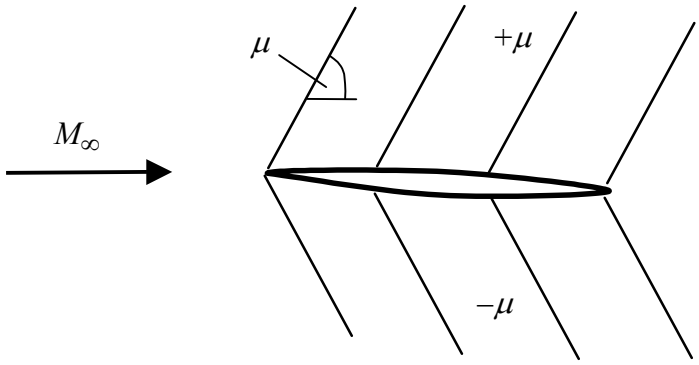
Field (or wave) method



$\nu_3 - \theta_3 = \nu_2 - \theta_2$ along $+\mu$ $\quad$ $\nu_3 + \theta_3 = \nu_1 + \theta_1$ across $+\mu$

$\nu_3 + \theta_3 = \nu_1 + \theta_1$ along $-\mu$ $\quad$ $\nu_3 - \theta_3 = \nu 2 - \theta_2$ across $-\mu$

Linearised Method of Characteristics (thin film theory)

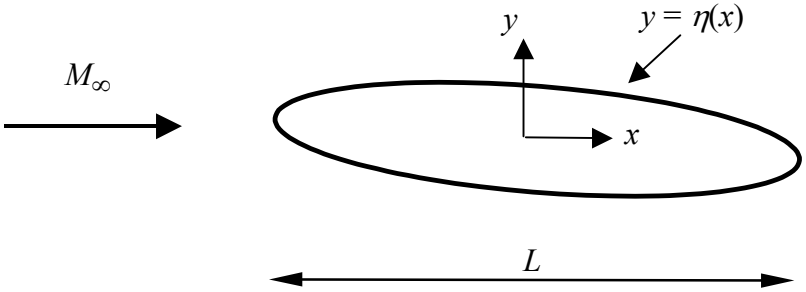


$$\mu \approx \sin^{-1}\left(1/M_\infty\right)$$

$$\Delta p \approx \pm \frac{\rho_\infty u_\infty^2 \Delta\theta}{\sqrt{M_\infty^2 - 1}} \qquad \text{across } \pm\mu \text{ waves}$$

Pressure coefficient $c_p = \dfrac{p - p_\infty}{\frac{1}{2}\rho_\infty u_\infty^2} = \pm \dfrac{2\theta}{\sqrt{M_\infty^2 - 1}}$ on upper/lower surface

Prandtl-Glauert rule for linearised potential flow past geometrically similar bodies



Pressure coefficient $c_p = \dfrac{p - p_\infty}{\frac{1}{2}\rho_\infty u_\infty^2}$

For geometrically similar bodies with $\dfrac{\eta}{L} = f\left(\dfrac{x}{L}\right)$ and $c_p\left(M_\infty = 0\right) = c_{p0}$,

$$c_p = \frac{c_{p0}}{\sqrt{1 - M_\infty^2}} \qquad \text{in subsonic flow}$$

$$c_p \propto \frac{1}{\sqrt{M_\infty^2 - 1}} \qquad \text{in supersonic flow}$$

Oblique Shock Relations (see tables)

$$\frac{p_2}{p_1} = 1 + \frac{2\gamma}{\gamma+1}\left(M_1^2 \sin^2\beta - 1\right)$$

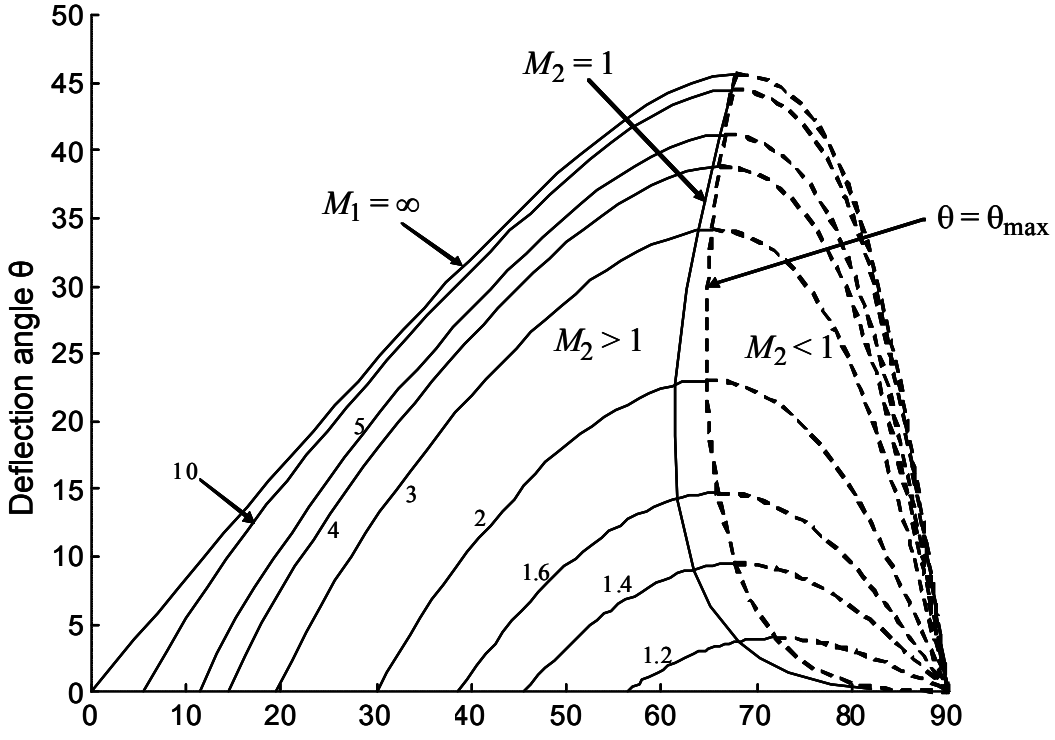
$$\frac{T_2}{T_1} = \frac{\gamma-1}{(\gamma+1)^2}\frac{2}{M_1^2\sin^2\beta}\left(1+\frac{\gamma-1}{2}M_1^2\sin^2\beta\right)\left(\frac{2\gamma}{\gamma-1}M_1^2\sin^2\beta - 1\right)$$

$$\frac{\rho_2}{\rho_1} = \frac{(\gamma+1)M_1^2\sin^2\beta}{2\left[1+\frac{\gamma-1}{2}M_1^2\sin^2\beta\right]}$$

$$M_2\sin(\beta-\theta) = \left[\frac{1+\frac{\gamma-1}{2}M_1^2\sin^2\beta}{\gamma M_1^2\sin^2\beta - \frac{\gamma-1}{2}}\right]^{\frac{1}{2}}$$

$$\frac{p_{02}}{p_{01}} = \left(\frac{\frac{\gamma+1}{2}M_1^2\sin^2\beta}{1+\frac{\gamma-1}{2}M_1^2\sin^2\beta}\right)^{\frac{\gamma}{\gamma-1}}\left(\frac{2\gamma}{\gamma+1}M_1^2\sin^2\beta - \frac{\gamma-1}{\gamma+1}\right)^{\frac{1}{1-\gamma}}$$

$$\tan\theta = \frac{2\cot\beta\left(M_1^2\sin^2\beta - 1\right)}{(\gamma+1)M_1^2 - 2\left(M_1^2\sin^2\beta - 1\right)}$$



GAS FLOW TABLES (γ=1.400): SUBSONIC FLOW

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
0.010	1.0000	0.9999	1.0000	0.0063	0.0221	0.0221	45.1813	7134.405	0.0001
0.020	0.9999	0.9997	0.9998	0.0126	0.0443	0.0443	22.5994	1778.450	0.0003
0.030	0.9998	0.9994	0.9996	0.0190	0.0664	0.0664	15.0761	787.0814	0.0006
0.040	0.9997	0.9989	0.9992	0.0253	0.0885	0.0886	11.3173	440.3522	0.0011
0.050	0.9995	0.9983	0.9988	0.0316	0.1105	0.1107	9.0644	280.0203	0.0017
0.060	0.9993	0.9975	0.9982	0.0379	0.1325	0.1329	7.5645	193.0311	0.0025
0.070	0.9990	0.9966	0.9976	0.0443	0.1545	0.1550	6.4947	140.6550	0.0034
0.080	0.9987	0.9955	0.9968	0.0506	0.1764	0.1772	5.6939	106.7182	0.0045
0.090	0.9984	0.9944	0.9960	0.0569	0.1983	0.1994	5.0723	83.4961	0.0056
0.100	0.9980	0.9930	0.9950	0.0632	0.2200	0.2216	4.5762	66.9216	0.0070
0.110	0.9976	0.9916	0.9940	0.0695	0.2417	0.2438	4.1714	54.6879	0.0084
0.120	0.9971	0.9900	0.9928	0.0758	0.2633	0.2660	3.8350	45.4080	0.0100
0.130	0.9966	0.9883	0.9916	0.0821	0.2849	0.2883	3.5513	38.2070	0.0117
0.140	0.9961	0.9864	0.9903	0.0884	0.3063	0.3105	3.3089	32.5113	0.0135
0.150	0.9955	0.9844	0.9888	0.0947	0.3276	0.3328	3.0996	27.9320	0.0155
0.160	0.9949	0.9823	0.9873	0.1009	0.3488	0.3551	2.9172	24.1978	0.0176
0.170	0.9943	0.9800	0.9857	0.1072	0.3699	0.3774	2.7569	21.1152	0.0198
0.180	0.9936	0.9776	0.9840	0.1135	0.3908	0.3997	2.6151	18.5427	0.0222
0.190	0.9928	0.9751	0.9822	0.1197	0.4116	0.4221	2.4889	16.3752	0.0246
0.200	0.9921	0.9725	0.9803	0.1260	0.4323	0.4445	2.3758	14.5333	0.0272
0.210	0.9913	0.9697	0.9783	0.1322	0.4528	0.4669	2.2740	12.9560	0.0299
0.220	0.9904	0.9668	0.9762	0.1385	0.4731	0.4893	2.1820	11.5961	0.0328
0.230	0.9895	0.9638	0.9740	0.1447	0.4933	0.5118	2.0985	10.4161	0.0357
0.240	0.9886	0.9607	0.9718	0.1509	0.5133	0.5343	2.0225	9.3865	0.0387
0.250	0.9877	0.9575	0.9694	0.1571	0.5332	0.5568	1.9530	8.4834	0.0419
0.260	0.9867	0.9541	0.9670	0.1633	0.5528	0.5794	1.8892	7.6876	0.0451
0.270	0.9856	0.9506	0.9645	0.1695	0.5723	0.6020	1.8306	6.9832	0.0485
0.280	0.9846	0.9470	0.9619	0.1757	0.5915	0.6246	1.7766	6.3572	0.0520
0.290	0.9835	0.9433	0.9592	0.1819	0.6106	0.6473	1.7267	5.7989	0.0555
0.300	0.9823	0.9395	0.9564	0.1881	0.6295	0.6700	1.6805	5.2993	0.0592
0.310	0.9811	0.9355	0.9535	0.1942	0.6481	0.6928	1.6377	4.8507	0.0629
0.320	0.9799	0.9315	0.9506	0.2003	0.6666	0.7156	1.5978	4.4467	0.0668
0.330	0.9787	0.9274	0.9476	0.2065	0.6848	0.7384	1.5608	4.0821	0.0707
0.340	0.9774	0.9231	0.9445	0.2126	0.7027	0.7613	1.5262	3.7520	0.0747
0.350	0.9761	0.9188	0.9413	0.2187	0.7205	0.7842	1.4939	3.4525	0.0788
0.360	0.9747	0.9143	0.9380	0.2248	0.7380	0.8072	1.4637	3.1801	0.0829
0.370	0.9733	0.9098	0.9347	0.2309	0.7553	0.8302	1.4354	2.9320	0.0872
0.380	0.9719	0.9052	0.9313	0.2369	0.7723	0.8532	1.4090	2.7054	0.0915
0.390	0.9705	0.9004	0.9278	0.2430	0.7891	0.8763	1.3841	2.4983	0.0959
0.400	0.9690	0.8956	0.9243	0.2490	0.8056	0.8995	1.3608	2.3085	0.1003
0.410	0.9675	0.8907	0.9207	0.2551	0.8219	0.9227	1.3388	2.1344	0.1048
0.420	0.9659	0.8857	0.9170	0.2611	0.8379	0.9460	1.3182	1.9744	0.1094
0.430	0.9643	0.8807	0.9132	0.2671	0.8536	0.9693	1.2988	1.8272	0.1140
0.440	0.9627	0.8755	0.9094	0.2730	0.8691	0.9927	1.2804	1.6915	0.1186
0.450	0.9611	0.8703	0.9055	0.2790	0.8843	1.0161	1.2632	1.5664	0.1234
0.460	0.9594	0.8650	0.9016	0.2850	0.8992	1.0396	1.2469	1.4509	0.1281
0.470	0.9577	0.8596	0.8976	0.2909	0.9138	1.0631	1.2315	1.3441	0.1329
0.480	0.9559	0.8541	0.8935	0.2968	0.9282	1.0867	1.2170	1.2453	0.1378
0.490	0.9542	0.8486	0.8894	0.3027	0.9423	1.1104	1.2033	1.1539	0.1426
0.500	0.9524	0.8430	0.8852	0.3086	0.9561	1.1341	1.1903	1.0691	0.1475

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
0.510	0.9506	0.8374	0.8809	0.3145	0.9696	1.1579	1.1781	0.9904	0.1525
0.520	0.9487	0.8317	0.8766	0.3203	0.9828	1.1818	1.1665	0.9174	0.1574
0.530	0.9468	0.8259	0.8723	0.3262	0.9958	1.2057	1.1556	0.8496	0.1624
0.540	0.9449	0.8201	0.8679	0.3320	1.0084	1.2297	1.1452	0.7866	0.1674
0.550	0.9430	0.8142	0.8634	0.3378	1.0208	1.2538	1.1354	0.7281	0.1724
0.560	0.9410	0.8082	0.8589	0.3436	1.0328	1.2779	1.1261	0.6736	0.1774
0.570	0.9390	0.8022	0.8544	0.3493	1.0446	1.3021	1.1173	0.6229	0.1825
0.580	0.9370	0.7962	0.8498	0.3551	1.0561	1.3264	1.1090	0.5757	0.1875
0.590	0.9349	0.7901	0.8451	0.3608	1.0672	1.3507	1.1011	0.5317	0.1925
0.600	0.9328	0.7840	0.8405	0.3665	1.0781	1.3751	1.0937	0.4908	0.1976
0.610	0.9307	0.7778	0.8357	0.3722	1.0887	1.3996	1.0867	0.4527	0.2026
0.620	0.9286	0.7716	0.8310	0.3779	1.0990	1.4242	1.0800	0.4172	0.2076
0.630	0.9265	0.7654	0.8262	0.3835	1.1090	1.4489	1.0737	0.3841	0.2127
0.640	0.9243	0.7591	0.8213	0.3891	1.1186	1.4736	1.0678	0.3533	0.2177
0.650	0.9221	0.7528	0.8164	0.3948	1.1280	1.4984	1.0621	0.3246	0.2226
0.660	0.9199	0.7465	0.8115	0.4003	1.1371	1.5233	1.0568	0.2979	0.2276
0.670	0.9176	0.7401	0.8066	0.4059	1.1459	1.5483	1.0518	0.2730	0.2326
0.680	0.9153	0.7338	0.8016	0.4115	1.1544	1.5733	1.0471	0.2498	0.2375
0.690	0.9131	0.7274	0.7966	0.4170	1.1626	1.5984	1.0426	0.2282	0.2424
0.700	0.9107	0.7209	0.7916	0.4225	1.1705	1.6237	1.0384	0.2081	0.2473
0.710	0.9084	0.7145	0.7865	0.4280	1.1782	1.6490	1.0344	0.1895	0.2521
0.720	0.9061	0.7080	0.7814	0.4335	1.1855	1.6744	1.0307	0.1721	0.2569
0.730	0.9037	0.7016	0.7763	0.4389	1.1925	1.6999	1.0272	0.1561	0.2617
0.740	0.9013	0.6951	0.7712	0.4443	1.1993	1.7254	1.0239	0.1411	0.2664
0.750	0.8989	0.6886	0.7660	0.4497	1.2058	1.7511	1.0208	0.1273	0.2711
0.760	0.8964	0.6821	0.7609	0.4551	1.2119	1.7768	1.0179	0.1145	0.2758
0.770	0.8940	0.6756	0.7557	0.4605	1.2178	1.8027	1.0152	0.1026	0.2804
0.780	0.8915	0.6691	0.7505	0.4658	1.2234	1.8286	1.0126	0.0917	0.2849
0.790	0.8890	0.6625	0.7452	0.4711	1.2288	1.8547	1.0103	0.0816	0.2894
0.800	0.8865	0.6560	0.7400	0.4764	1.2338	1.8808	1.0081	0.0723	0.2939
0.810	0.8840	0.6495	0.7347	0.4817	1.2386	1.9070	1.0060	0.0638	0.2983
0.820	0.8815	0.6430	0.7295	0.4869	1.2431	1.9333	1.0041	0.0559	0.3026
0.830	0.8789	0.6365	0.7242	0.4921	1.2474	1.9598	1.0024	0.0488	0.3069
0.840	0.8763	0.6300	0.7189	0.4973	1.2514	1.9863	1.0008	0.0423	0.3112
0.850	0.8737	0.6235	0.7136	0.5025	1.2551	2.0129	0.9993	0.0363	0.3153
0.860	0.8711	0.6170	0.7083	0.5077	1.2585	2.0396	0.9979	0.0310	0.3195
0.870	0.8685	0.6106	0.7030	0.5128	1.2617	2.0665	0.9967	0.0261	0.3235
0.880	0.8659	0.6041	0.6977	0.5179	1.2646	2.0934	0.9956	0.0218	0.3275
0.890	0.8632	0.5977	0.6924	0.5230	1.2673	2.1204	0.9946	0.0179	0.3314
0.900	0.8606	0.5913	0.6870	0.5280	1.2698	2.1476	0.9937	0.0145	0.3352
0.910	0.8579	0.5849	0.6817	0.5331	1.2719	2.1748	0.9929	0.0115	0.3390
0.920	0.8552	0.5785	0.6764	0.5381	1.2739	2.2021	0.9922	0.0089	0.3427
0.930	0.8525	0.5721	0.6711	0.5431	1.2756	2.2296	0.9916	0.0067	0.3464
0.940	0.8498	0.5658	0.6658	0.5481	1.2770	2.2572	0.9911	0.0048	0.3499
0.950	0.8471	0.5595	0.6604	0.5530	1.2783	2.2848	0.9907	0.0033	0.3534
0.960	0.8444	0.5532	0.6551	0.5579	1.2793	2.3126	0.9903	0.0021	0.3569
0.970	0.8416	0.5469	0.6498	0.5628	1.2800	2.3405	0.9901	0.0011	0.3602
0.980	0.8389	0.5407	0.6445	0.5677	1.2806	2.3685	0.9899	0.0005	0.3635
0.990	0.8361	0.5345	0.6392	0.5725	1.2809	2.3966	0.9898	0.0001	0.3667
1.000	0.8333	0.5283	0.6339	0.5774	1.2810	2.4249	0.9897	0.0000	0.3698

GAS FLOW TABLES (γ=1.400): SUPERSONIC FLOW

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
1.010	0.8306	0.5221	0.6287	0.5821	1.2809	2.4532	0.9898	0.0001	0.3728	0.9901	1.0000	1.0235	1.9152	1.0066	0.04	1.010
1.020	0.8278	0.5160	0.6234	0.5869	1.2806	2.4817	0.9899	0.0005	0.3758	0.9805	1.0000	1.0471	1.9379	1.0132	0.13	1.020
1.030	0.8250	0.5099	0.6181	0.5917	1.2801	2.5103	0.9900	0.0010	0.3787	0.9712	1.0000	1.0711	1.9610	1.0198	0.23	1.030
1.040	0.8222	0.5039	0.6129	0.5964	1.2793	2.5390	0.9903	0.0018	0.3815	0.9620	0.9999	1.0952	1.9844	1.0263	0.35	1.040
1.050	0.8193	0.4979	0.6077	0.6011	1.2784	2.5678	0.9905	0.0027	0.3842	0.9531	0.9999	1.1196	2.0083	1.0328	0.49	1.050
1.060	0.8165	0.4919	0.6024	0.6058	1.2773	2.5967	0.9909	0.0038	0.3869	0.9444	0.9998	1.1442	2.0325	1.0393	0.64	1.060
1.070	0.8137	0.4860	0.5972	0.6104	1.2760	2.6258	0.9913	0.0051	0.3895	0.9360	0.9996	1.1691	2.0570	1.0458	0.80	1.070
1.080	0.8108	0.4800	0.5920	0.6151	1.2745	2.6549	0.9917	0.0066	0.3919	0.9277	0.9994	1.1941	2.0819	1.0522	0.97	1.080
1.090	0.8080	0.4742	0.5869	0.6197	1.2728	2.6842	0.9922	0.0082	0.3944	0.9196	0.9992	1.2195	2.1072	1.0586	1.15	1.090
1.100	0.8052	0.4684	0.5817	0.6243	1.2709	2.7136	0.9928	0.0099	0.3967	0.9118	0.9989	1.2450	2.1328	1.0649	1.34	1.100
1.110	0.8023	0.4626	0.5766	0.6288	1.2689	2.7432	0.9934	0.0118	0.3990	0.9041	0.9986	1.2708	2.1588	1.0713	1.53	1.110
1.120	0.7994	0.4568	0.5714	0.6333	1.2667	2.7728	0.9940	0.0138	0.4011	0.8966	0.9982	1.2968	2.1851	1.0776	1.74	1.120
1.130	0.7966	0.4511	0.5663	0.6379	1.2643	2.8026	0.9947	0.0159	0.4032	0.8892	0.9978	1.3231	2.2118	1.0840	1.94	1.130
1.140	0.7937	0.4455	0.5612	0.6423	1.2618	2.8325	0.9954	0.0182	0.4052	0.8820	0.9973	1.3495	2.2388	1.0903	2.16	1.140
1.150	0.7908	0.4398	0.5562	0.6468	1.2590	2.8626	0.9961	0.0205	0.4072	0.8750	0.9967	1.3763	2.2661	1.0966	2.38	1.150
1.160	0.7879	0.4343	0.5511	0.6512	1.2562	2.8927	0.9969	0.0230	0.4090	0.8682	0.9961	1.4032	2.2937	1.1029	2.61	1.160
1.170	0.7851	0.4287	0.5461	0.6556	1.2531	2.9230	0.9978	0.0255	0.4108	0.8615	0.9953	1.4304	2.3217	1.1092	2.84	1.170
1.180	0.7822	0.4232	0.5411	0.6600	1.2500	2.9534	0.9986	0.0281	0.4125	0.8549	0.9946	1.4578	2.3500	1.1154	3.07	1.180
1.190	0.7793	0.4178	0.5361	0.6644	1.2466	2.9840	0.9995	0.0309	0.4141	0.8485	0.9937	1.4855	2.3786	1.1217	3.31	1.190
1.200	0.7764	0.4124	0.5311	0.6687	1.2432	3.0147	1.0004	0.0336	0.4157	0.8422	0.9928	1.5133	2.4075	1.1280	3.56	1.200
1.210	0.7735	0.4070	0.5262	0.6730	1.2396	3.0455	1.0014	0.0365	0.4171	0.8360	0.9918	1.5415	2.4367	1.1343	3.81	1.210
1.220	0.7706	0.4017	0.5213	0.6773	1.2358	3.0764	1.0024	0.0394	0.4185	0.8300	0.9907	1.5698	2.4663	1.1405	4.06	1.220
1.230	0.7677	0.3964	0.5164	0.6816	1.2319	3.1075	1.0034	0.0424	0.4198	0.8241	0.9896	1.5984	2.4961	1.1468	4.31	1.230
1.240	0.7648	0.3912	0.5115	0.6858	1.2279	3.1387	1.0045	0.0455	0.4211	0.8183	0.9884	1.6272	2.5263	1.1531	4.57	1.240
1.250	0.7619	0.3861	0.5067	0.6901	1.2238	3.1700	1.0055	0.0486	0.4223	0.8126	0.9871	1.6563	2.5568	1.1594	4.83	1.250

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
1.260	0.7590	0.3809	0.5019	0.6943	1.2195	3.2015	1.0066	0.0517	0.4233	0.8071	0.9857	1.6855	2.5875	1.1657	5.09	1.260
1.270	0.7561	0.3759	0.4971	0.6984	1.2152	3.2331	1.0077	0.0549	0.4244	0.8016	0.9842	1.7151	2.6186	1.1720	5.36	1.270
1.280	0.7532	0.3708	0.4923	0.7026	1.2107	3.2648	1.0089	0.0582	0.4253	0.7963	0.9827	1.7448	2.6500	1.1783	5.63	1.280
1.290	0.7503	0.3658	0.4876	0.7067	1.2061	3.2967	1.0100	0.0615	0.4262	0.7911	0.9811	1.7748	2.6816	1.1846	5.90	1.290
1.300	0.7474	0.3609	0.4829	0.7108	1.2014	3.3287	1.0112	0.0648	0.4270	0.7860	0.9794	1.8050	2.7136	1.1909	6.17	1.300
1.310	0.7445	0.3560	0.4782	0.7149	1.1965	3.3608	1.0124	0.0682	0.4277	0.7809	0.9776	1.8355	2.7459	1.1972	6.44	1.310
1.320	0.7416	0.3512	0.4736	0.7189	1.1916	3.3931	1.0136	0.0716	0.4283	0.7760	0.9758	1.8661	2.7784	1.2035	6.72	1.320
1.330	0.7387	0.3464	0.4690	0.7229	1.1866	3.4255	1.0149	0.0750	0.4289	0.7712	0.9738	1.8971	2.8112	1.2099	7.00	1.330
1.340	0.7358	0.3417	0.4644	0.7270	1.1815	3.4581	1.0161	0.0785	0.4294	0.7664	0.9718	1.9282	2.8444	1.2162	7.28	1.340
1.350	0.7329	0.3370	0.4598	0.7309	1.1763	3.4907	1.0174	0.0820	0.4299	0.7618	0.9697	1.9596	2.8778	1.2226	7.56	1.350
1.360	0.7300	0.3323	0.4553	0.7349	1.1710	3.5236	1.0187	0.0855	0.4303	0.7572	0.9676	1.9912	2.9115	1.2290	7.84	1.360
1.370	0.7271	0.3277	0.4508	0.7388	1.1656	3.5566	1.0200	0.0890	0.4306	0.7527	0.9653	2.0231	2.9455	1.2354	8.13	1.370
1.380	0.7242	0.3232	0.4463	0.7427	1.1601	3.5897	1.0213	0.0926	0.4308	0.7483	0.9630	2.0551	2.9798	1.2418	8.41	1.380
1.390	0.7213	0.3187	0.4418	0.7466	1.1546	3.6229	1.0226	0.0962	0.4310	0.7440	0.9607	2.0875	3.0144	1.2482	8.70	1.390
1.400	0.7184	0.3142	0.4374	0.7505	1.1490	3.6563	1.0240	0.0997	0.4311	0.7397	0.9582	2.1200	3.0492	1.2547	8.99	1.400
1.410	0.7155	0.3098	0.4330	0.7543	1.1433	3.6899	1.0253	0.1033	0.4312	0.7355	0.9557	2.1528	3.0844	1.2612	9.28	1.410
1.420	0.7126	0.3055	0.4287	0.7581	1.1375	3.7236	1.0267	0.1069	0.4312	0.7314	0.9531	2.1858	3.1198	1.2676	9.57	1.420
1.430	0.7097	0.3012	0.4244	0.7619	1.1317	3.7574	1.0281	0.1106	0.4311	0.7274	0.9504	2.2191	3.1555	1.2741	9.86	1.430
1.440	0.7069	0.2969	0.4201	0.7657	1.1258	3.7914	1.0295	0.1142	0.4310	0.7235	0.9476	2.2525	3.1915	1.2807	10.15	1.440
1.450	0.7040	0.2927	0.4158	0.7694	1.1198	3.8255	1.0308	0.1178	0.4308	0.7196	0.9448	2.2863	3.2278	1.2872	10.44	1.450
1.460	0.7011	0.2886	0.4116	0.7732	1.1138	3.8598	1.0323	0.1215	0.4306	0.7157	0.9420	2.3202	3.2643	1.2938	10.73	1.460
1.470	0.6982	0.2845	0.4074	0.7769	1.1077	3.8942	1.0337	0.1251	0.4303	0.7120	0.9390	2.3544	3.3011	1.3003	11.02	1.470
1.480	0.6954	0.2804	0.4032	0.7805	1.1016	3.9287	1.0351	0.1288	0.4299	0.7083	0.9360	2.3888	3.3382	1.3069	11.32	1.480
1.490	0.6925	0.2764	0.3991	0.7842	1.0954	3.9634	1.0365	0.1324	0.4295	0.7047	0.9329	2.4235	3.3756	1.3136	11.61	1.490
1.500	0.6897	0.2724	0.3950	0.7878	1.0891	3.9983	1.0379	0.1361	0.4290	0.7011	0.9298	2.4583	3.4133	1.3202	11.91	1.500

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
1.510	0.6868	0.2685	0.3909	0.7914	1.0829	4.0333	1.0394	0.1397	0.4285	0.6976	0.9266	2.4935	3.4512	1.3269	12.20	1.510
1.520	0.6840	0.2646	0.3869	0.7950	1.0765	4.0684	1.0408	0.1433	0.4279	0.6941	0.9233	2.5288	3.4894	1.3336	12.49	1.520
1.530	0.6811	0.2608	0.3829	0.7986	1.0702	4.1037	1.0423	0.1470	0.4273	0.6907	0.9200	2.5644	3.5279	1.3403	12.79	1.530
1.540	0.6783	0.2570	0.3789	0.8021	1.0638	4.1392	1.0437	0.1506	0.4266	0.6874	0.9166	2.6002	3.5667	1.3470	13.09	1.540
1.550	0.6754	0.2533	0.3750	0.8057	1.0573	4.1748	1.0452	0.1543	0.4259	0.6841	0.9132	2.6363	3.6057	1.3538	13.38	1.550
1.560	0.6726	0.2496	0.3710	0.8092	1.0508	4.2105	1.0467	0.1579	0.4252	0.6809	0.9097	2.6725	3.6450	1.3606	13.68	1.560
1.570	0.6698	0.2459	0.3672	0.8126	1.0443	4.2464	1.0481	0.1615	0.4243	0.6777	0.9062	2.7091	3.6846	1.3674	13.97	1.570
1.580	0.6670	0.2423	0.3633	0.8161	1.0378	4.2825	1.0496	0.1651	0.4235	0.6746	0.9026	2.7458	3.7244	1.3742	14.27	1.580
1.590	0.6642	0.2388	0.3595	0.8195	1.0312	4.3187	1.0511	0.1688	0.4226	0.6715	0.8989	2.7828	3.7646	1.3811	14.56	1.590
1.600	0.6614	0.2353	0.3557	0.8230	1.0246	4.3551	1.0526	0.1724	0.4216	0.6684	0.8952	2.8200	3.8050	1.3880	14.86	1.600
1.610	0.6586	0.2318	0.3520	0.8263	1.0180	4.3916	1.0541	0.1760	0.4206	0.6655	0.8915	2.8575	3.8456	1.3949	15.16	1.610
1.620	0.6558	0.2284	0.3483	0.8297	1.0114	4.4282	1.0555	0.1795	0.4196	0.6625	0.8877	2.8951	3.8866	1.4018	15.45	1.620
1.630	0.6530	0.2250	0.3446	0.8331	1.0047	4.4651	1.0570	0.1831	0.4185	0.6596	0.8838	2.9331	3.9278	1.4088	15.75	1.630
1.640	0.6502	0.2217	0.3409	0.8364	0.9980	4.5020	1.0585	0.1867	0.4174	0.6568	0.8799	2.9712	3.9693	1.4158	16.04	1.640
1.650	0.6475	0.2184	0.3373	0.8397	0.9913	4.5392	1.0600	0.1902	0.4162	0.6540	0.8760	3.0096	4.0110	1.4228	16.34	1.650
1.660	0.6447	0.2151	0.3337	0.8430	0.9846	4.5765	1.0615	0.1938	0.4150	0.6512	0.8720	3.0482	4.0531	1.4299	16.63	1.660
1.670	0.6419	0.2119	0.3302	0.8462	0.9779	4.6139	1.0630	0.1973	0.4138	0.6485	0.8680	3.0871	4.0953	1.4369	16.93	1.670
1.680	0.6392	0.2088	0.3266	0.8495	0.9712	4.6515	1.0645	0.2008	0.4125	0.6458	0.8639	3.1261	4.1379	1.4440	17.22	1.680
1.690	0.6364	0.2057	0.3232	0.8527	0.9644	4.6892	1.0660	0.2043	0.4112	0.6431	0.8599	3.1655	4.1807	1.4512	17.52	1.690
1.700	0.6337	0.2026	0.3197	0.8559	0.9577	4.7272	1.0674	0.2078	0.4098	0.6405	0.8557	3.2050	4.2238	1.4583	17.81	1.700
1.710	0.6310	0.1996	0.3163	0.8591	0.9509	4.7652	1.0689	0.2113	0.4085	0.6380	0.8516	3.2448	4.2672	1.4655	18.10	1.710
1.720	0.6283	0.1966	0.3129	0.8622	0.9442	4.8035	1.0704	0.2147	0.4071	0.6355	0.8474	3.2848	4.3108	1.4727	18.40	1.720
1.730	0.6256	0.1936	0.3095	0.8654	0.9374	4.8418	1.0719	0.2182	0.4056	0.6330	0.8431	3.3251	4.3547	1.4800	18.69	1.730
1.740	0.6229	0.1907	0.3062	0.8685	0.9307	4.8804	1.0734	0.2216	0.4041	0.6305	0.8389	3.3655	4.3989	1.4873	18.98	1.740
1.750	0.6202	0.1878	0.3029	0.8716	0.9239	4.9191	1.0749	0.2250	0.4026	0.6281	0.8346	3.4063	4.4433	1.4946	19.27	1.750

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
1.760	0.6175	0.1850	0.2996	0.8747	0.9172	4.9580	1.0764	0.2284	0.4011	0.6257	0.8302	3.4472	4.4880	1.5019	19.56	1.760
1.770	0.6148	0.1822	0.2964	0.8777	0.9104	4.9970	1.0779	0.2318	0.3996	0.6234	0.8259	3.4884	4.5330	1.5093	19.86	1.770
1.780	0.6121	0.1794	0.2931	0.8808	0.9037	5.0362	1.0793	0.2352	0.3980	0.6210	0.8215	3.5298	4.5782	1.5167	20.15	1.780
1.790	0.6095	0.1767	0.2900	0.8838	0.8970	5.0755	1.0808	0.2385	0.3964	0.6188	0.8171	3.5715	4.6237	1.5241	20.44	1.790
1.800	0.6068	0.1740	0.2868	0.8868	0.8902	5.1150	1.0823	0.2419	0.3947	0.6165	0.8127	3.6133	4.6695	1.5316	20.73	1.800
1.810	0.6041	0.1714	0.2837	0.8898	0.8835	5.1547	1.0838	0.2452	0.3931	0.6143	0.8082	3.6555	4.7155	1.5391	21.01	1.810
1.820	0.6015	0.1688	0.2806	0.8927	0.8768	5.1945	1.0852	0.2485	0.3914	0.6121	0.8038	3.6978	4.7618	1.5466	21.30	1.820
1.830	0.5989	0.1662	0.2776	0.8957	0.8701	5.2345	1.0867	0.2518	0.3897	0.6099	0.7993	3.7404	4.8084	1.5541	21.59	1.830
1.840	0.5963	0.1637	0.2745	0.8986	0.8634	5.2747	1.0882	0.2551	0.3879	0.6078	0.7948	3.7832	4.8552	1.5617	21.88	1.840
1.850	0.5936	0.1612	0.2715	0.9015	0.8568	5.3150	1.0896	0.2583	0.3862	0.6057	0.7902	3.8263	4.9023	1.5693	22.16	1.850
1.860	0.5910	0.1587	0.2686	0.9044	0.8501	5.3555	1.0911	0.2616	0.3844	0.6036	0.7857	3.8695	4.9497	1.5770	22.45	1.860
1.870	0.5884	0.1563	0.2656	0.9072	0.8435	5.3962	1.0926	0.2648	0.3826	0.6016	0.7811	3.9131	4.9973	1.5847	22.73	1.870
1.880	0.5859	0.1539	0.2627	0.9101	0.8368	5.4370	1.0940	0.2680	0.3808	0.5996	0.7765	3.9568	5.0452	1.5924	23.02	1.880
1.890	0.5833	0.1516	0.2598	0.9129	0.8302	5.4780	1.0955	0.2712	0.3790	0.5976	0.7720	4.0008	5.0934	1.6001	23.30	1.890
1.900	0.5807	0.1492	0.2570	0.9157	0.8237	5.5191	1.0969	0.2743	0.3771	0.5956	0.7674	4.0450	5.1418	1.6079	23.59	1.900
1.910	0.5782	0.1470	0.2542	0.9185	0.8171	5.5604	1.0984	0.2775	0.3753	0.5937	0.7627	4.0895	5.1905	1.6157	23.87	1.910
1.920	0.5756	0.1447	0.2514	0.9213	0.8106	5.6019	1.0998	0.2806	0.3734	0.5918	0.7581	4.1341	5.2394	1.6236	24.15	1.920
1.930	0.5731	0.1425	0.2486	0.9240	0.8041	5.6435	1.1012	0.2837	0.3715	0.5899	0.7535	4.1791	5.2886	1.6314	24.43	1.930
1.940	0.5705	0.1403	0.2459	0.9268	0.7976	5.6853	1.1027	0.2868	0.3696	0.5880	0.7488	4.2242	5.3381	1.6394	24.71	1.940
1.950	0.5680	0.1381	0.2432	0.9295	0.7911	5.7273	1.1041	0.2899	0.3677	0.5862	0.7442	4.2696	5.3878	1.6473	24.99	1.950
1.960	0.5655	0.1360	0.2405	0.9322	0.7846	5.7695	1.1055	0.2929	0.3657	0.5844	0.7395	4.3152	5.4378	1.6553	25.27	1.960
1.970	0.5630	0.1339	0.2378	0.9349	0.7782	5.8118	1.1069	0.2960	0.3638	0.5826	0.7349	4.3611	5.4881	1.6633	25.55	1.970
1.980	0.5605	0.1318	0.2352	0.9375	0.7718	5.8542	1.1084	0.2990	0.3618	0.5808	0.7302	4.4071	5.5386	1.6713	25.83	1.980
1.990	0.5580	0.1298	0.2326	0.9402	0.7655	5.8969	1.1098	0.3020	0.3598	0.5791	0.7255	4.4535	5.5894	1.6794	26.10	1.990
2.000	0.5556	0.1278	0.2300	0.9428	0.7591	5.9397	1.1112	0.3050	0.3579	0.5774	0.7209	4.5000	5.6404	1.6875	26.38	2.000

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
2.010	0.5531	0.1258	0.2275	0.9454	0.7528	5.9827	1.1126	0.3080	0.3559	0.5757	0.7162	4.5468	5.6918	1.6956	26.66	2.010
2.020	0.5506	0.1239	0.2250	0.9480	0.7465	6.0258	1.1140	0.3109	0.3539	0.5740	0.7115	4.5938	5.7433	1.7038	26.93	2.020
2.030	0.5482	0.1220	0.2225	0.9506	0.7403	6.0692	1.1154	0.3138	0.3518	0.5723	0.7069	4.6411	5.7952	1.7120	27.20	2.030
2.040	0.5458	0.1201	0.2200	0.9531	0.7340	6.1126	1.1167	0.3168	0.3498	0.5707	0.7022	4.6885	5.8473	1.7203	27.48	2.040
2.050	0.5433	0.1182	0.2176	0.9557	0.7279	6.1563	1.1181	0.3197	0.3478	0.5691	0.6975	4.7363	5.8996	1.7285	27.75	2.050
2.060	0.5409	0.1164	0.2152	0.9582	0.7217	6.2001	1.1195	0.3225	0.3458	0.5675	0.6928	4.7842	5.9523	1.7369	28.02	2.060
2.070	0.5385	0.1146	0.2128	0.9607	0.7156	6.2441	1.1209	0.3254	0.3437	0.5659	0.6882	4.8324	6.0051	1.7452	28.29	2.070
2.080	0.5361	0.1128	0.2104	0.9632	0.7095	6.2883	1.1222	0.3282	0.3417	0.5643	0.6835	4.8808	6.0583	1.7536	28.56	2.080
2.090	0.5337	0.1111	0.2081	0.9657	0.7034	6.3326	1.1236	0.3310	0.3396	0.5628	0.6789	4.9295	6.1117	1.7620	28.83	2.090
2.100	0.5313	0.1094	0.2058	0.9681	0.6974	6.3772	1.1250	0.3339	0.3376	0.5613	0.6742	4.9783	6.1654	1.7705	29.10	2.100
2.110	0.5290	0.1077	0.2035	0.9706	0.6914	6.4218	1.1263	0.3366	0.3355	0.5598	0.6696	5.0275	6.2193	1.7789	29.36	2.110
2.120	0.5266	0.1060	0.2013	0.9730	0.6854	6.4667	1.1276	0.3394	0.3334	0.5583	0.6649	5.0768	6.2735	1.7875	29.63	2.120
2.130	0.5243	0.1043	0.1990	0.9754	0.6795	6.5117	1.1290	0.3422	0.3314	0.5568	0.6603	5.1264	6.3280	1.7960	29.90	2.130
2.140	0.5219	0.1027	0.1968	0.9778	0.6736	6.5569	1.1303	0.3449	0.3293	0.5554	0.6557	5.1762	6.3827	1.8046	30.16	2.140
2.150	0.5196	0.1011	0.1946	0.9802	0.6677	6.6023	1.1317	0.3476	0.3272	0.5540	0.6511	5.2263	6.4377	1.8132	30.43	2.150
2.160	0.5173	0.0996	0.1925	0.9825	0.6619	6.6478	1.1330	0.3503	0.3252	0.5525	0.6464	5.2765	6.4929	1.8219	30.69	2.160
2.170	0.5150	0.0980	0.1903	0.9849	0.6561	6.6936	1.1343	0.3530	0.3231	0.5511	0.6419	5.3271	6.5484	1.8306	30.95	2.170
2.180	0.5127	0.0965	0.1882	0.9872	0.6503	6.7395	1.1356	0.3556	0.3210	0.5498	0.6373	5.3778	6.6042	1.8393	31.21	2.180
2.190	0.5104	0.0950	0.1861	0.9895	0.6446	6.7855	1.1369	0.3583	0.3189	0.5484	0.6327	5.4288	6.6602	1.8481	31.47	2.190
2.200	0.5081	0.0935	0.1841	0.9918	0.6389	6.8318	1.1382	0.3609	0.3169	0.5471	0.6281	5.4800	6.7165	1.8569	31.73	2.200
2.210	0.5059	0.0921	0.1820	0.9941	0.6333	6.8782	1.1395	0.3635	0.3148	0.5457	0.6236	5.5315	6.7730	1.8657	31.99	2.210
2.220	0.5036	0.0906	0.1800	0.9964	0.6277	6.9248	1.1408	0.3661	0.3127	0.5444	0.6191	5.5831	6.8298	1.8746	32.25	2.220
2.230	0.5014	0.0892	0.1780	0.9986	0.6221	6.9715	1.1421	0.3687	0.3106	0.5431	0.6145	5.6351	6.8869	1.8835	32.51	2.230
2.240	0.4991	0.0878	0.1760	1.0009	0.6165	7.0185	1.1434	0.3712	0.3085	0.5418	0.6100	5.6872	6.9442	1.8924	32.76	2.240
2.250	0.4969	0.0865	0.1740	1.0031	0.6110	7.0656	1.1446	0.3738	0.3065	0.5406	0.6055	5.7396	7.0018	1.9014	33.02	2.250

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
2.260	0.4947	0.0851	0.1721	1.0053	0.6056	7.1129	1.1459	0.3763	0.3044	0.5393	0.6011	5.7922	7.0597	1.9104	33.27	2.260
2.270	0.4925	0.0838	0.1702	1.0075	0.6002	7.1603	1.1472	0.3788	0.3023	0.5381	0.5966	5.8451	7.1178	1.9194	33.53	2.270
2.280	0.4903	0.0825	0.1683	1.0097	0.5948	7.2080	1.1484	0.3813	0.3003	0.5368	0.5921	5.8981	7.1762	1.9285	33.78	2.280
2.290	0.4881	0.0812	0.1664	1.0118	0.5894	7.2558	1.1497	0.3838	0.2982	0.5356	0.5877	5.9515	7.2348	1.9376	34.03	2.290
2.300	0.4859	0.0800	0.1646	1.0140	0.5841	7.3038	1.1509	0.3862	0.2961	0.5344	0.5833	6.0050	7.2937	1.9468	34.28	2.300
2.310	0.4837	0.0787	0.1628	1.0161	0.5788	7.3520	1.1521	0.3887	0.2941	0.5332	0.5789	6.0588	7.3528	1.9560	34.53	2.310
2.320	0.4816	0.0775	0.1609	1.0182	0.5736	7.4003	1.1534	0.3911	0.2920	0.5321	0.5745	6.1128	7.4122	1.9652	34.78	2.320
2.330	0.4794	0.0763	0.1592	1.0204	0.5684	7.4488	1.1546	0.3935	0.2900	0.5309	0.5702	6.1671	7.4719	1.9745	35.03	2.330
2.340	0.4773	0.0751	0.1574	1.0224	0.5632	7.4975	1.1558	0.3959	0.2879	0.5297	0.5658	6.2215	7.5319	1.9838	35.28	2.340
2.350	0.4752	0.0740	0.1556	1.0245	0.5581	7.5464	1.1570	0.3983	0.2859	0.5286	0.5615	6.2763	7.5920	1.9931	35.53	2.350
2.360	0.4731	0.0728	0.1539	1.0266	0.5530	7.5955	1.1582	0.4006	0.2839	0.5275	0.5572	6.3312	7.6525	2.0025	35.77	2.360
2.370	0.4709	0.0717	0.1522	1.0286	0.5480	7.6447	1.1595	0.4030	0.2818	0.5264	0.5529	6.3864	7.7132	2.0119	36.02	2.370
2.380	0.4688	0.0706	0.1505	1.0307	0.5430	7.6941	1.1606	0.4053	0.2798	0.5253	0.5486	6.4418	7.7742	2.0213	36.26	2.380
2.390	0.4668	0.0695	0.1488	1.0327	0.5380	7.7437	1.1618	0.4076	0.2778	0.5242	0.5444	6.4975	7.8354	2.0308	36.50	2.390
2.400	0.4647	0.0684	0.1472	1.0347	0.5331	7.7935	1.1630	0.4099	0.2758	0.5231	0.5401	6.5533	7.8969	2.0403	36.75	2.400
2.410	0.4626	0.0673	0.1456	1.0367	0.5282	7.8434	1.1642	0.4122	0.2738	0.5221	0.5359	6.6095	7.9587	2.0499	36.99	2.410
2.420	0.4606	0.0663	0.1439	1.0387	0.5233	7.8935	1.1654	0.4144	0.2718	0.5210	0.5317	6.6658	8.0207	2.0595	37.23	2.420
2.430	0.4585	0.0653	0.1424	1.0407	0.5185	7.9438	1.1665	0.4167	0.2698	0.5200	0.5276	6.7224	8.0830	2.0691	37.47	2.430
2.440	0.4565	0.0643	0.1408	1.0426	0.5137	7.9943	1.1677	0.4189	0.2678	0.5189	0.5234	6.7792	8.1455	2.0788	37.71	2.440
2.450	0.4544	0.0633	0.1392	1.0446	0.5090	8.0450	1.1689	0.4211	0.2658	0.5179	0.5193	6.8363	8.2083	2.0885	37.95	2.450
2.460	0.4524	0.0623	0.1377	1.0465	0.5043	8.0958	1.1700	0.4233	0.2639	0.5169	0.5152	6.8935	8.2713	2.0982	38.18	2.460
2.470	0.4504	0.0613	0.1362	1.0484	0.4996	8.1468	1.1712	0.4255	0.2619	0.5159	0.5111	6.9511	8.3346	2.1080	38.42	2.470
2.480	0.4484	0.0604	0.1346	1.0503	0.4950	8.1980	1.1723	0.4277	0.2599	0.5149	0.5071	7.0088	8.3982	2.1178	38.66	2.480
2.490	0.4464	0.0594	0.1332	1.0522	0.4904	8.2494	1.1734	0.4298	0.2580	0.5140	0.5030	7.0668	8.4620	2.1276	38.89	2.490
2.500	0.4444	0.0585	0.1317	1.0541	0.4858	8.3010	1.1746	0.4320	0.2561	0.5130	0.4990	7.1250	8.5261	2.1375	39.12	2.500

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
2.510	0.4425	0.0576	0.1302	1.0560	0.4813	8.3527	1.1757	0.4341	0.2541	0.5120	0.4950	7.1835	8.5905	2.1474	39.36	2.510
2.520	0.4405	0.0567	0.1288	1.0578	0.4768	8.4046	1.1768	0.4362	0.2522	0.5111	0.4911	7.2421	8.6551	2.1574	39.59	2.520
2.530	0.4386	0.0559	0.1274	1.0597	0.4724	8.4567	1.1779	0.4383	0.2503	0.5102	0.4871	7.3011	8.7200	2.1674	39.82	2.530
2.540	0.4366	0.0550	0.1260	1.0615	0.4680	8.5090	1.1790	0.4404	0.2484	0.5092	0.4832	7.3602	8.7851	2.1774	40.05	2.540
2.550	0.4347	0.0542	0.1246	1.0633	0.4636	8.5615	1.1801	0.4425	0.2465	0.5083	0.4793	7.4196	8.8505	2.1875	40.28	2.550
2.560	0.4328	0.0533	0.1232	1.0651	0.4593	8.6141	1.1812	0.4445	0.2446	0.5074	0.4754	7.4792	8.9161	2.1976	40.51	2.560
2.570	0.4309	0.0525	0.1218	1.0669	0.4550	8.6670	1.1823	0.4466	0.2427	0.5065	0.4715	7.5391	8.9820	2.2077	40.74	2.570
2.580	0.4289	0.0517	0.1205	1.0687	0.4507	8.7200	1.1834	0.4486	0.2409	0.5056	0.4677	7.5991	9.0482	2.2179	40.96	2.580
2.590	0.4271	0.0509	0.1192	1.0705	0.4465	8.7732	1.1844	0.4506	0.2390	0.5047	0.4639	7.6595	9.1146	2.2281	41.19	2.590
2.600	0.4252	0.0501	0.1179	1.0722	0.4423	8.8265	1.1855	0.4526	0.2371	0.5039	0.4601	7.7200	9.1813	2.2383	41.41	2.600
2.610	0.4233	0.0493	0.1166	1.0740	0.4382	8.8801	1.1866	0.4546	0.2353	0.5030	0.4564	7.7808	9.2483	2.2486	41.64	2.610
2.620	0.4214	0.0486	0.1153	1.0757	0.4341	8.9338	1.1876	0.4565	0.2335	0.5022	0.4526	7.8418	9.3155	2.2590	41.86	2.620
2.630	0.4196	0.0478	0.1140	1.0774	0.4300	8.9877	1.1887	0.4585	0.2317	0.5013	0.4489	7.9031	9.3829	2.2693	42.09	2.630
2.640	0.4177	0.0471	0.1128	1.0791	0.4260	9.0418	1.1897	0.4604	0.2298	0.5005	0.4452	7.9645	9.4506	2.2797	42.31	2.640
2.650	0.4159	0.0464	0.1115	1.0808	0.4220	9.0961	1.1908	0.4624	0.2280	0.4996	0.4416	8.0263	9.5186	2.2902	42.53	2.650
2.660	0.4141	0.0457	0.1103	1.0825	0.4180	9.1506	1.1918	0.4643	0.2262	0.4988	0.4379	8.0882	9.5869	2.3006	42.75	2.660
2.670	0.4122	0.0450	0.1091	1.0842	0.4141	9.2052	1.1928	0.4662	0.2245	0.4980	0.4343	8.1504	9.6554	2.3111	42.97	2.670
2.680	0.4104	0.0443	0.1079	1.0859	0.4102	9.2601	1.1939	0.4681	0.2227	0.4972	0.4307	8.2128	9.7241	2.3217	43.19	2.680
2.690	0.4086	0.0436	0.1067	1.0875	0.4063	9.3151	1.1949	0.4700	0.2209	0.4964	0.4271	8.2755	9.7931	2.3323	43.40	2.690
2.700	0.4068	0.0430	0.1056	1.0892	0.4025	9.3703	1.1959	0.4718	0.2192	0.4956	0.4236	8.3383	9.8624	2.3429	43.62	2.700
2.710	0.4051	0.0423	0.1044	1.0908	0.3987	9.4257	1.1969	0.4737	0.2174	0.4949	0.4201	8.4015	9.9319	2.3536	43.84	2.710
2.720	0.4033	0.0417	0.1033	1.0924	0.3949	9.4812	1.1979	0.4755	0.2157	0.4941	0.4166	8.4648	10.0017	2.3642	44.05	2.720
2.730	0.4015	0.0410	0.1022	1.0941	0.3912	9.5370	1.1989	0.4773	0.2140	0.4933	0.4131	8.5284	10.0718	2.3750	44.27	2.730
2.740	0.3998	0.0404	0.1010	1.0957	0.3875	9.5929	1.1999	0.4791	0.2123	0.4926	0.4097	8.5922	10.1421	2.3858	44.48	2.740
2.750	0.3980	0.0398	0.0999	1.0973	0.3838	9.6490	1.2009	0.4809	0.2106	0.4918	0.4062	8.6563	10.2127	2.3966	44.69	2.750

γ=1.400

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	M_s	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	ν	M
2.760	0.3963	0.0392	0.0989	1.0988	0.3802	9.7053	1.2019	0.4827	0.2089	0.4911	0.4028	8.7205	10.2835	2.4074	44.91	2.760
2.770	0.3945	0.0386	0.0978	1.1004	0.3766	9.7618	1.2029	0.4845	0.2072	0.4903	0.3994	8.7851	10.3546	2.4183	45.12	2.770
2.780	0.3928	0.0380	0.0967	1.1020	0.3730	9.8185	1.2038	0.4863	0.2055	0.4896	0.3961	8.8498	10.4259	2.4292	45.33	2.780
2.790	0.3911	0.0374	0.0957	1.1035	0.3695	9.8753	1.2048	0.4880	0.2039	0.4889	0.3928	8.9148	10.4975	2.4402	45.54	2.790
2.800	0.3894	0.0368	0.0946	1.1051	0.3660	9.9324	1.2058	0.4898	0.2022	0.4882	0.3895	8.9800	10.5694	2.4512	45.75	2.800
2.810	0.3877	0.0363	0.0936	1.1066	0.3625	9.9896	1.2067	0.4915	0.2006	0.4875	0.3862	9.0455	10.6415	2.4622	45.95	2.810
2.820	0.3860	0.0357	0.0926	1.1081	0.3591	10.0470	1.2077	0.4932	0.1990	0.4868	0.3829	9.1111	10.7139	2.4733	46.16	2.820
2.830	0.3844	0.0352	0.0916	1.1096	0.3557	10.1046	1.2086	0.4949	0.1973	0.4861	0.3797	9.1771	10.7865	2.4844	46.37	2.830
2.840	0.3827	0.0347	0.0906	1.1111	0.3523	10.1624	1.2095	0.4966	0.1957	0.4854	0.3765	9.2432	10.8594	2.4955	46.57	2.840
2.850	0.3810	0.0341	0.0896	1.1126	0.3490	10.2204	1.2105	0.4983	0.1941	0.4847	0.3733	9.3096	10.9326	2.5067	46.78	2.850
2.860	0.3794	0.0336	0.0886	1.1141	0.3457	10.2785	1.2114	0.5000	0.1926	0.4840	0.3701	9.3762	11.0060	2.5179	46.98	2.860
2.870	0.3777	0.0331	0.0877	1.1156	0.3424	10.3368	1.2123	0.5016	0.1910	0.4833	0.3670	9.4431	11.0797	2.5292	47.19	2.870
2.880	0.3761	0.0326	0.0867	1.1171	0.3392	10.3954	1.2132	0.5033	0.1894	0.4827	0.3639	9.5101	11.1536	2.5405	47.39	2.880
2.890	0.3745	0.0321	0.0858	1.1185	0.3359	10.4541	1.2142	0.5049	0.1879	0.4820	0.3608	9.5775	11.2278	2.5518	47.59	2.890
2.900	0.3729	0.0317	0.0849	1.1199	0.3328	10.5130	1.2151	0.5065	0.1863	0.4814	0.3577	9.6450	11.3022	2.5632	47.79	2.900
2.910	0.3712	0.0312	0.0840	1.1214	0.3296	10.5720	1.2160	0.5081	0.1848	0.4807	0.3547	9.7128	11.3770	2.5746	47.99	2.910
2.920	0.3696	0.0307	0.0831	1.1228	0.3265	10.6313	1.2169	0.5097	0.1833	0.4801	0.3517	9.7808	11.4519	2.5861	48.19	2.920
2.930	0.3681	0.0302	0.0822	1.1242	0.3234	10.6908	1.2178	0.5113	0.1818	0.4795	0.3487	9.8491	11.5271	2.5976	48.39	2.930
2.940	0.3665	0.0298	0.0813	1.1256	0.3203	10.7504	1.2187	0.5129	0.1803	0.4788	0.3457	9.9175	11.6026	2.6091	48.59	2.940
2.950	0.3649	0.0293	0.0804	1.1270	0.3173	10.8102	1.2195	0.5145	0.1788	0.4782	0.3428	9.9863	11.6784	2.6206	48.78	2.950
2.960	0.3633	0.0289	0.0796	1.1284	0.3143	10.8702	1.2204	0.5160	0.1773	0.4776	0.3398	10.0552	11.7544	2.6322	48.98	2.960
2.970	0.3618	0.0285	0.0787	1.1298	0.3113	10.9304	1.2213	0.5176	0.1758	0.4770	0.3369	10.1244	11.8306	2.6439	49.18	2.970
2.980	0.3602	0.0281	0.0779	1.1312	0.3083	10.9908	1.2222	0.5191	0.1744	0.4764	0.3340	10.1938	11.9072	2.6555	49.37	2.980
2.990	0.3587	0.0276	0.0770	1.1325	0.3054	11.0514	1.2230	0.5206	0.1729	0.4758	0.3312	10.2635	11.9839	2.6673	49.56	2.990
3.000	0.3571	0.0272	0.0762	1.1339	0.3025	11.1122	1.2239	0.5222	0.1715	0.4752	0.3283	10.3333	12.0610	2.6790	49.76	3.000

GAS FLOW TABLES (γ=1.333): SUBSONIC FLOW

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
0.010	1.0000	0.9999	1.0000	0.0058	0.0231	0.0231	43.2958	7493.200	0.0001
0.020	0.9999	0.9997	0.9998	0.0115	0.0462	0.0462	21.6560	1868.007	0.0003
0.030	0.9999	0.9994	0.9996	0.0173	0.0693	0.0693	14.4464	826.7890	0.0006
0.040	0.9997	0.9989	0.9992	0.0231	0.0923	0.0924	10.8442	462.6179	0.0011
0.050	0.9996	0.9983	0.9988	0.0288	0.1153	0.1155	8.6851	294.2161	0.0017
0.060	0.9994	0.9976	0.9982	0.0346	0.1383	0.1386	7.2475	202.8455	0.0024
0.070	0.9992	0.9967	0.9976	0.0404	0.1612	0.1618	6.2222	147.8292	0.0033
0.080	0.9989	0.9957	0.9968	0.0461	0.1841	0.1849	5.4546	112.1800	0.0042
0.090	0.9987	0.9946	0.9960	0.0519	0.2069	0.2080	4.8587	87.7848	0.0054
0.100	0.9983	0.9934	0.9950	0.0577	0.2297	0.2312	4.3831	70.3719	0.0066
0.110	0.9980	0.9920	0.9940	0.0634	0.2523	0.2544	3.9949	57.5186	0.0080
0.120	0.9976	0.9905	0.9928	0.0692	0.2749	0.2775	3.6724	47.7680	0.0095
0.130	0.9972	0.9888	0.9916	0.0749	0.2974	0.3007	3.4003	40.2012	0.0111
0.140	0.9967	0.9870	0.9903	0.0807	0.3197	0.3239	3.1678	34.2155	0.0129
0.150	0.9963	0.9851	0.9888	0.0864	0.3420	0.3471	2.9670	29.4027	0.0148
0.160	0.9958	0.9831	0.9873	0.0921	0.3641	0.3704	2.7920	25.4777	0.0168
0.170	0.9952	0.9810	0.9857	0.0979	0.3861	0.3936	2.6383	22.2372	0.0189
0.180	0.9946	0.9787	0.9840	0.1036	0.4080	0.4169	2.5022	19.5326	0.0211
0.190	0.9940	0.9763	0.9822	0.1093	0.4298	0.4402	2.3809	17.2536	0.0235
0.200	0.9934	0.9738	0.9803	0.1150	0.4514	0.4635	2.2724	15.3166	0.0260
0.210	0.9927	0.9711	0.9783	0.1207	0.4728	0.4869	2.1747	13.6578	0.0285
0.220	0.9920	0.9684	0.9762	0.1264	0.4941	0.5102	2.0863	12.2273	0.0312
0.230	0.9913	0.9655	0.9740	0.1321	0.5152	0.5336	2.0061	10.9859	0.0340
0.240	0.9905	0.9625	0.9717	0.1378	0.5362	0.5570	1.9330	9.9026	0.0370
0.250	0.9897	0.9594	0.9694	0.1435	0.5569	0.5805	1.8662	8.9522	0.0400
0.260	0.9889	0.9562	0.9669	0.1492	0.5775	0.6040	1.8049	8.1146	0.0431
0.270	0.9880	0.9529	0.9644	0.1549	0.5979	0.6275	1.7486	7.3731	0.0463
0.280	0.9871	0.9494	0.9618	0.1605	0.6181	0.6510	1.6966	6.7140	0.0496
0.290	0.9862	0.9459	0.9591	0.1662	0.6380	0.6746	1.6486	6.1261	0.0530
0.300	0.9852	0.9422	0.9563	0.1718	0.6578	0.6982	1.6042	5.5998	0.0565
0.310	0.9843	0.9384	0.9534	0.1775	0.6774	0.7218	1.5629	5.1272	0.0601
0.320	0.9832	0.9346	0.9505	0.1831	0.6967	0.7455	1.5245	4.7016	0.0638
0.330	0.9822	0.9306	0.9475	0.1887	0.7158	0.7692	1.4888	4.3173	0.0675
0.340	0.9811	0.9265	0.9444	0.1943	0.7347	0.7929	1.4555	3.9693	0.0714
0.350	0.9800	0.9224	0.9412	0.1999	0.7533	0.8167	1.4244	3.6535	0.0753
0.360	0.9789	0.9181	0.9379	0.2055	0.7717	0.8405	1.3953	3.3663	0.0793
0.370	0.9777	0.9137	0.9346	0.2111	0.7898	0.8644	1.3680	3.1046	0.0834
0.380	0.9765	0.9093	0.9311	0.2167	0.8077	0.8883	1.3425	2.8655	0.0875
0.390	0.9753	0.9047	0.9276	0.2223	0.8253	0.9122	1.3185	2.6469	0.0917
0.400	0.9741	0.9001	0.9241	0.2278	0.8427	0.9362	1.2959	2.4466	0.0960
0.410	0.9728	0.8954	0.9204	0.2334	0.8598	0.9603	1.2747	2.2627	0.1003
0.420	0.9715	0.8906	0.9167	0.2389	0.8766	0.9843	1.2548	2.0937	0.1047
0.430	0.9701	0.8857	0.9130	0.2444	0.8932	1.0085	1.2360	1.9382	0.1091
0.440	0.9688	0.8807	0.9091	0.2499	0.9095	1.0326	1.2183	1.7949	0.1136
0.450	0.9674	0.8757	0.9052	0.2554	0.9255	1.0569	1.2016	1.6627	0.1182
0.460	0.9660	0.8706	0.9012	0.2609	0.9412	1.0811	1.1858	1.5405	0.1228
0.470	0.9645	0.8654	0.8972	0.2664	0.9567	1.1055	1.1710	1.4276	0.1274
0.480	0.9631	0.8601	0.8931	0.2718	0.9718	1.1299	1.1569	1.3231	0.1321
0.490	0.9616	0.8548	0.8890	0.2773	0.9867	1.1543	1.1436	1.2263	0.1368
0.500	0.9600	0.8494	0.8847	0.2827	1.0012	1.1788	1.1310	1.1365	0.1415

γ=1.333

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
0.510	0.9585	0.8439	0.8805	0.2881	1.0155	1.2033	1.1192	1.0532	0.1463
0.520	0.9569	0.8384	0.8761	0.2935	1.0295	1.2279	1.1079	0.9759	0.1511
0.530	0.9553	0.8328	0.8717	0.2989	1.0431	1.2526	1.0973	0.9041	0.1559
0.540	0.9537	0.8271	0.8673	0.3043	1.0565	1.2773	1.0872	0.8373	0.1608
0.550	0.9520	0.8214	0.8628	0.3097	1.0696	1.3021	1.0777	0.7752	0.1656
0.560	0.9504	0.8157	0.8583	0.3150	1.0823	1.3269	1.0687	0.7174	0.1705
0.570	0.9487	0.8099	0.8537	0.3204	1.0948	1.3518	1.0601	0.6636	0.1754
0.580	0.9470	0.8040	0.8490	0.3257	1.1069	1.3768	1.0520	0.6136	0.1803
0.590	0.9452	0.7981	0.8443	0.3310	1.1188	1.4018	1.0444	0.5669	0.1852
0.600	0.9434	0.7921	0.8396	0.3363	1.1303	1.4269	1.0371	0.5235	0.1901
0.610	0.9417	0.7861	0.8348	0.3416	1.1415	1.4521	1.0303	0.4830	0.1950
0.620	0.9398	0.7801	0.8300	0.3469	1.1524	1.4773	1.0238	0.4452	0.1999
0.630	0.9380	0.7740	0.8252	0.3521	1.1630	1.5026	1.0176	0.4101	0.2048
0.640	0.9362	0.7679	0.8203	0.3573	1.1733	1.5280	1.0118	0.3773	0.2096
0.650	0.9343	0.7618	0.8153	0.3626	1.1833	1.5534	1.0063	0.3467	0.2145
0.660	0.9324	0.7556	0.8104	0.3678	1.1930	1.5789	1.0011	0.3183	0.2194
0.670	0.9305	0.7494	0.8054	0.3729	1.2023	1.6045	0.9962	0.2918	0.2242
0.680	0.9285	0.7431	0.8003	0.3781	1.2114	1.6301	0.9916	0.2671	0.2290
0.690	0.9266	0.7368	0.7953	0.3833	1.2201	1.6559	0.9872	0.2441	0.2338
0.700	0.9246	0.7306	0.7902	0.3884	1.2285	1.6817	0.9831	0.2227	0.2386
0.710	0.9226	0.7242	0.7850	0.3935	1.2367	1.7075	0.9792	0.2028	0.2433
0.720	0.9205	0.7179	0.7799	0.3986	1.2445	1.7335	0.9755	0.1843	0.2480
0.730	0.9185	0.7116	0.7747	0.4037	1.2520	1.7595	0.9721	0.1671	0.2527
0.740	0.9164	0.7052	0.7695	0.4088	1.2592	1.7856	0.9688	0.1512	0.2574
0.750	0.9144	0.6988	0.7643	0.4139	1.2661	1.8118	0.9658	0.1364	0.2620
0.760	0.9123	0.6924	0.7590	0.4189	1.2727	1.8381	0.9629	0.1227	0.2666
0.770	0.9102	0.6860	0.7537	0.4239	1.2790	1.8644	0.9603	0.1100	0.2711
0.780	0.9080	0.6796	0.7484	0.4289	1.2850	1.8908	0.9578	0.0983	0.2756
0.790	0.9059	0.6732	0.7431	0.4339	1.2907	1.9174	0.9554	0.0875	0.2800
0.800	0.9037	0.6668	0.7378	0.4389	1.2961	1.9440	0.9533	0.0776	0.2844
0.810	0.9015	0.6603	0.7325	0.4438	1.3013	1.9706	0.9513	0.0685	0.2888
0.820	0.8993	0.6539	0.7271	0.4487	1.3061	1.9974	0.9494	0.0601	0.2930
0.830	0.8971	0.6475	0.7217	0.4536	1.3107	2.0243	0.9477	0.0524	0.2973
0.840	0.8949	0.6411	0.7164	0.4585	1.3149	2.0512	0.9461	0.0454	0.3015
0.850	0.8926	0.6346	0.7110	0.4634	1.3189	2.0782	0.9446	0.0391	0.3056
0.860	0.8904	0.6282	0.7056	0.4683	1.3226	2.1053	0.9433	0.0333	0.3097
0.870	0.8881	0.6218	0.7002	0.4731	1.3260	2.1326	0.9420	0.0281	0.3137
0.880	0.8858	0.6154	0.6948	0.4779	1.3292	2.1599	0.9409	0.0235	0.3176
0.890	0.8835	0.6090	0.6893	0.4827	1.3321	2.1873	0.9399	0.0193	0.3215
0.900	0.8812	0.6026	0.6839	0.4875	1.3347	2.2147	0.9390	0.0156	0.3253
0.910	0.8788	0.5963	0.6785	0.4923	1.3370	2.2423	0.9383	0.0124	0.3291
0.920	0.8765	0.5899	0.6731	0.4970	1.3391	2.2700	0.9376	0.0096	0.3328
0.930	0.8741	0.5836	0.6676	0.5018	1.3410	2.2978	0.9370	0.0072	0.3364
0.940	0.8717	0.5773	0.6622	0.5065	1.3425	2.3256	0.9365	0.0052	0.3400
0.950	0.8694	0.5710	0.6568	0.5111	1.3439	2.3536	0.9360	0.0035	0.3435
0.960	0.8670	0.5647	0.6514	0.5158	1.3449	2.3817	0.9357	0.0022	0.3469
0.970	0.8646	0.5585	0.6459	0.5205	1.3458	2.4098	0.9354	0.0012	0.3502
0.980	0.8621	0.5522	0.6405	0.5251	1.3464	2.4381	0.9353	0.0005	0.3535
0.990	0.8597	0.5460	0.6351	0.5297	1.3467	2.4664	0.9351	0.0001	0.3567
1.000	0.8573	0.5398	0.6297	0.5343	1.3468	2.4949	0.9351	0.0000	0.3598

GAS FLOW TABLES (γ=1.333): SUPERSONIC FLOW

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
1.010	0.8548	0.5337	0.6243	0.5389	1.3467	2.5234	0.9351	0.0001	0.3628
1.020	0.8524	0.5276	0.6189	0.5434	1.3464	2.5521	0.9352	0.0005	0.3658
1.030	0.8499	0.5215	0.6136	0.5479	1.3458	2.5809	0.9354	0.0011	0.3687
1.040	0.8474	0.5154	0.6082	0.5525	1.3450	2.6097	0.9356	0.0019	0.3715
1.050	0.8449	0.5093	0.6028	0.5569	1.3440	2.6387	0.9359	0.0029	0.3743
1.060	0.8424	0.5033	0.5975	0.5614	1.3428	2.6678	0.9363	0.0042	0.3769
1.070	0.8399	0.4974	0.5922	0.5659	1.3414	2.6970	0.9367	0.0056	0.3795
1.080	0.8374	0.4914	0.5869	0.5703	1.3397	2.7263	0.9371	0.0071	0.3820
1.090	0.8349	0.4855	0.5816	0.5747	1.3379	2.7557	0.9376	0.0089	0.3845
1.100	0.8323	0.4796	0.5763	0.5791	1.3359	2.7852	0.9381	0.0108	0.3868
1.110	0.8298	0.4738	0.5710	0.5835	1.3337	2.8148	0.9387	0.0128	0.3891
1.120	0.8272	0.4680	0.5658	0.5878	1.3313	2.8446	0.9394	0.0150	0.3913
1.130	0.8247	0.4622	0.5605	0.5922	1.3287	2.8744	0.9401	0.0173	0.3934
1.140	0.8221	0.4565	0.5553	0.5965	1.3259	2.9043	0.9408	0.0197	0.3954
1.150	0.8195	0.4508	0.5501	0.6008	1.3229	2.9344	0.9415	0.0223	0.3974
1.160	0.8170	0.4452	0.5449	0.6050	1.3198	2.9646	0.9424	0.0250	0.3993
1.170	0.8144	0.4396	0.5398	0.6093	1.3165	2.9949	0.9432	0.0277	0.4011
1.180	0.8118	0.4340	0.5347	0.6135	1.3131	3.0253	0.9441	0.0306	0.4028
1.190	0.8092	0.4285	0.5295	0.6177	1.3094	3.0558	0.9450	0.0335	0.4044
1.200	0.8066	0.4230	0.5245	0.6219	1.3057	3.0864	0.9459	0.0366	0.4060
1.210	0.8040	0.4176	0.5194	0.6261	1.3017	3.1172	0.9469	0.0397	0.4075
1.220	0.8014	0.4122	0.5143	0.6302	1.2976	3.1481	0.9479	0.0429	0.4089
1.230	0.7988	0.4068	0.5093	0.6344	1.2934	3.1791	0.9489	0.0462	0.4102
1.240	0.7962	0.4015	0.5043	0.6385	1.2890	3.2102	0.9500	0.0495	0.4115
1.250	0.7936	0.3963	0.4994	0.6426	1.2845	3.2414	0.9511	0.0529	0.4127
1.260	0.7909	0.3911	0.4944	0.6466	1.2798	3.2727	0.9522	0.0564	0.4138
1.270	0.7883	0.3859	0.4895	0.6507	1.2751	3.3042	0.9533	0.0599	0.4148
1.280	0.7857	0.3808	0.4846	0.6547	1.2701	3.3358	0.9545	0.0634	0.4158
1.290	0.7830	0.3757	0.4798	0.6587	1.2651	3.3675	0.9557	0.0670	0.4167
1.300	0.7804	0.3706	0.4749	0.6627	1.2599	3.3993	0.9569	0.0707	0.4175
1.310	0.7778	0.3657	0.4701	0.6667	1.2547	3.4313	0.9581	0.0744	0.4182
1.320	0.7751	0.3607	0.4654	0.6706	1.2493	3.4633	0.9594	0.0781	0.4189
1.330	0.7725	0.3558	0.4606	0.6746	1.2438	3.4955	0.9606	0.0819	0.4195
1.340	0.7698	0.3510	0.4559	0.6785	1.2382	3.5279	0.9619	0.0857	0.4200
1.350	0.7672	0.3462	0.4512	0.6824	1.2325	3.5603	0.9632	0.0895	0.4205
1.360	0.7646	0.3414	0.4465	0.6862	1.2266	3.5929	0.9645	0.0934	0.4209
1.370	0.7619	0.3367	0.4419	0.6901	1.2207	3.6256	0.9659	0.0973	0.4212
1.380	0.7593	0.3320	0.4373	0.6939	1.2147	3.6584	0.9672	0.1012	0.4215
1.390	0.7566	0.3274	0.4328	0.6977	1.2086	3.6914	0.9686	0.1051	0.4216
1.400	0.7540	0.3229	0.4282	0.7015	1.2025	3.7245	0.9700	0.1091	0.4218
1.410	0.7513	0.3183	0.4237	0.7053	1.1962	3.7577	0.9714	0.1130	0.4218
1.420	0.7487	0.3139	0.4192	0.7090	1.1899	3.7910	0.9728	0.1170	0.4218
1.430	0.7460	0.3094	0.4148	0.7127	1.1835	3.8245	0.9742	0.1210	0.4217
1.440	0.7434	0.3051	0.4104	0.7164	1.1770	3.8581	0.9756	0.1250	0.4216
1.450	0.7407	0.3007	0.4060	0.7201	1.1704	3.8918	0.9771	0.1290	0.4214
1.460	0.7381	0.2965	0.4017	0.7238	1.1638	3.9257	0.9785	0.1331	0.4212
1.470	0.7354	0.2922	0.3974	0.7275	1.1571	3.9597	0.9800	0.1371	0.4209
1.480	0.7328	0.2880	0.3931	0.7311	1.1504	3.9938	0.9815	0.1411	0.4205
1.490	0.7301	0.2839	0.3888	0.7347	1.1435	4.0281	0.9829	0.1452	0.4201
1.500	0.7275	0.2798	0.3846	0.7383	1.1367	4.0625	0.9844	0.1492	0.4196

γ=1.333

M	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4 c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$
1.510	0.7248	0.2758	0.3804	0.7419	1.1298	4.0970	0.9859	0.1532	0.4191
1.520	0.7222	0.2718	0.3763	0.7454	1.1228	4.1317	0.9874	0.1573	0.4185
1.530	0.7195	0.2678	0.3722	0.7489	1.1158	4.1665	0.9889	0.1613	0.4178
1.540	0.7169	0.2639	0.3681	0.7524	1.1087	4.2014	0.9905	0.1654	0.4171
1.550	0.7143	0.2600	0.3641	0.7559	1.1016	4.2365	0.9920	0.1694	0.4164
1.560	0.7116	0.2562	0.3600	0.7594	1.0945	4.2717	0.9935	0.1734	0.4156
1.570	0.7090	0.2524	0.3561	0.7629	1.0873	4.3070	0.9950	0.1775	0.4147
1.580	0.7064	0.2487	0.3521	0.7663	1.0801	4.3425	0.9966	0.1815	0.4138
1.590	0.7038	0.2450	0.3482	0.7697	1.0729	4.3782	0.9981	0.1855	0.4129
1.600	0.7011	0.2414	0.3443	0.7731	1.0656	4.4139	0.9997	0.1895	0.4119
1.610	0.6985	0.2378	0.3405	0.7765	1.0583	4.4498	1.0012	0.1935	0.4109
1.620	0.6959	0.2343	0.3367	0.7799	1.0510	4.4859	1.0028	0.1975	0.4098
1.630	0.6933	0.2308	0.3329	0.7832	1.0436	4.5220	1.0043	0.2015	0.4087
1.640	0.6907	0.2273	0.3291	0.7865	1.0363	4.5584	1.0059	0.2055	0.4075
1.650	0.6881	0.2239	0.3254	0.7898	1.0289	4.5948	1.0075	0.2094	0.4063
1.660	0.6855	0.2206	0.3217	0.7931	1.0215	4.6314	1.0090	0.2134	0.4051
1.670	0.6829	0.2172	0.3181	0.7964	1.0141	4.6682	1.0106	0.2173	0.4038
1.680	0.6803	0.2139	0.3145	0.7996	1.0066	4.7051	1.0122	0.2213	0.4025
1.690	0.6777	0.2107	0.3109	0.8028	0.9992	4.7421	1.0137	0.2252	0.4011
1.700	0.6751	0.2075	0.3074	0.8061	0.9918	4.7793	1.0153	0.2291	0.3997
1.710	0.6726	0.2044	0.3039	0.8093	0.9843	4.8166	1.0169	0.2330	0.3983
1.720	0.6700	0.2012	0.3004	0.8124	0.9769	4.8541	1.0184	0.2369	0.3968
1.730	0.6674	0.1982	0.2969	0.8156	0.9694	4.8917	1.0200	0.2407	0.3953
1.740	0.6649	0.1951	0.2935	0.8187	0.9620	4.9294	1.0216	0.2446	0.3938
1.750	0.6623	0.1922	0.2901	0.8218	0.9545	4.9673	1.0232	0.2484	0.3922
1.760	0.6597	0.1892	0.2868	0.8249	0.9471	5.0054	1.0247	0.2522	0.3906
1.770	0.6572	0.1863	0.2835	0.8280	0.9396	5.0435	1.0263	0.2560	0.3890
1.780	0.6546	0.1834	0.2802	0.8311	0.9322	5.0819	1.0279	0.2598	0.3874
1.790	0.6521	0.1806	0.2770	0.8341	0.9248	5.1204	1.0294	0.2636	0.3857
1.800	0.6496	0.1778	0.2737	0.8372	0.9173	5.1590	1.0310	0.2673	0.3840
1.810	0.6471	0.1751	0.2706	0.8402	0.9099	5.1978	1.0326	0.2711	0.3822
1.820	0.6445	0.1723	0.2674	0.8432	0.9025	5.2367	1.0341	0.2748	0.3805
1.830	0.6420	0.1697	0.2643	0.8461	0.8951	5.2758	1.0357	0.2785	0.3787
1.840	0.6395	0.1670	0.2612	0.8491	0.8878	5.3150	1.0373	0.2822	0.3769
1.850	0.6370	0.1644	0.2581	0.8521	0.8804	5.3544	1.0388	0.2858	0.3751
1.860	0.6345	0.1619	0.2551	0.8550	0.8731	5.3939	1.0404	0.2895	0.3732
1.870	0.6320	0.1593	0.2521	0.8579	0.8658	5.4336	1.0419	0.2931	0.3714
1.880	0.6295	0.1568	0.2491	0.8608	0.8585	5.4734	1.0435	0.2967	0.3695
1.890	0.6271	0.1544	0.2462	0.8636	0.8512	5.5134	1.0450	0.3003	0.3676
1.900	0.6246	0.1520	0.2433	0.8665	0.8439	5.5535	1.0466	0.3039	0.3656
1.910	0.6221	0.1496	0.2404	0.8693	0.8367	5.5938	1.0481	0.3074	0.3637
1.920	0.6197	0.1472	0.2376	0.8722	0.8295	5.6342	1.0497	0.3110	0.3617
1.930	0.6172	0.1449	0.2348	0.8750	0.8223	5.6748	1.0512	0.3145	0.3598
1.940	0.6148	0.1426	0.2320	0.8778	0.8152	5.7155	1.0527	0.3180	0.3578
1.950	0.6123	0.1404	0.2292	0.8805	0.8081	5.7564	1.0543	0.3215	0.3558
1.960	0.6099	0.1382	0.2265	0.8833	0.8010	5.7974	1.0558	0.3249	0.3537
1.970	0.6075	0.1360	0.2238	0.8860	0.7939	5.8386	1.0573	0.3284	0.3517
1.980	0.6051	0.1338	0.2212	0.8888	0.7869	5.8800	1.0588	0.3318	0.3497
1.990	0.6026	0.1317	0.2185	0.8915	0.7799	5.9215	1.0603	0.3352	0.3476
2.000	0.6002	0.1296	0.2159	0.8942	0.7729	5.9631	1.0619	0.3386	0.3455

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$	M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
1.05	0.558	79.937	1.0803	1.0567	1.0223	0.9845	0.99995	1.40	8.000	75.893	1.9842	1.6163	1.2276	0.8184	0.96806
									6.000	80.485	2.0575	1.6562	1.2423	0.7762	0.96286
									4.000	83.988	2.0949	1.6763	1.2497	0.7545	0.96009
1.10	1.515	76.297	1.1658	1.1157	1.0449	0.9711	0.99963		2.000	87.075	2.1140	1.6865	1.2535	0.7432	0.95865
1.15	2.000	67.003	1.1408	1.0986	1.0384	1.0434	0.99977	1.45	2.000	46.004	1.1028	1.0723	1.0284	1.3808	0.99990
	2.671	73.822	1.2565	1.1767	1.0678	0.9598	0.99879		4.000	48.679	1.2169	1.1503	1.0579	1.3091	0.99923
	2.000	81.173	1.3399	1.2316	1.0880	0.9007	0.99745		6.000	51.755	1.3463	1.2357	1.0895	1.2325	0.99733
									8.000	55.517	1.5000	1.3333	1.1250	1.1460	0.99325
									10.000	61.046	1.7114	1.4613	1.1712	1.0317	0.98440
1.20	2.000	61.050	1.1197	1.0841	1.0329	1.1113	0.99985		10.785	67.097	1.9147	1.5779	1.2135	0.9235	0.97269
	3.944	71.977	1.3525	1.2397	1.0910	0.9502	0.99720		10.000	72.994	2.0764	1.6664	1.2461	0.8366	0.96147
	2.000	83.861	1.4941	1.3297	1.1237	0.8551	0.99344		8.000	78.197	2.1836	1.7232	1.2672	0.7777	0.95324
									6.000	81.733	2.2355	1.7501	1.2774	0.7485	0.94905
									4.000	84.702	2.2653	1.7654	1.2832	0.7316	0.94659
1.25	2.000	56.844	1.1110	1.0780	1.0306	1.1696	0.99988		2.000	87.406	2.2812	1.7736	1.2862	0.7225	0.94526
	4.000	61.986	1.2541	1.1752	1.0672	1.0721	0.99882								
	5.286	70.540	1.4539	1.3045	1.1146	0.9423	0.99468								
	4.000	79.385	1.5944	1.3913	1.1459	0.8525	0.98975	1.50	2.000	44.065	1.1030	1.0725	1.0284	1.4316	0.99990
	2.000	85.211	1.6435	1.4210	1.1566	0.8209	0.98763		4.000	46.543	1.2165	1.1500	1.0578	1.3615	0.99923
									6.000	49.326	1.3433	1.2337	1.0888	1.2879	0.99739
									8.000	52.571	1.4887	1.3263	1.1224	1.2079	0.99362
1.30	2.000	53.474	1.1065	1.0749	1.0294	1.2244	0.99989		10.000	56.679	1.6662	1.4345	1.1615	1.1144	0.98660
	4.000	57.423	1.2334	1.1613	1.0621	1.1398	0.99906		12.000	64.359	1.9668	1.6068	1.2241	0.9607	0.96925
	6.000	63.459	1.4113	1.2775	1.1048	1.0274	0.99585		12.113	66.589	2.0439	1.6489	1.2396	0.9213	0.96385
	6.662	69.395	1.5608	1.3709	1.1386	0.9359	0.99108		12.000	68.790	2.1147	1.6869	1.2537	0.8849	0.95860
	6.000	75.372	1.6793	1.4423	1.1643	0.8636	0.98598		10.000	75.995	2.3046	1.7855	1.2908	0.7854	0.94329
	4.000	81.649	1.7634	1.4917	1.1822	0.8118	0.98169		8.000	79.712	2.3746	1.8207	1.3042	0.7476	0.93725
	2.000	86.058	1.7957	1.5103	1.1889	0.7918	0.97990		6.000	82.662	2.4155	1.8410	1.3121	0.7250	0.93363
									4.000	85.256	2.4404	1.8533	1.3168	0.7112	0.93141
									2.000	87.668	2.4540	1.8599	1.3194	0.7035	0.93018
1.35	2.000	50.634	1.1042	1.0733	1.0287	1.2774	0.99990								
	4.000	53.965	1.2238	1.1549	1.0596	1.1994	0.99916								
	6.000	58.232	1.3702	1.2512	1.0952	1.1089	0.99682	1.55	2.000	42.315	1.1036	1.0729	1.0286	1.4821	0.99990
	8.000	66.914	1.6327	1.4145	1.1543	0.9543	0.98812		4.000	44.642	1.2173	1.1505	1.0580	1.4130	0.99923
	8.048	68.470	1.6732	1.4387	1.1630	0.9307	0.98627		6.000	47.214	1.3430	1.2336	1.0887	1.3414	0.99739
	8.000	70.023	1.7114	1.4613	1.1712	0.9085	0.98440		8.000	50.131	1.4845	1.3236	1.1215	1.2651	0.99375
	6.000	78.660	1.8774	1.5569	1.2058	0.8111	0.97506		10.000	53.598	1.6491	1.4243	1.1578	1.1804	0.98738
	4.000	83.028	1.9283	1.5854	1.2163	0.7807	0.97182		12.000	58.240	1.8597	1.5469	1.2022	1.0758	0.97615
	2.000	86.644	1.9523	1.5988	1.2211	0.7662	0.97023		13.403	66.171	2.1787	1.7206	1.2663	0.9198	0.95362
									12.000	73.688	2.4151	1.8408	1.3120	0.8014	0.93367
									10.000	77.804	2.5112	1.8877	1.3302	0.7515	0.92496
1.40	2.000	48.173	1.1030	1.0725	1.0284	1.3295	0.99990		8.000	80.825	2.5650	1.9136	1.3404	0.7229	0.91995
	4.000	51.117	1.2189	1.1516	1.0584	1.2553	0.99921		6.000	83.385	2.5991	1.9298	1.3468	0.7045	0.91673
	6.000	54.633	1.3539	1.2406	1.0913	1.1737	0.99717		4.000	85.699	2.6205	1.9399	1.3508	0.6928	0.91470
	8.000	59.367	1.5263	1.3496	1.1309	1.0744	0.99235		2.000	87.879	2.6324	1.9455	1.3531	0.6862	0.91356
	9.427	67.716	1.7912	1.5077	1.1880	0.9266	0.98016								

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
1.60	2.000	40.724	1.1046	1.0736	1.0289	1.5323	0.99990
	4.000	42.931	1.2189	1.1516	1.0584	1.4638	0.99921
	6.000	45.344	1.3446	1.2346	1.0891	1.3934	0.99736
	8.000	48.030	1.4843	1.3236	1.1215	1.3195	0.99376
	10.000	51.116	1.6430	1.4207	1.1565	1.2397	0.98766
	12.000	54.889	1.8320	1.5311	1.1965	1.1483	0.97781
	14.000	60.537	2.0974	1.6777	1.2502	1.0232	0.95990
	14.652	65.828	2.3192	1.7929	1.2936	0.9188	0.94204
	14.000	70.895	2.5000	1.8824	1.3281	0.8320	0.92598
	12.000	75.900	2.6428	1.9504	1.3550	0.7611	0.91256
	10.000	79.102	2.7132	1.9831	1.3682	0.7250	0.90574
	8.000	81.691	2.7576	2.0035	1.3764	0.7018	0.90139
	6.000	83.967	2.7870	2.0168	1.3819	0.6862	0.89848
	4.000	86.061	2.8059	2.0254	1.3854	0.6761	0.89660
	2.000	88.054	2.8166	2.0302	1.3873	0.6703	0.89554
1.65	2.000	39.267	1.1058	1.0744	1.0292	1.5823	0.99990
	4.000	41.377	1.2212	1.1531	1.0590	1.5140	0.99919
	6.000	43.665	1.3475	1.2365	1.0898	1.4444	0.99730
	8.000	46.181	1.4869	1.3252	1.1221	1.3720	0.99367
	10.000	49.007	1.6429	1.4206	1.1565	1.2952	0.98766
	12.000	52.312	1.8224	1.5257	1.1945	1.2104	0.97837
	14.000	56.541	2.0441	1.6490	1.2396	1.1090	0.96384
	15.855	65.547	2.4653	1.8655	1.3215	0.9184	0.92915
	14.000	73.864	2.7642	2.0065	1.3776	0.7782	0.90073
	12.000	77.411	2.8587	2.0491	1.3951	0.7317	0.89132
	10.000	80.102	2.9157	2.0744	1.4056	0.7029	0.88557
	8.000	82.389	2.9539	2.0911	1.4126	0.6833	0.88169
	6.000	84.446	2.9798	2.1024	1.4174	0.6697	0.87904
	4.000	86.364	2.9968	2.1097	1.4205	0.6607	0.87730
	2.000	88.200	3.0065	2.1139	1.4222	0.6556	0.87631
1.70	2.000	37.927	1.1072	1.0754	1.0295	1.6320	0.99989
	4.000	39.957	1.2239	1.1550	1.0597	1.5638	0.99916
	6.000	42.145	1.3514	1.2390	1.0907	1.4946	0.99722
	8.000	44.528	1.4914	1.3280	1.1231	1.4232	0.99353
	10.000	47.167	1.6466	1.4228	1.1573	1.3482	0.98750
	12.000	50.168	1.8216	1.5252	1.1943	1.2674	0.97841
	14.000	53.771	2.0273	1.6399	1.2362	1.1757	0.96504
	16.000	58.794	2.2999	1.7831	1.2898	1.0569	0.94369
	17.012	65.319	2.6171	1.9383	1.3502	0.9185	0.91502
	16.000	71.426	2.8629	2.0510	1.3959	0.8077	0.89090
	14.000	75.670	2.9984	2.1104	1.4208	0.7439	0.87713
	12.000	78.555	3.0722	2.1421	1.4342	0.7080	0.86953
	10.000	80.906	3.1208	2.1626	1.4431	0.6838	0.86450
	8.000	82.965	3.1544	2.1767	1.4492	0.6667	0.86100
1.70	6.000	84.848	3.1778	2.1865	1.4534	0.6547	0.85856
	4.000	86.619	3.1933	2.1929	1.4562	0.6467	0.85695
	2.000	88.325	3.2021	2.1965	1.4578	0.6421	0.85602
1.75	2.000	36.689	1.1087	1.0765	1.0300	1.6816	0.99989
	4.000	38.651	1.2271	1.1571	1.0605	1.6133	0.99913
	6.000	40.756	1.3561	1.2421	1.0918	1.5441	0.99713
	8.000	43.034	1.4973	1.3317	1.1244	1.4733	0.99334
	10.000	45.531	1.6529	1.4266	1.1586	1.3995	0.98721
	12.000	48.319	1.8263	1.5279	1.1953	1.3210	0.97814
	14.000	51.547	2.0245	1.6384	1.2357	1.2348	0.96524
	16.000	55.589	2.2652	1.7654	1.2831	1.1329	0.94660
	18.000	62.944	2.6670	1.9617	1.3595	0.9645	0.91023
	18.121	65.134	2.7745	2.0112	1.3795	0.9189	0.89972
	18.000	67.269	2.8728	2.0554	1.3977	0.8766	0.88991
	16.000	73.757	3.1267	2.1651	1.4441	0.7635	0.86389
	14.000	76.988	3.2251	2.2060	1.4620	0.7175	0.85362
	12.000	79.465	3.2868	2.2312	1.4731	0.6878	0.84714
	10.000	81.570	3.3295	2.2484	1.4808	0.6669	0.84266
	8.000	83.451	3.3598	2.2606	1.4862	0.6518	0.83947
	6.000	85.190	3.3811	2.2691	1.4901	0.6409	0.83722
	4.000	86.838	3.3954	2.2748	1.4926	0.6337	0.83571
	2.000	88.432	3.4036	2.2780	1.4941	0.6295	0.83485
1.80	2.000	35.538	1.1104	1.0776	1.0304	1.7312	0.99988
	4.000	37.444	1.2306	1.1594	1.0613	1.6624	0.99909
	6.000	39.481	1.3615	1.2455	1.0931	1.5932	0.99701
	8.000	41.673	1.5044	1.3360	1.1260	1.5225	0.99310
	10.000	44.057	1.6611	1.4315	1.1604	1.4494	0.98683
	12.000	46.686	1.8345	1.5326	1.1970	1.3725	0.97766
	14.000	49.661	2.0295	1.6411	1.2367	1.2896	0.96489
	16.000	53.198	2.2568	1.7611	1.2815	1.1958	0.94729
	18.000	57.995	2.5516	1.9072	1.3379	1.0766	0.92120
	19.183	64.987	2.9376	2.0839	1.4096	0.9195	0.88335
	18.000	71.424	3.2297	2.2079	1.4628	0.7956	0.85313
	16.000	75.324	3.3707	2.2650	1.4882	0.7327	0.83832
	14.000	78.020	3.4505	2.2965	1.5025	0.6958	0.82990
	12.000	80.214	3.5041	2.3174	1.5121	0.6703	0.82423
	10.000	82.128	3.5424	2.3322	1.5189	0.6518	0.82018
	8.000	83.865	3.5702	2.3428	1.5239	0.6381	0.81725
	6.000	85.485	3.5899	2.3503	1.5274	0.6283	0.81516
	4.000	87.028	3.6032	2.3554	1.5298	0.6216	0.81376
	2.000	88.525	3.6108	2.3583	1.5311	0.6178	0.81295

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
1.85	2.000	34.466	1.1121	1.0788	1.0309	1.7805	0.99988
	4.000	36.323	1.2343	1.1619	1.0623	1.7114	0.99905
	6.000	38.302	1.3672	1.2492	1.0945	1.6418	0.99689
	8.000	40.424	1.5123	1.3409	1.1278	1.5711	0.99284
	10.000	42.717	1.6709	1.4373	1.1625	1.4983	0.98638
	12.000	45.223	1.8453	1.5388	1.1992	1.4224	0.97701
	14.000	48.014	2.0395	1.6465	1.2387	1.3415	0.96417
	16.000	51.232	2.2607	1.7631	1.2822	1.2524	0.94697
	18.000	55.227	2.5275	1.8956	1.3333	1.1476	0.92345
	20.000	62.099	2.9519	2.0902	1.4123	0.9818	0.88189
	20.198	64.872	3.1062	2.1565	1.4404	0.9205	0.86601
	20.000	67.544	3.2437	2.2136	1.4653	0.8648	0.85167
	18.000	73.440	3.5019	2.3165	1.5117	0.7560	0.82446
	16.000	76.511	3.6090	2.3576	1.5308	0.7085	0.81314
	14.000	78.861	3.6772	2.3833	1.5429	0.6773	0.80593
	12.000	80.844	3.7252	2.4011	1.5514	0.6548	0.80088
	10.000	82.606	3.7601	2.4140	1.5576	0.6381	0.79719
	8.000	84.222	3.7858	2.4234	1.5622	0.6257	0.79449
	6.000	85.740	3.8042	2.4301	1.5655	0.6166	0.79255
	4.000	87.193	3.8167	2.4346	1.5677	0.6105	0.79124
	2.000	88.606	3.8239	2.4373	1.5689	0.6069	0.79048
1.90	2.000	33.466	1.1140	1.0801	1.0314	1.8298	0.99987
	4.000	35.279	1.2382	1.1646	1.0633	1.7600	0.99901
	6.000	37.209	1.3735	1.2533	1.0959	1.6901	0.99675
	8.000	39.272	1.5209	1.3463	1.1297	1.6191	0.99254
	10.000	41.490	1.6818	1.4438	1.1649	1.5464	0.98586
	12.000	43.898	1.8582	1.5460	1.2019	1.4709	0.97624
	14.000	46.550	2.0530	1.6538	1.2414	1.3913	0.96319
	16.000	49.544	2.2718	1.7688	1.2844	1.3052	0.94605
	18.000	53.095	2.5263	1.8951	1.3331	1.2077	0.92356
	20.000	57.900	2.8557	2.0477	1.3946	1.0835	0.89162
	21.167	64.783	3.2805	2.2286	1.4720	0.9216	0.84781
	20.000	71.057	3.6012	2.3546	1.5294	0.7935	0.81397
	18.000	74.861	3.7578	2.4131	1.5572	0.7274	0.79744
	16.000	77.463	3.8466	2.4455	1.5729	0.6884	0.78810
	14.000	79.565	3.9068	2.4671	1.5836	0.6611	0.78178
	12.000	81.383	3.9504	2.4826	1.5913	0.6409	0.77721
	10.000	83.020	3.9828	2.4940	1.5970	0.6257	0.77383
	8.000	84.534	4.0068	2.5024	1.6012	0.6142	0.77133
	6.000	85.965	4.0241	2.5084	1.6042	0.6058	0.76953
	4.000	87.338	4.0359	2.5125	1.6063	0.6001	0.76830
	2.000	88.677	4.0428	2.5149	1.6075	0.5967	0.76759

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
1.95	2.000	32.528	1.1160	1.0815	1.0319	1.8790	0.99987
	4.000	34.304	1.2424	1.1674	1.0643	1.8085	0.99896
	6.000	36.191	1.3801	1.2575	1.0975	1.7380	0.99660
	8.000	38.204	1.5302	1.3521	1.1318	1.6666	0.99221
	10.000	40.360	1.6938	1.4509	1.1674	1.5938	0.98528
	12.000	42.688	1.8726	1.5542	1.2049	1.5185	0.97535
	14.000	45.230	2.0693	1.6625	1.2446	1.4396	0.96200
	16.000	48.059	2.2879	1.7770	1.2875	1.3553	0.94470
	18.000	51.320	2.5368	1.9001	1.3351	1.2622	0.92258
	20.000	55.381	2.8378	2.0397	1.3913	1.1520	0.89342
	22.000	62.860	3.3464	2.2553	1.4838	0.9655	0.84087
	22.092	64.716	3.4603	2.3003	1.5043	0.9229	0.82885
	22.000	66.523	3.5655	2.3410	1.5231	0.8829	0.81774
	20.000	72.926	3.8872	2.4601	1.5801	0.7555	0.78384
	18.000	75.964	4.0086	2.5030	1.6015	0.7045	0.77114
	16.000	78.253	4.0857	2.5297	1.6151	0.6710	0.76313
	14.000	80.165	4.1401	2.5484	1.6246	0.6467	0.75750
	12.000	81.849	4.1804	2.5620	1.6317	0.6283	0.75335
	10.000	83.381	4.2106	2.5722	1.6370	0.6142	0.75024
	8.000	84.808	4.2333	2.5798	1.6409	0.6036	0.74791
	6.000	86.163	4.2497	2.5853	1.6438	0.5957	0.74623
	4.000	87.467	4.2609	2.5890	1.6458	0.5904	0.74508
	2.000	88.741	4.2674	2.5912	1.6469	0.5872	0.74441
2.00	2.000	31.647	1.1180	1.0829	1.0324	1.9280	0.99986
	4.000	33.390	1.2468	1.1702	1.0654	1.8568	0.99891
	6.000	35.241	1.3871	1.2620	1.0991	1.7856	0.99644
	8.000	37.210	1.5400	1.3581	1.1339	1.7138	0.99186
	10.000	39.314	1.7066	1.4584	1.1702	1.6405	0.98464
	12.000	41.575	1.8884	1.5631	1.2081	1.5651	0.97437
	14.000	44.029	2.0876	1.6724	1.2483	1.4866	0.96064
	16.000	46.731	2.3076	1.7870	1.2913	1.4034	0.94304
	18.000	49.785	2.5546	1.9086	1.3384	1.3131	0.92092
	20.000	53.423	2.8429	2.0420	1.3922	1.2102	0.89291
	22.000	58.457	3.2228	2.2051	1.4616	1.0760	0.85385
	22.974	64.669	3.6458	2.3715	1.5373	0.9243	0.80926
	22.000	70.332	3.9714	2.4899	1.5950	0.8017	0.77503
	20.000	74.270	4.1570	2.5541	1.6276	0.7278	0.75576
	18.000	76.862	4.2589	2.5883	1.6454	0.6854	0.74529
	16.000	78.921	4.3277	2.6110	1.6574	0.6558	0.73827
	14.000	80.684	4.3777	2.6274	1.6662	0.6337	0.73319
	12.000	82.257	4.4153	2.6396	1.6727	0.6168	0.72939
	10.000	83.700	4.4438	2.6487	1.6777	0.6037	0.72652
	8.000	85.052	4.4653	2.6556	1.6815	0.5937	0.72436
	6.000	86.339	4.4810	2.6606	1.6842	0.5864	0.72278
	4.000	87.582	4.4917	2.6640	1.6861	0.5813	0.72171
	2.000	88.798	4.4979	2.6660	1.6871	0.5783	0.72108

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.05	2.000	30.816	1.1200	1.0843	1.0330	1.9771	0.99985
	4.000	32.532	1.2512	1.1732	1.0665	1.9050	0.99885
	6.000	34.350	1.3943	1.2666	1.1008	1.8330	0.99627
	8.000	36.281	1.5502	1.3644	1.1362	1.7605	0.99148
	10.000	38.341	1.7201	1.4664	1.1730	1.6868	0.98396
	12.000	40.547	1.9053	1.5726	1.2116	1.6111	0.97330
	14.000	42.928	2.1076	1.6831	1.2522	1.5326	0.95914
	16.000	45.528	2.3300	1.7983	1.2956	1.4500	0.94112
	18.000	48.428	2.5774	1.9195	1.3427	1.3614	0.91878
	20.000	51.785	2.8600	2.0497	1.3953	1.2630	0.89120
	22.000	56.032	3.2057	2.1980	1.4585	1.1444	0.85565
	23.814	64.638	3.8367	2.4419	1.5712	0.9257	0.78913
	22.000	72.193	4.2777	2.5946	1.6487	0.7626	0.74336
	20.000	75.324	4.4215	2.6416	1.6738	0.7056	0.72876
	18.000	77.614	4.5107	2.6700	1.6894	0.6688	0.71981
	16.000	79.498	4.5734	2.6898	1.7003	0.6422	0.71356
	14.000	81.138	4.6199	2.7043	1.7084	0.6219	0.70894
	12.000	82.617	4.6553	2.7152	1.7145	0.6062	0.70545
	10.000	83.983	4.6824	2.7236	1.7192	0.5939	0.70278
	8.000	85.269	4.7029	2.7299	1.7228	0.5846	0.70077
	6.000	86.497	4.7179	2.7344	1.7254	0.5776	0.69930
	4.000	87.685	4.7283	2.7376	1.7272	0.5728	0.69829
	2.000	88.849	4.7343	2.7394	1.7282	0.5700	0.69770
2.10	2.000	30.033	1.1222	1.0858	1.0335	2.0260	0.99984
	4.000	31.723	1.2558	1.1763	1.0676	1.9530	0.99880
	6.000	33.513	1.4017	1.2714	1.1025	1.8801	0.99609
	8.000	35.412	1.5608	1.3709	1.1386	1.8069	0.99108
	10.000	37.433	1.7342	1.4746	1.1760	1.7325	0.98324
	12.000	39.592	1.9230	1.5825	1.2152	1.6564	0.97216
	14.000	41.912	2.1290	1.6944	1.2565	1.5777	0.95750
	16.000	44.430	2.3547	1.8107	1.3004	1.4954	0.93899
	18.000	47.210	2.6041	1.9322	1.3478	1.4078	0.91626
	20.000	50.365	2.8848	2.0607	1.3999	1.3122	0.88870
	22.000	54.169	3.2152	2.2019	1.4602	1.2019	0.85466
	24.000	59.767	3.6739	2.3820	1.5424	1.0493	0.80628
	24.614	64.621	4.0332	2.5116	1.6058	0.9273	0.76858
	24.000	69.104	4.3238	2.6098	1.6568	0.8245	0.73867
	22.000	73.521	4.5644	2.6870	1.6987	0.7345	0.71445
	20.000	76.189	4.6852	2.7244	1.7197	0.6870	0.70251
	18.000	78.257	4.7652	2.7488	1.7336	0.6543	0.69468
	16.000	80.001	4.8232	2.7662	1.7436	0.6299	0.68906
	14.000	81.539	4.8669	2.7792	1.7512	0.6111	0.68484
	12.000	82.938	4.9006	2.7892	1.7570	0.5964	0.68162
	10.000	84.237	4.9264	2.7968	1.7615	0.5849	0.67914
	8.000	85.463	4.9461	2.8025	1.7649	0.5760	0.67726
	6.000	86.638	4.9606	2.8068	1.7674	0.5694	0.67588
2.10	4.000	87.778	4.9706	2.8097	1.7691	0.5648	0.67494
	2.000	88.894	4.9764	2.8113	1.7701	0.5622	0.67438
2.15	2.000	29.293	1.1243	1.0872	1.0341	2.0749	0.99984
	4.000	30.960	1.2606	1.1794	1.0688	2.0008	0.99874
	6.000	32.725	1.4094	1.2763	1.1043	1.9271	0.99590
	8.000	34.596	1.5719	1.3777	1.1410	1.8529	0.99065
	10.000	36.584	1.7490	1.4833	1.1791	1.7778	0.98246
	12.000	38.702	1.9417	1.5929	1.2190	1.7011	0.97093
	14.000	40.971	2.1518	1.7065	1.2610	1.6221	0.95574
	16.000	43.422	2.3813	1.8241	1.3055	1.5397	0.93666
	18.000	46.104	2.6337	1.9461	1.3533	1.4527	0.91343
	20.000	49.106	2.9150	2.0740	1.4055	1.3588	0.88564
	22.000	52.618	3.2384	2.2115	1.4644	1.2534	0.85222
	24.000	57.217	3.6452	2.3712	1.5372	1.1223	0.80932
	25.376	64.616	4.2352	2.5804	1.6413	0.9289	0.74772
	24.000	71.164	4.6641	2.7180	1.7160	0.7794	0.70458
	22.000	74.564	4.8442	2.7725	1.7472	0.7122	0.68703
	20.000	76.920	4.9500	2.8037	1.7656	0.6709	0.67689
	18.000	78.817	5.0234	2.8249	1.7782	0.6413	0.66994
	16.000	80.444	5.0776	2.8405	1.7876	0.6188	0.66484
	14.000	81.896	5.1191	2.8523	1.7947	0.6012	0.66097
	12.000	83.224	5.1512	2.8613	1.8003	0.5874	0.65798
	10.000	84.464	5.1761	2.8683	1.8046	0.5765	0.65568
	8.000	85.639	5.1951	2.8736	1.8078	0.5680	0.65392
	6.000	86.767	5.2091	2.8775	1.8103	0.5617	0.65263
	4.000	87.862	5.2187	2.8802	1.8119	0.5574	0.65174
	2.000	88.936	5.2244	2.8818	1.8129	0.5548	0.65122
2.20	2.000	28.592	1.1266	1.0888	1.0347	2.1237	0.99983
	4.000	30.238	1.2654	1.1826	1.0700	2.0485	0.99867
	6.000	31.981	1.4173	1.2813	1.1061	1.9738	0.99569
	8.000	33.827	1.5832	1.3845	1.1435	1.8987	0.99020
	10.000	35.785	1.7641	1.4921	1.1823	1.8228	0.98165
	12.000	37.869	1.9611	1.6036	1.2229	1.7454	0.96964
	14.000	40.095	2.1756	1.7190	1.2656	1.6657	0.95387
	16.000	42.489	2.4095	1.8380	1.3109	1.5831	0.93417
	18.000	45.092	2.6658	1.9611	1.3593	1.4963	0.91035
	20.000	47.975	2.9494	2.0891	1.4118	1.4035	0.88215
	22.000	51.277	3.2704	2.2245	1.4701	1.3013	0.84887
	24.000	55.356	3.6552	2.3750	1.5390	1.1805	0.80826
	26.000	62.695	4.2918	2.5992	1.6512	0.9795	0.74193
	26.103	64.620	4.4426	2.6484	1.6775	0.9305	0.72663
	26.000	66.480	4.5807	2.6921	1.7015	0.8849	0.71283
	24.000	72.560	4.9728	2.8103	1.7695	0.7490	0.67473
	22.000	75.420	5.1222	2.8531	1.7953	0.6936	0.66068

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.20	20.000	77.549	5.2175	2.8799	1.8117	0.6568	0.65185
	18.000	79.308	5.2856	2.8987	1.8234	0.6296	0.64562
	16.000	80.839	5.3369	2.9127	1.8323	0.6086	0.64096
	14.000	82.216	5.3764	2.9235	1.8391	0.5921	0.63739
	12.000	83.483	5.4073	2.9318	1.8444	0.5789	0.63462
	10.000	84.670	5.4313	2.9382	1.8485	0.5686	0.63247
	8.000	85.798	5.4497	2.9431	1.8517	0.5605	0.63083
	6.000	86.883	5.4633	2.9468	1.8540	0.5545	0.62962
	4.000	87.938	5.4727	2.9493	1.8556	0.5503	0.62879
	2.000	88.973	5.4782	2.9507	1.8565	0.5479	0.62830
2.25	2.000	27.926	1.1288	1.0903	1.0353	2.1725	0.99982
	4.000	29.555	1.2703	1.1859	1.0712	2.0962	0.99861
	6.000	31.277	1.4254	1.2864	1.1080	2.0203	0.99548
	8.000	33.102	1.5949	1.3916	1.1461	1.9443	0.98973
	10.000	35.034	1.7798	1.5011	1.1856	1.8674	0.98079
	12.000	37.088	1.9812	1.6147	1.2270	1.7891	0.96827
	14.000	39.277	2.2004	1.7319	1.2705	1.7088	0.95189
	16.000	41.623	2.4392	1.8527	1.3166	1.6257	0.93152
	18.000	44.161	2.7000	1.9770	1.3657	1.5388	0.90703
	20.000	46.948	2.9871	2.1055	1.4187	1.4466	0.87829
	22.000	50.091	3.3085	2.2400	1.4770	1.3464	0.84486
	24.000	53.837	3.6830	2.3854	1.5440	1.2318	0.80532
	26.000	59.122	4.1839	2.5632	1.6323	1.0792	0.75298
	26.795	64.633	4.6556	2.7153	1.7145	0.9321	0.70542
	26.000	69.627	5.0238	2.8250	1.7783	0.8115	0.66991
	24.000	73.634	5.2707	2.8946	1.8209	0.7254	0.64698
	22.000	76.145	5.4009	2.9301	1.8433	0.6775	0.63519
	20.000	78.098	5.4884	2.9534	1.8583	0.6441	0.62739
	18.000	79.744	5.5523	2.9703	1.8693	0.6189	0.62175
	16.000	81.192	5.6011	2.9830	1.8776	0.5993	0.61749
	14.000	82.504	5.6391	2.9929	1.8842	0.5836	0.61418
	12.000	83.716	5.6688	3.0006	1.8893	0.5711	0.61161
	10.000	84.856	5.6921	3.0065	1.8932	0.5612	0.60960
	8.000	85.942	5.7100	3.0111	1.8963	0.5535	0.60806
	6.000	86.988	5.7233	3.0145	1.8986	0.5477	0.60692
	4.000	88.007	5.7324	3.0168	1.9002	0.5437	0.60614
	2.000	89.008	5.7378	3.0182	1.9011	0.5413	0.60568
2.30	2.000	27.294	1.1311	1.0919	1.0359	2.2212	0.99981
	4.000	28.906	1.2753	1.1892	1.0724	2.1437	0.99854
	6.000	30.611	1.4336	1.2916	1.1099	2.0667	0.99526
	8.000	32.415	1.6068	1.3988	1.1487	1.9896	0.98923
	10.000	34.326	1.7959	1.5104	1.1890	1.9117	0.97989
	12.000	36.354	2.0019	1.6260	1.2311	1.8325	0.96684
	14.000	38.510	2.2261	1.7452	1.2755	1.7514	0.94982

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.30	16.000	40.816	2.4701	1.8678	1.3224	1.6676	0.92872
	18.000	43.299	2.7360	1.9936	1.3724	1.5804	0.90351
	20.000	46.007	3.0276	2.1230	1.4261	1.4885	0.87413
	22.000	49.026	3.3514	2.2573	1.4847	1.3894	0.84035
	24.000	52.536	3.7216	2.3998	1.5508	1.2788	0.80125
	26.000	57.077	4.1819	2.5625	1.6319	1.1425	0.75319
	27.454	64.653	4.8739	2.7813	1.7524	0.9338	0.68417
	26.000	71.264	5.3682	2.9212	1.8377	0.7743	0.63813
	24.000	74.512	5.5649	2.9736	1.8714	0.7060	0.62065
	22.000	76.770	5.6817	3.0039	1.8915	0.6635	0.61049
	20.000	78.582	5.7631	3.0246	1.9054	0.6328	0.60352
	18.000	80.133	5.8238	3.0399	1.9158	0.6092	0.59838
	16.000	81.509	5.8705	3.0515	1.9238	0.5906	0.59445
	14.000	82.764	5.9071	3.0606	1.9301	0.5757	0.59139
	12.000	83.928	5.9360	3.0677	1.9350	0.5638	0.58899
	10.000	85.026	5.9586	3.0732	1.9389	0.5543	0.58712
	8.000	86.074	5.9761	3.0775	1.9419	0.5469	0.58568
	6.000	87.085	5.9890	3.0807	1.9441	0.5413	0.58461
	4.000	88.070	5.9980	3.0828	1.9456	0.5374	0.58387
	2.000	89.039	6.0033	3.0841	1.9465	0.5352	0.58344
2.35	2.000	26.692	1.1334	1.0935	1.0365	2.2698	0.99980
	4.000	28.289	1.2804	1.1926	1.0736	2.1911	0.99846
	6.000	29.979	1.4420	1.2970	1.1118	2.1129	0.99502
	8.000	31.765	1.6189	1.4062	1.1513	2.0346	0.98872
	10.000	33.657	1.8124	1.5199	1.1924	1.9557	0.97895
	12.000	35.662	2.0232	1.6376	1.2354	1.8755	0.96534
	14.000	37.790	2.2526	1.7589	1.2807	1.7934	0.94765
	16.000	40.060	2.5021	1.8833	1.3285	1.7089	0.92580
	18.000	42.497	2.7736	2.0108	1.3794	1.6212	0.89981
	20.000	45.140	3.0705	2.1413	1.4339	1.5291	0.86971
	22.000	48.059	3.3981	2.2759	1.4931	1.4308	0.83542
	24.000	51.393	3.7677	2.4168	1.5590	1.3227	0.79639
	26.000	55.500	4.2092	2.5717	1.6367	1.1954	0.75038
	28.000	62.973	4.9459	2.8024	1.7648	0.9810	0.67729
	28.082	64.679	5.0977	2.8462	1.7911	0.9354	0.66296
	28.000	66.328	5.2377	2.8855	1.8152	0.8927	0.65000
	26.000	72.454	5.6907	3.0062	1.8930	0.7474	0.60972
	24.000	75.251	5.8587	3.0486	1.9218	0.6895	0.59544
	22.000	77.317	5.9657	3.0750	1.9401	0.6510	0.58653
	20.000	79.014	6.0423	3.0936	1.9532	0.6224	0.58024
	18.000	80.483	6.1001	3.1075	1.9631	0.6002	0.57554
	16.000	81.798	6.1451	3.1182	1.9707	0.5826	0.57191
	14.000	83.001	6.1806	3.1266	1.9768	0.5683	0.56907
	12.000	84.122	6.2087	3.1332	1.9816	0.5569	0.56683
	10.000	85.182	6.2308	3.1384	1.9854	0.5478	0.56508
	8.000	86.195	6.2479	3.1424	1.9883	0.5406	0.56372

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.35	6.000	87.174	6.2606	3.1453	1.9904	0.5353	0.56272
	4.000	88.129	6.2694	3.1474	1.9919	0.5315	0.56203
	2.000	89.068	6.2745	3.1486	1.9928	0.5293	0.56162
2.40	2.000	26.120	1.1358	1.0951	1.0371	2.3184	0.99979
	4.000	27.702	1.2856	1.1960	1.0749	2.2383	0.99839
	6.000	29.377	1.4505	1.3023	1.1138	2.1589	0.99478
	8.000	31.149	1.6314	1.4137	1.1540	2.0794	0.98818
	10.000	33.023	1.8292	1.5295	1.1959	1.9994	0.97797
	12.000	35.007	2.0450	1.6495	1.2398	1.9181	0.96377
	14.000	37.112	2.2798	1.7729	1.2860	1.8350	0.94538
	16.000	39.351	2.5351	1.8993	1.3348	1.7497	0.92274
	18.000	41.748	2.8128	2.0285	1.3866	1.6613	0.89592
	20.000	44.336	3.1155	2.1604	1.4421	1.5689	0.86505
	22.000	47.174	3.4480	2.2955	1.5021	1.4709	0.83015
	24.000	50.371	3.8196	2.4357	1.5682	1.3644	0.79093
	26.000	54.184	4.2521	2.5861	1.6442	1.2426	0.74598
	28.000	59.656	4.8382	2.7707	1.7462	1.0779	0.68761
	28.681	64.710	5.3269	2.9100	1.8305	0.9370	0.64187
	28.000	69.291	5.7130	3.0119	1.8968	0.8201	0.60781
	26.000	73.400	6.0048	3.0845	1.9468	0.7260	0.58331
	24.000	75.889	6.1539	3.1203	1.9722	0.6751	0.57121
	22.000	77.803	6.2534	3.1436	1.9892	0.6397	0.56329
	20.000	79.402	6.3260	3.1605	2.0016	0.6129	0.55758
	18.000	80.800	6.3816	3.1732	2.0111	0.5919	0.55326
	16.000	82.059	6.4251	3.1831	2.0185	0.5751	0.54990
	14.000	83.217	6.4596	3.1909	2.0244	0.5615	0.54726
	12.000	84.299	6.4870	3.1971	2.0290	0.5505	0.54517
	10.000	85.324	6.5087	3.2019	2.0327	0.5416	0.54352
	8.000	86.306	6.5254	3.2057	2.0356	0.5348	0.54225
	6.000	87.255	6.5379	3.2085	2.0377	0.5296	0.54131
	4.000	88.182	6.5466	3.2104	2.0392	0.5260	0.54065
	2.000	89.094	6.5517	3.2115	2.0400	0.5238	0.54027
2.45	2.000	25.572	1.1381	1.0968	1.0377	2.3670	0.99978
	4.000	27.143	1.2908	1.1994	1.0762	2.2855	0.99831
	6.000	28.805	1.4591	1.3078	1.1157	2.2048	0.99453
	8.000	30.563	1.6440	1.4212	1.1567	2.1241	0.98761
	10.000	32.422	1.8463	1.5393	1.1994	2.0428	0.97695
	12.000	34.388	2.0672	1.6615	1.2442	1.9603	0.96215
	14.000	36.472	2.3078	1.7871	1.2914	1.8762	0.94302
	16.000	38.685	2.5692	1.9156	1.3412	1.7898	0.91955
	18.000	41.047	2.8532	2.0466	1.3941	1.7006	0.89187
	20.000	43.588	3.1623	2.1800	1.4506	1.6077	0.86018
	22.000	46.358	3.5007	2.3160	1.5115	1.5097	0.82459
	24.000	49.445	3.8759	2.4560	1.5781	1.4042	0.78502
2.45	26.000	53.045	4.3053	2.6037	1.6535	1.2861	0.74055
	28.000	57.780	4.8455	2.7729	1.7475	1.1385	0.68691
	29.253	64.744	5.5614	2.9727	1.8708	0.9386	0.62095
	28.000	70.828	6.0810	3.1029	1.9598	0.7837	0.57709
	26.000	74.185	6.3161	3.1582	1.9999	0.7082	0.55836
	24.000	76.446	6.4516	3.1891	2.0230	0.6623	0.54787
	22.000	78.236	6.5451	3.2101	2.0389	0.6294	0.54076
	20.000	79.752	6.6146	3.2254	2.0508	0.6042	0.53555
	18.000	81.089	6.6682	3.2372	2.0599	0.5842	0.53157
	16.000	82.299	6.7105	3.2464	2.0671	0.5681	0.52845
	14.000	83.416	6.7442	3.2536	2.0728	0.5550	0.52599
	12.000	84.462	6.7710	3.2594	2.0774	0.5444	0.52403
	10.000	85.455	6.7923	3.2640	2.0810	0.5359	0.52249
	8.000	86.408	6.8088	3.2675	2.0838	0.5292	0.52129
	6.000	87.331	6.8211	3.2701	2.0859	0.5242	0.52041
	4.000	88.232	6.8296	3.2719	2.0873	0.5207	0.51979
	2.000	89.119	6.8346	3.2730	2.0882	0.5186	0.51943
2.50	2.000	25.050	1.1405	1.0984	1.0384	2.4155	0.99977
	4.000	26.609	1.2961	1.2029	1.0775	2.3326	0.99822
	6.000	28.259	1.4679	1.3133	1.1177	2.2505	0.99427
	8.000	30.005	1.6568	1.4289	1.1595	2.1685	0.98703
	10.000	31.851	1.8639	1.5493	1.2031	2.0859	0.97589
	12.000	33.802	2.0900	1.6737	1.2488	2.0022	0.96046
	14.000	35.866	2.3364	1.8015	1.2969	1.9169	0.94057
	16.000	38.057	2.6042	1.9322	1.3478	1.8295	0.91625
	18.000	40.389	2.8949	2.0652	1.4018	1.7394	0.88767
	20.000	42.890	3.2109	2.2002	1.4594	1.6458	0.85510
	22.000	45.602	3.5558	2.3373	1.5213	1.5475	0.81877
	24.000	48.600	3.9361	2.4775	1.5887	1.4426	0.77871
	26.000	52.036	4.3657	2.6235	1.6641	1.3268	0.73441
	28.000	56.335	4.8844	2.7844	1.7542	1.1888	0.68317
	29.797	64.782	5.8014	3.0342	1.9120	0.9402	0.60027
	28.000	71.949	6.4249	3.1831	2.0185	0.7573	0.54992
	26.000	74.856	6.6273	3.2282	2.0529	0.6928	0.53460
	24.000	76.939	6.7526	3.2555	2.0742	0.6509	0.52537
	22.000	78.625	6.8414	3.2744	2.0893	0.6201	0.51894
	20.000	80.070	6.9082	3.2885	2.1007	0.5962	0.51417
	18.000	81.353	6.9602	3.2994	2.1095	0.5770	0.51048
	16.000	82.518	7.0014	3.3080	2.1165	0.5616	0.50759
	14.000	83.598	7.0343	3.3148	2.1221	0.5489	0.50528
	12.000	84.612	7.0607	3.3202	2.1266	0.5387	0.50345
	10.000	85.576	7.0816	3.3245	2.1301	0.5304	0.50200
	8.000	86.502	7.0979	3.3278	2.1329	0.5240	0.50088
	6.000	87.400	7.1100	3.3303	2.1350	0.5191	0.50005
	4.000	88.277	7.1184	3.3320	2.1364	0.5157	0.49947
	2.000	89.142	7.1234	3.3330	2.1372	0.5137	0.49913

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.55	2.000	24.550	1.1429	1.1001	1.0390	2.4639	0.99976
	4.000	26.099	1.3015	1.2065	1.0788	2.3796	0.99814
	6.000	27.739	1.4768	1.3189	1.1198	2.2961	0.99399
	8.000	29.474	1.6699	1.4367	1.1623	2.2128	0.98642
	10.000	31.307	1.8817	1.5593	1.2067	2.1288	0.97479
	12.000	33.244	2.1133	1.6861	1.2534	2.0438	0.95871
	14.000	35.293	2.3656	1.8162	1.3025	1.9573	0.93803
	16.000	37.463	2.6399	1.9490	1.3545	1.8687	0.91283
	18.000	39.770	2.9378	2.0840	1.4097	1.7776	0.88333
	20.000	42.236	3.2611	2.2207	1.4685	1.6832	0.84985
	22.000	44.899	3.6130	2.3591	1.5315	1.5845	0.81272
	24.000	47.822	3.9995	2.4998	1.5999	1.4797	0.77209
	26.000	51.130	4.4319	2.6449	1.6756	1.3655	0.72772
	28.000	55.131	4.9401	2.8007	1.7638	1.2334	0.67784
	30.000	61.449	5.6866	3.0051	1.8923	1.0385	0.61007
	30.317	64.823	6.0466	3.0946	1.9539	0.9418	0.57989
	30.000	67.966	6.3519	3.1664	2.0060	0.8568	0.55557
	28.000	72.844	6.7595	3.2569	2.0754	0.7364	0.52487
	26.000	75.440	6.9402	3.2952	2.1061	0.6793	0.51190
	24.000	77.380	7.0575	3.3195	2.1260	0.6405	0.50368
	22.000	78.978	7.1423	3.3368	2.1404	0.6115	0.49783
	20.000	80.360	7.2068	3.3499	2.1514	0.5887	0.49343
	18.000	81.594	7.2575	3.3600	2.1600	0.5703	0.49002
	16.000	82.720	7.2978	3.3680	2.1668	0.5554	0.48732
	14.000	83.766	7.3301	3.3744	2.1723	0.5432	0.48517
	12.000	84.750	7.3561	3.3795	2.1767	0.5333	0.48345
	10.000	85.688	7.3767	3.3835	2.1802	0.5253	0.48209
	8.000	86.590	7.3927	3.3866	2.1829	0.5190	0.48104
	6.000	87.464	7.4047	3.3890	2.1849	0.5142	0.48025
	4.000	88.320	7.4131	3.3906	2.1864	0.5109	0.47971
	2.000	89.163	7.4180	3.3916	2.1872	0.5090	0.47939
2.60	2.000	24.071	1.1454	1.1017	1.0396	2.5123	0.99975
	4.000	25.611	1.3070	1.2100	1.0801	2.4265	0.99805
	6.000	27.241	1.4858	1.3245	1.1218	2.3416	0.99371
	8.000	28.966	1.6831	1.4445	1.1651	2.2568	0.98579
	10.000	30.789	1.8998	1.5695	1.2105	2.1715	0.97365
	12.000	32.714	2.1369	1.6986	1.2580	2.0852	0.95690
	14.000	34.749	2.3955	1.8311	1.3082	1.9973	0.93541
	16.000	36.901	2.6767	1.9662	1.3613	1.9075	0.90930
	18.000	39.185	2.9817	2.1032	1.4177	1.8152	0.87884
	20.000	41.621	3.3126	2.2417	1.4778	1.7199	0.84443
	22.000	44.242	3.6723	2.3814	1.5421	1.6205	0.80645
	24.000	47.102	4.0658	2.5229	1.6116	1.5157	0.76520
	26.000	50.305	4.5028	2.6675	1.6880	1.4025	0.72060
	28.000	54.088	5.0067	2.8201	1.7754	1.2744	0.67151
	30.000	59.352	5.6706	3.0010	1.8896	1.1062	0.61145
2.60	30.814	64.866	6.2972	3.1538	1.9967	0.9433	0.55984
	30.000	69.778	6.7777	3.2609	2.0785	0.8111	0.52354
	28.000	73.590	7.0906	3.3263	2.1317	0.7189	0.50138
	26.000	75.955	7.2555	3.3596	2.1596	0.6673	0.49015
	24.000	77.778	7.3665	3.3815	2.1785	0.6311	0.48276
	22.000	79.299	7.4481	3.3974	2.1923	0.6035	0.47742
	20.000	80.626	7.5108	3.4095	2.2029	0.5817	0.47336
	18.000	81.815	7.5602	3.4189	2.2113	0.5641	0.47020
	16.000	82.906	7.5997	3.4264	2.2180	0.5497	0.46768
	14.000	83.922	7.6316	3.4324	2.2234	0.5378	0.46566
	12.000	84.879	7.6572	3.4372	2.2277	0.5282	0.46405
	10.000	85.792	7.6775	3.4411	2.2312	0.5204	0.46277
	8.000	86.671	7.6934	3.4440	2.2338	0.5143	0.46178
	6.000	87.524	7.7053	3.4462	2.2359	0.5096	0.46104
	4.000	88.359	7.7135	3.4478	2.2372	0.5064	0.46053
	2.000	89.183	7.7184	3.4487	2.2381	0.5045	0.46022
2.65	2.000	23.613	1.1479	1.1034	1.0403	2.5607	0.99973
	4.000	25.144	1.3124	1.2136	1.0814	2.4734	0.99796
	6.000	26.766	1.4950	1.3302	1.1239	2.3869	0.99341
	8.000	28.482	1.6966	1.4525	1.1680	2.3007	0.98514
	10.000	30.295	1.9182	1.5798	1.2142	2.2139	0.97247
	12.000	32.210	2.1610	1.7113	1.2628	2.1262	0.95502
	14.000	34.232	2.4260	1.8462	1.3141	2.0370	0.93270
	16.000	36.368	2.7141	1.9835	1.3683	1.9459	0.90566
	18.000	38.632	3.0267	2.1226	1.4259	1.8524	0.87423
	20.000	41.043	3.3657	2.2630	1.4873	1.7560	0.83884
	22.000	43.627	3.7335	2.4042	1.5529	1.6559	0.80000
	24.000	46.433	4.1347	2.5465	1.6237	1.5507	0.75806
	26.000	49.549	4.5776	2.6911	1.7010	1.4380	0.71313
	28.000	53.164	5.0815	2.8416	1.7883	1.3126	0.66448
	30.000	57.877	5.7097	3.0110	1.8963	1.1576	0.60809
	31.288	64.910	6.5531	3.2118	2.0403	0.9447	0.54016
	30.000	70.983	7.1564	3.3397	2.1428	0.7814	0.49687
	28.000	74.230	7.4211	3.3922	2.1877	0.7039	0.47918
	26.000	76.415	7.5742	3.4216	2.2137	0.6565	0.46930
	24.000	78.138	7.6801	3.4415	2.2316	0.6224	0.46262
	22.000	79.592	7.7589	3.4562	2.2449	0.5962	0.45771
	20.000	80.870	7.8200	3.4674	2.2553	0.5752	0.45396
	18.000	82.020	7.8684	3.4763	2.2634	0.5582	0.45101
	16.000	83.079	7.9073	3.4833	2.2700	0.5442	0.44866
	14.000	84.066	7.9387	3.4890	2.2753	0.5327	0.44677
	12.000	84.998	7.9640	3.4935	2.2796	0.5234	0.44526
	10.000	85.888	7.9841	3.4972	2.2830	0.5158	0.44406
	8.000	86.746	7.9999	3.5000	2.2857	0.5098	0.44312
	6.000	87.579	8.0116	3.5021	2.2877	0.5053	0.44242

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.65	4.000	88.396	8.0198	3.5035	2.2891	0.5021	0.44194
	2.000	89.200	8.0247	3.5044	2.2899	0.5003	0.44165
2.70	2.000	23.173	1.1503	1.1051	1.0409	2.6090	0.99972
	4.000	24.696	1.3179	1.2172	1.0827	2.5201	0.99786
	6.000	26.311	1.5042	1.3360	1.1260	2.4321	0.99311
	8.000	28.019	1.7102	1.4605	1.1709	2.3444	0.98446
	10.000	29.824	1.9369	1.5902	1.2180	2.2561	0.97125
	12.000	31.728	2.1855	1.7241	1.2676	2.1669	0.95309
	14.000	33.739	2.4569	1.8614	1.3199	2.0763	0.92991
	16.000	35.862	2.7523	2.0010	1.3754	1.9838	0.90191
	18.000	38.109	3.0727	2.1423	1.4343	1.8890	0.86948
	20.000	40.496	3.4200	2.2845	1.4970	1.7915	0.83311
	22.000	43.049	3.7964	2.4273	1.5641	1.6905	0.79337
	24.000	45.809	4.2059	2.5706	1.6362	1.5848	0.75072
	26.000	48.852	4.6560	2.7155	1.7146	1.4723	0.70538
	28.000	52.334	5.1626	2.8645	1.8022	1.3488	0.65692
	30.000	56.687	5.7730	3.0271	1.9071	1.2018	0.60268
	31.741	64.956	6.8143	3.2687	2.0847	0.9462	0.52090
	30.000	71.913	7.5186	3.4110	2.2042	0.7587	0.47286
	28.000	74.790	7.7529	3.4551	2.2439	0.6907	0.45808
	26.000	76.828	7.8967	3.4814	2.2682	0.6468	0.44930
	24.000	78.466	7.9983	3.4997	2.2854	0.6145	0.44321
	22.000	79.862	8.0748	3.5133	2.2984	0.5893	0.43870
	20.000	81.095	8.1345	3.5238	2.3085	0.5691	0.43522
	18.000	82.210	8.1821	3.5321	2.3165	0.5527	0.43247
	16.000	83.238	8.2204	3.5388	2.3230	0.5391	0.43027
	14.000	84.199	8.2515	3.5441	2.3282	0.5279	0.42850
	12.000	85.109	8.2765	3.5484	2.3324	0.5188	0.42708
	10.000	85.978	8.2965	3.5518	2.3358	0.5114	0.42595
	8.000	86.816	8.3121	3.5545	2.3385	0.5056	0.42506
	6.000	87.631	8.3238	3.5565	2.3404	0.5012	0.42441
	4.000	88.430	8.3319	3.5579	2.3418	0.4981	0.42395
	2.000	89.218	8.3367	3.5587	2.3426	0.4962	0.42368
2.75	2.000	22.750	1.1528	1.1068	1.0415	2.6573	0.99971
	4.000	24.267	1.3236	1.2209	1.0841	2.5667	0.99776
	6.000	25.873	1.5135	1.3417	1.1280	2.4772	0.99279
	8.000	27.575	1.7239	1.4686	1.1738	2.3879	0.98377
	10.000	29.372	1.9558	1.6007	1.2219	2.2982	0.96999
	12.000	31.269	2.2104	1.7371	1.2724	2.2074	0.95109
	14.000	33.269	2.4885	1.8768	1.3259	2.1153	0.92704
	16.000	35.381	2.7912	2.0188	1.3826	2.0213	0.89806
	18.000	37.612	3.1197	2.1622	1.4429	1.9253	0.86461
	20.000	39.980	3.4757	2.3063	1.5070	1.8265	0.82724
	22.000	42.504	3.8610	2.4506	1.5755	1.7245	0.78659
2.75	24.000	45.225	4.2794	2.5951	1.6490	1.6181	0.74319
	26.000	48.206	4.7375	2.7404	1.7288	1.5056	0.69739
	28.000	51.579	5.2490	2.8886	1.8171	1.3832	0.64896
	30.000	55.674	5.8507	3.0466	1.9204	1.2416	0.59611
	32.000	62.549	6.7812	3.2616	2.0791	1.0209	0.52329
	32.173	65.002	7.0807	3.3243	2.1300	0.9476	0.50207
	32.000	67.323	7.3448	3.3773	2.1748	0.8812	0.48420
	30.000	72.678	7.8741	3.4773	2.2644	0.7401	0.45066
	28.000	75.285	8.0870	3.5154	2.3004	0.6789	0.43799
	26.000	77.202	8.2233	3.5393	2.3235	0.6378	0.43010
	24.000	78.766	8.3214	3.5561	2.3400	0.6071	0.42454
	22.000	80.110	8.3960	3.5688	2.3526	0.5829	0.42037
	20.000	81.303	8.4545	3.5786	2.3625	0.5634	0.41714
	18.000	82.386	8.5014	3.5864	2.3704	0.5474	0.41457
	16.000	83.387	8.5392	3.5927	2.3768	0.5343	0.41251
	14.000	84.324	8.5699	3.5978	2.3820	0.5234	0.41085
	12.000	85.212	8.5948	3.6019	2.3862	0.5145	0.40951
	10.000	86.062	8.6146	3.6051	2.3895	0.5072	0.40845
	8.000	86.882	8.6301	3.6077	2.3922	0.5015	0.40762
	6.000	87.680	8.6418	3.6096	2.3941	0.4972	0.40700
	4.000	88.462	8.6499	3.6109	2.3955	0.4942	0.40656
	2.000	89.234	8.6547	3.6117	2.3963	0.4924	0.40631
2.80	2.000	22.344	1.1553	1.1085	1.0422	2.7056	0.99969
	4.000	23.854	1.3292	1.2246	1.0854	2.6133	0.99766
	6.000	25.455	1.5230	1.3476	1.1302	2.5222	0.99246
	8.000	27.150	1.7379	1.4768	1.1768	2.4313	0.98304
	10.000	28.940	1.9751	1.6113	1.2257	2.3399	0.96869
	12.000	30.830	2.2357	1.7502	1.2774	2.2476	0.94903
	14.000	32.822	2.5205	1.8923	1.3320	2.1540	0.92409
	16.000	34.923	2.8309	2.0367	1.3900	2.0585	0.89411
	18.000	37.141	3.1677	2.1822	1.4516	1.9610	0.85962
	20.000	39.490	3.5324	2.3283	1.5172	1.8610	0.82123
	22.000	41.990	3.9271	2.4743	1.5872	1.7578	0.77965
	24.000	44.676	4.3550	2.6200	1.6622	1.6506	0.73549
	26.000	47.604	4.8219	2.7658	1.7434	1.5379	0.68919
	28.000	50.887	5.3398	2.9135	1.8328	1.4163	0.64070
	30.000	54.786	5.9387	3.0683	1.9355	1.2783	0.58877
	32.000	60.433	6.7529	3.2555	2.0743	1.0909	0.52535
	32.587	65.050	7.3524	3.3788	2.1761	0.9490	0.48369
	32.000	69.211	7.8278	3.4689	2.2566	0.8307	0.45348
	30.000	73.328	8.2272	3.5399	2.3241	0.7243	0.42988
	28.000	75.728	8.4241	3.5735	2.3574	0.6684	0.41882
	26.000	77.543	8.5544	3.5952	2.3794	0.6296	0.41169
	24.000	79.042	8.6495	3.6108	2.3954	0.6002	0.40659
	22.000	80.339	8.7224	3.6227	2.4077	0.5769	0.40273
	20.000	81.496	8.7800	3.6319	2.4174	0.5580	0.39971

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.80	18.000	82.550	8.8262	3.6393	2.4252	0.5425	0.39731
	16.000	83.525	8.8637	3.6453	2.4316	0.5297	0.39538
	14.000	84.440	8.8942	3.6501	2.4367	0.5191	0.39382
	12.000	85.308	8.9188	3.6540	2.4409	0.5103	0.39256
	10.000	86.140	8.9385	3.6571	2.4442	0.5033	0.39156
	8.000	86.943	8.9540	3.6595	2.4468	0.4977	0.39078
	6.000	87.725	8.9656	3.6613	2.4487	0.4935	0.39019
	4.000	88.492	8.9737	3.6626	2.4501	0.4905	0.38978
	2.000	89.248	8.9784	3.6633	2.4509	0.4887	0.38954
2.85	2.000	21.954	1.1579	1.1103	1.0429	2.7537	0.99968
	4.000	23.457	1.3349	1.2283	1.0868	2.6598	0.99755
	6.000	25.052	1.5325	1.3535	1.1323	2.5670	0.99213
	8.000	26.742	1.7520	1.4850	1.1798	2.4744	0.98230
	10.000	28.526	1.9946	1.6220	1.2297	2.3815	0.96735
	12.000	30.410	2.2613	1.7634	1.2824	2.2876	0.94692
	14.000	32.394	2.5532	1.9080	1.3382	2.1923	0.92105
	16.000	34.486	2.8712	2.0547	1.3974	2.0953	0.89006
	18.000	36.692	3.2165	2.2025	1.4604	1.9964	0.85451
	20.000	39.025	3.5904	2.3505	1.5275	1.8950	0.81511
	22.000	41.505	3.9948	2.4982	1.5991	1.7906	0.77258
	24.000	44.160	4.4325	2.6451	1.6757	1.6825	0.72766
	26.000	47.042	4.9089	2.7916	1.7585	1.5692	0.68081
	28.000	50.247	5.4345	2.9391	1.8490	1.4481	0.63219
	30.000	53.992	6.0344	3.0917	1.9518	1.3127	0.58089
	32.000	59.037	6.8013	3.2659	2.0825	1.1407	0.52183
	32.984	65.097	7.6294	3.4320	2.2230	0.9503	0.46580
	32.000	70.389	8.2421	3.5425	2.3266	0.8001	0.42903
	30.000	73.893	8.5802	3.5995	2.3837	0.7107	0.41030
	28.000	76.127	8.7648	3.6295	2.4149	0.6588	0.40050
	26.000	77.855	8.8902	3.6495	2.4360	0.6220	0.39402
	24.000	79.297	8.9827	3.6640	2.4516	0.5938	0.38933
	22.000	80.552	9.0543	3.6751	2.4637	0.5713	0.38574
	20.000	81.676	9.1110	3.6838	2.4733	0.5530	0.38294
	18.000	82.702	9.1567	3.6908	2.4810	0.5379	0.38069
	16.000	83.655	9.1938	3.6964	2.4872	0.5253	0.37888
	14.000	84.549	9.2241	3.7010	2.4923	0.5150	0.37741
	12.000	85.399	9.2486	3.7047	2.4964	0.5064	0.37623
	10.000	86.213	9.2683	3.7077	2.4998	0.4995	0.37528
	8.000	87.001	9.2836	3.7100	2.5023	0.4940	0.37454
	6.000	87.768	9.2952	3.7117	2.5043	0.4899	0.37399
	4.000	88.520	9.3033	3.7129	2.5057	0.4870	0.37360
	2.000	89.262	9.3080	3.7136	2.5065	0.4853	0.37338
2.90	2.000	21.578	1.1604	1.1120	1.0435	2.8019	0.99966
	4.000	23.076	1.3406	1.2320	1.0882	2.7062	0.99744
2.90	6.000	24.666	1.5421	1.3594	1.1344	2.6117	0.99178
	8.000	26.350	1.7663	1.4933	1.1828	2.5175	0.98153
	10.000	28.129	2.0143	1.6328	1.2336	2.4229	0.96597
	12.000	30.007	2.2873	1.7767	1.2874	2.3273	0.94475
	14.000	31.985	2.5863	1.9238	1.3444	2.2304	0.91794
	16.000	34.069	2.9123	2.0729	1.4050	2.1318	0.88591
	18.000	36.264	3.2663	2.2229	1.4694	2.0313	0.84930
	20.000	38.584	3.6496	2.3729	1.5380	1.9285	0.80886
	22.000	41.044	4.0638	2.5222	1.6112	1.8229	0.76540
	24.000	43.672	4.5119	2.6704	1.6896	1.7138	0.71969
	26.000	46.515	4.9984	2.8177	1.7739	1.5999	0.67230
	28.000	49.655	5.5328	2.9652	1.8659	1.4788	0.62347
	30.000	53.274	6.1364	3.1161	1.9692	1.3453	0.57262
	32.000	57.931	6.8791	3.2824	2.0957	1.1827	0.51624
	33.363	65.145	7.9116	3.4841	2.2708	0.9516	0.44840
	32.000	71.287	8.6350	3.6085	2.3930	0.7771	0.40736
	30.000	74.392	8.9347	3.6565	2.4435	0.6985	0.39175
	28.000	76.490	9.1095	3.6836	2.4730	0.6500	0.38301
	26.000	78.142	9.2307	3.7020	2.4934	0.6149	0.37709
	24.000	79.533	9.3212	3.7156	2.5087	0.5878	0.37275
	22.000	80.750	9.3915	3.7260	2.5205	0.5660	0.36942
	20.000	81.843	9.4475	3.7343	2.5300	0.5482	0.36680
	18.000	82.845	9.4928	3.7409	2.5376	0.5335	0.36469
	16.000	83.775	9.5296	3.7462	2.5438	0.5212	0.36299
	14.000	84.651	9.5597	3.7506	2.5489	0.5111	0.36161
	12.000	85.484	9.5842	3.7541	2.5530	0.5027	0.36049
	10.000	86.283	9.6038	3.7570	2.5563	0.4959	0.35960
	8.000	87.055	9.6191	3.7592	2.5588	0.4906	0.35890
	6.000	87.808	9.6306	3.7608	2.5608	0.4865	0.35838
	4.000	88.546	9.6387	3.7620	2.5621	0.4836	0.35802
	2.000	89.275	9.6434	3.7626	2.5629	0.4819	0.35780
2.95	2.000	21.216	1.1630	1.1138	1.0442	2.8500	0.99965
	4.000	22.708	1.3464	1.2357	1.0895	2.7526	0.99732
	6.000	24.294	1.5518	1.3654	1.1366	2.6563	0.99142
	8.000	25.974	1.7807	1.5017	1.1858	2.5604	0.98074
	10.000	27.749	2.0343	1.6437	1.2377	2.4640	0.96454
	12.000	29.621	2.3137	1.7901	1.2925	2.3668	0.94252
	14.000	31.593	2.6199	1.9396	1.3507	2.2682	0.91475
	16.000	33.670	2.9540	2.0911	1.4126	2.1679	0.88168
	18.000	35.856	3.3169	2.2434	1.4785	2.0658	0.84398
	20.000	38.164	3.7098	2.3954	1.5487	1.9615	0.80249
	22.000	40.607	4.1344	2.5464	1.6236	1.8546	0.75809
	24.000	43.211	4.5930	2.6959	1.7037	1.7444	0.71160
	26.000	46.018	5.0902	2.8441	1.7898	1.6297	0.66366
	28.000	49.102	5.6343	2.9916	1.8833	1.5085	0.61460
	30.000	52.618	6.2438	3.1414	1.9876	1.3762	0.56404

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$	M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
2.95	32.000	56.997	6.9741	3.3023	2.1119	1.2199	0.50950	3.00	14.000	84.837	10.2483	3.8459	2.6647	0.5038	0.33180
	33.726	65.193	8.1990	3.5350	2.3194	0.9528	0.43150		12.000	85.638	10.2726	3.8491	2.6688	0.4958	0.33081
	32.000	72.020	9.0188	3.6696	2.4577	0.7585	0.38752		10.000	86.408	10.2921	3.8517	2.6721	0.4892	0.33001
	30.000	74.838	9.2917	3.7112	2.5037	0.6877	0.37416		8.000	87.154	10.3074	3.8537	2.6747	0.4841	0.32939
	28.000	76.821	9.4585	3.7359	2.5318	0.6420	0.36628		6.000	87.881	10.3190	3.8553	2.6766	0.4801	0.32892
	26.000	78.407	9.5762	3.7530	2.5516	0.6084	0.36086		4.000	88.594	10.3270	3.8563	2.6779	0.4774	0.32860
	24.000	79.752	9.6649	3.7657	2.5666	0.5821	0.35684		2.000	89.299	10.3318	3.8569	2.6787	0.4757	0.32841
	22.000	80.935	9.7342	3.7755	2.5782	0.5610	0.35374								
	20.000	82.000	9.7896	3.7834	2.5875	0.5437	0.35128								
	18.000	82.978	9.8345	3.7896	2.5951	0.5293	0.34931	3.05	2.000	20.530	1.1681	1.1173	1.0455	2.9462	0.99962
	16.000	83.889	9.8712	3.7947	2.6013	0.5173	0.34771		4.000	22.014	1.3581	1.2433	1.0923	2.8450	0.99708
	14.000	84.747	9.9012	3.7989	2.6063	0.5074	0.34641		6.000	23.591	1.5716	1.3774	1.1409	2.7451	0.99066
	12.000	85.563	9.9255	3.8023	2.6104	0.4992	0.34536		8.000	25.263	1.8100	1.5186	1.1919	2.6457	0.97909
	10.000	86.348	9.9450	3.8050	2.6137	0.4925	0.34452		10.000	27.031	2.0749	1.6656	1.2458	2.5458	0.96158
	8.000	87.106	9.9604	3.8071	2.6163	0.4872	0.34386		12.000	28.895	2.3674	1.8171	1.3029	2.4450	0.93788
	6.000	87.845	9.9719	3.8087	2.6182	0.4832	0.34336		14.000	30.859	2.6886	1.9717	1.3636	2.3429	0.90814
	4.000	88.571	9.9799	3.8098	2.6196	0.4804	0.34302		16.000	32.923	3.0394	2.1281	1.4282	2.2392	0.87292
	2.000	89.288	9.9847	3.8104	2.6204	0.4788	0.34282		18.000	35.095	3.4208	2.2848	1.4972	2.1338	0.83303
									20.000	37.382	3.8338	2.4408	1.5707	2.0263	0.78944
									22.000	39.797	4.2796	2.5952	1.6490	1.9166	0.74317
3.00	2.000	20.867	1.1656	1.1155	1.0449	2.8981	0.99963		24.000	42.361	4.7607	2.7474	1.7328	1.8039	0.69513
	4.000	22.355	1.3522	1.2395	1.0909	2.7988	0.99721		26.000	45.110	5.2806	2.8973	1.8226	1.6874	0.64608
	6.000	23.936	1.5616	1.3714	1.1387	2.7008	0.99105		28.000	48.102	5.8462	3.0455	1.9196	1.5654	0.59649
	8.000	25.611	1.7953	1.5101	1.1888	2.6031	0.97993		30.000	51.455	6.4722	3.1938	2.0265	1.4345	0.54630
	10.000	27.383	2.0545	1.6546	1.2417	2.5050	0.96308		32.000	55.456	7.1967	3.3478	2.1497	1.2858	0.49412
	12.000	29.251	2.3404	1.8036	1.2977	2.4060	0.94022		34.000	61.505	8.2161	3.5380	2.3222	1.0765	0.43052
	14.000	31.218	2.6540	1.9556	1.3571	2.3056	0.91148		34.407	65.288	8.7895	3.6335	2.4190	0.9552	0.39922
	16.000	33.288	2.9964	2.1095	1.4204	2.2037	0.87734		34.000	68.742	9.2596	3.7064	2.4983	0.8514	0.37570
	18.000	35.467	3.3685	2.2641	1.4878	2.1000	0.83855		32.000	73.184	9.7779	3.7817	2.5856	0.7291	0.35180
	20.000	37.764	3.7713	2.4181	1.5596	1.9941	0.79602		30.000	75.604	10.0154	3.8146	2.6255	0.6689	0.34151
	22.000	40.192	4.2064	2.5708	1.6362	1.8858	0.75068		28.000	77.406	10.1703	3.8355	2.6516	0.6276	0.33501
	24.000	42.775	4.6761	2.7216	1.7181	1.7744	0.70340		26.000	78.880	10.2825	3.8505	2.6705	0.5965	0.33040
	26.000	45.552	5.1844	2.8706	1.8060	1.6589	0.65491		24.000	80.145	10.3683	3.8617	2.6849	0.5719	0.32694
	28.000	48.586	5.7388	3.0184	1.9012	1.5374	0.60560		22.000	81.267	10.4361	3.8705	2.6963	0.5518	0.32423
	30.000	52.014	6.3559	3.1673	2.0067	1.4059	0.55526		20.000	82.284	10.4906	3.8776	2.7055	0.5353	0.32208
	32.000	56.182	7.0810	3.3244	2.1300	1.2541	0.50205		18.000	83.221	10.5350	3.8833	2.7129	0.5215	0.32034
	34.000	63.673	8.2682	3.5470	2.3310	1.0029	0.42755		16.000	84.095	10.5714	3.8879	2.7190	0.5100	0.31892
	34.073	65.241	8.4917	3.5848	2.3688	0.9540	0.41510		14.000	84.921	10.6012	3.8917	2.7240	0.5005	0.31777
	34.000	66.749	8.6971	3.6186	2.4035	0.9083	0.40406		12.000	85.709	10.6255	3.8948	2.7281	0.4926	0.31683
	32.000	72.642	9.3988	3.7271	2.5217	0.7428	0.36908		10.000	86.466	10.6450	3.8973	2.7314	0.4861	0.31608
	30.000	75.239	9.6517	3.7638	2.5643	0.6779	0.35743		8.000	87.199	10.6603	3.8992	2.7340	0.4810	0.31549
	28.000	77.126	9.8121	3.7865	2.5913	0.6345	0.35029		6.000	87.914	10.6719	3.9007	2.7359	0.4772	0.31505
	26.000	78.652	9.9268	3.8024	2.6106	0.6022	0.34530		4.000	88.617	10.6799	3.9017	2.7373	0.4744	0.31474
	24.000	79.956	10.0139	3.8144	2.6253	0.5768	0.34157		2.000	89.310	10.6847	3.9023	2.7381	0.4728	0.31456
	22.000	81.106	10.0824	3.8237	2.6368	0.5563	0.33868								
	20.000	82.147	10.1373	3.8311	2.6460	0.5394	0.33638								
	18.000	83.103	10.1819	3.8371	2.6536	0.5253	0.33453	3.10	2.000	20.205	1.1707	1.1190	1.0462	2.9942	0.99960
	16.000	83.996	10.2184	3.8420	2.6597	0.5136	0.33302		4.000	21.684	1.3640	1.2471	1.0937	2.8911	0.99696

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.10	6.000	23.258	1.5815	1.3835	1.1431	2.7894	0.99027
	8.000	24.927	1.8249	1.5271	1.1950	2.6881	0.97822
	10.000	26.692	2.0956	1.6767	1.2499	2.5864	0.96004
	12.000	28.554	2.3949	1.8308	1.3081	2.4837	0.93546
	14.000	30.513	2.7236	1.9879	1.3701	2.3798	0.90473
	16.000	32.574	3.0831	2.1467	1.4362	2.2743	0.86841
	18.000	34.739	3.4740	2.3057	1.5067	2.1672	0.82741
	20.000	37.017	3.8973	2.4637	1.5819	2.0581	0.78278
	22.000	39.421	4.3543	2.6198	1.6621	1.9468	0.73556
	24.000	41.968	4.8470	2.7733	1.7477	1.8329	0.68676
	26.000	44.692	5.3788	2.9241	1.8395	1.7154	0.63718
	28.000	47.646	5.9563	3.0727	1.9385	1.5928	0.58731
	30.000	50.935	6.5922	3.2205	2.0470	1.4620	0.53722
	32.000	54.800	7.3197	3.3723	2.1705	1.3157	0.48586
	34.000	60.205	8.2768	3.5485	2.3325	1.1241	0.42706
	34.726	65.335	9.0925	3.6810	2.4701	0.9564	0.38385
	34.000	69.872	9.7174	3.7732	2.5754	0.8203	0.35449
	32.000	73.661	10.1577	3.8339	2.6495	0.7171	0.33553
	30.000	75.938	10.3831	3.8636	2.6874	0.6607	0.32634
	28.000	77.666	10.5334	3.8831	2.7126	0.6212	0.32040
	26.000	79.091	10.6435	3.8971	2.7311	0.5911	0.31614
	24.000	80.324	10.7282	3.9077	2.7454	0.5671	0.31291
	22.000	81.419	10.7954	3.9161	2.7567	0.5476	0.31038
	20.000	82.413	10.8496	3.9228	2.7658	0.5314	0.30836
	18.000	83.331	10.8938	3.9282	2.7732	0.5179	0.30672
	16.000	84.189	10.9301	3.9327	2.7793	0.5067	0.30539
	14.000	85.001	10.9599	3.9363	2.7843	0.4973	0.30430
	12.000	85.775	10.9842	3.9393	2.7884	0.4895	0.30341
	10.000	86.520	11.0037	3.9416	2.7917	0.4832	0.30270
	8.000	87.242	11.0190	3.9435	2.7942	0.4781	0.30215
	6.000	87.945	11.0306	3.9449	2.7962	0.4743	0.30173
	4.000	88.637	11.0387	3.9458	2.7975	0.4716	0.30144
	2.000	89.321	11.0434	3.9464	2.7983	0.4701	0.30127
3.15	2.000	19.891	1.1734	1.1208	1.0469	3.0421	0.99958
	4.000	21.366	1.3699	1.2510	1.0951	2.9371	0.99683
	6.000	22.937	1.5915	1.3896	1.1453	2.8336	0.98986
	8.000	24.603	1.8399	1.5357	1.1981	2.7304	0.97734
	10.000	26.366	2.1166	1.6878	1.2540	2.6267	0.95846
	12.000	28.225	2.4226	1.8445	1.3134	2.5222	0.93300
	14.000	30.181	2.7592	2.0042	1.3767	2.4165	0.90123
	16.000	32.238	3.1273	2.1654	1.4443	2.3092	0.86382
	18.000	34.398	3.5279	2.3266	1.5163	2.2003	0.82172
	20.000	36.668	3.9617	2.4866	1.5933	2.0895	0.77603
	22.000	39.061	4.4302	2.6444	1.6753	1.9767	0.72789
	24.000	41.594	4.9349	2.7992	1.7629	1.8613	0.67833
	26.000	44.296	5.4793	2.9510	1.8567	1.7427	0.62820
3.15	28.000	47.216	6.0688	3.1000	1.9577	1.6194	0.57808
	30.000	50.449	6.7158	3.2475	2.0680	1.4886	0.52806
	32.000	54.201	7.4487	3.3975	2.1924	1.3441	0.47738
	34.000	59.196	8.3736	3.5650	2.3489	1.1632	0.42162
	35.033	65.382	9.4008	3.7274	2.5221	0.9575	0.36898
	34.000	70.719	10.1474	3.8325	2.6478	0.7974	0.33596
	32.000	74.089	10.5396	3.8839	2.7137	0.7064	0.32016
	30.000	76.244	10.7550	3.9111	2.7499	0.6531	0.31190
	28.000	77.906	10.9014	3.9292	2.7745	0.6152	0.30644
	26.000	79.289	11.0097	3.9424	2.7927	0.5860	0.30248
	24.000	80.490	11.0936	3.9524	2.8068	0.5627	0.29947
	22.000	81.560	11.1602	3.9604	2.8180	0.5436	0.29710
	20.000	82.535	11.2142	3.9668	2.8270	0.5278	0.29520
	18.000	83.436	11.2583	3.9720	2.8344	0.5145	0.29366
	16.000	84.279	11.2945	3.9762	2.8405	0.5035	0.29240
	14.000	85.076	11.3243	3.9797	2.8455	0.4942	0.29138
	12.000	85.838	11.3486	3.9825	2.8496	0.4865	0.29054
	10.000	86.571	11.3682	3.9848	2.8529	0.4803	0.28987
	8.000	87.281	11.3835	3.9866	2.8555	0.4754	0.28935
	6.000	87.976	11.3951	3.9879	2.8574	0.4716	0.28895
	4.000	88.657	11.4032	3.9889	2.8588	0.4690	0.28867
	2.000	89.330	11.4080	3.9894	2.8596	0.4674	0.28851
3.20	2.000	19.587	1.1760	1.1226	1.0475	3.0901	0.99957
	4.000	21.059	1.3759	1.2548	1.0965	2.9831	0.99670
	6.000	22.628	1.6017	1.3958	1.1475	2.8776	0.98944
	8.000	24.292	1.8552	1.5443	1.2013	2.7725	0.97642
	10.000	26.052	2.1377	1.6990	1.2582	2.6670	0.95684
	12.000	27.909	2.4507	1.8583	1.3188	2.5605	0.93048
	14.000	29.863	2.7952	2.0206	1.3834	2.4528	0.89766
	16.000	31.915	3.1723	2.1842	1.4524	2.3437	0.85914
	18.000	34.071	3.5828	2.3476	1.5261	2.2329	0.81591
	20.000	36.335	4.0273	2.5095	1.6048	2.1205	0.76919
	22.000	38.718	4.5073	2.6690	1.6888	2.0061	0.72014
	24.000	41.238	5.0245	2.8252	1.7784	1.8893	0.66984
	26.000	43.920	5.5816	2.9780	1.8743	1.7695	0.61919
	28.000	46.811	6.1840	3.1274	1.9774	1.6454	0.56880
	30.000	49.994	6.8427	3.2747	2.0895	1.5144	0.51885
	32.000	53.651	7.5832	3.4233	2.2152	1.3711	0.46873
	34.000	58.350	8.4906	3.5846	2.3686	1.1976	0.41516
	35.327	65.428	9.7141	3.7727	2.5748	0.9585	0.35463
	34.000	71.408	10.5657	3.8872	2.7181	0.7791	0.31914
	32.000	74.475	10.9242	3.9320	2.7783	0.6967	0.30560
	30.000	76.526	11.1314	3.9570	2.8131	0.6461	0.29812
	28.000	78.130	11.2746	3.9739	2.8372	0.6096	0.29310
	26.000	79.475	11.3814	3.9864	2.8551	0.5812	0.28942
	24.000	80.646	11.4644	3.9959	2.8690	0.5585	0.28660

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.20	22.000	81.694	11.5307	4.0035	2.8802	0.5398	0.28438
	20.000	82.649	11.5844	4.0096	2.8892	0.5243	0.28260
	18.000	83.533	11.6285	4.0146	2.8966	0.5113	0.28115
	16.000	84.363	11.6647	4.0187	2.9026	0.5004	0.27996
	14.000	85.147	11.6945	4.0220	2.9076	0.4913	0.27899
	12.000	85.897	11.7188	4.0247	2.9117	0.4837	0.27820
	10.000	86.619	11.7385	4.0269	2.9150	0.4776	0.27757
	8.000	87.320	11.7539	4.0286	2.9176	0.4727	0.27707
	6.000	88.003	11.7655	4.0299	2.9196	0.4690	0.27669
	4.000	88.675	11.7736	4.0308	2.9209	0.4664	0.27643
	2.000	89.340	11.7784	4.0313	2.9217	0.4649	0.27628
3.25	2.000	19.293	1.1786	1.1244	1.0482	3.1380	0.99955
	4.000	20.762	1.3818	1.2586	1.0979	3.0290	0.99656
	6.000	22.328	1.6119	1.4019	1.1498	2.9215	0.98902
	8.000	23.990	1.8704	1.5530	1.2044	2.8145	0.97549
	10.000	25.749	2.1590	1.7103	1.2624	2.7070	0.95518
	12.000	27.604	2.4791	1.8722	1.3242	2.5986	0.92789
	14.000	29.556	2.8318	2.0370	1.3901	2.4889	0.89402
	16.000	31.606	3.2179	2.2030	1.4607	2.3779	0.85437
	18.000	33.757	3.6384	2.3687	1.5360	2.2653	0.81004
	20.000	36.016	4.0940	2.5326	1.6165	2.1511	0.76227
	22.000	38.390	4.5858	2.6937	1.7024	2.0350	0.71232
	24.000	40.898	5.1156	2.8513	1.7941	1.9168	0.66129
	26.000	43.563	5.6858	3.0049	1.8922	1.7958	0.61015
	28.000	46.426	6.3015	3.1548	1.9974	1.6707	0.55950
	30.000	49.566	6.9727	3.3020	2.1116	1.5394	0.50960
	32.000	53.141	7.7223	3.4494	2.2387	1.3970	0.45998
	34.000	57.616	8.6213	3.6062	2.3907	1.2287	0.40809
	35.610	65.473	10.0327	3.8170	2.6285	0.9596	0.34078
	34.000	71.993	10.9786	3.9386	2.7875	0.7636	0.30361
	32.000	74.827	11.3120	3.9783	2.8434	0.6878	0.29180
	30.000	76.787	11.5124	4.0014	2.8771	0.6396	0.28499
	28.000	78.339	11.6529	4.0173	2.9007	0.6043	0.28035
	26.000	79.649	11.7584	4.0291	2.9184	0.5767	0.27692
	24.000	80.793	11.8408	4.0382	2.9322	0.5545	0.27429
	22.000	81.819	11.9067	4.0454	2.9433	0.5362	0.27220
	20.000	82.757	11.9604	4.0513	2.9523	0.5210	0.27052
	18.000	83.626	12.0044	4.0560	2.9596	0.5082	0.26916
	16.000	84.442	12.0407	4.0599	2.9657	0.4974	0.26804
	14.000	85.214	12.0705	4.0631	2.9707	0.4885	0.26712
	12.000	85.953	12.0949	4.0658	2.9748	0.4810	0.26637
	10.000	86.665	12.1145	4.0679	2.9781	0.4750	0.26577
	8.000	87.356	12.1300	4.0695	2.9807	0.4702	0.26530
	6.000	88.030	12.1417	4.0707	2.9827	0.4665	0.26495
	4.000	88.693	12.1498	4.0716	2.9840	0.4639	0.26470
	2.000	89.348	12.1547	4.0721	2.9848	0.4624	0.26455
3.30	2.000	19.009	1.1812	1.1262	1.0489	3.1858	0.99953
	4.000	20.475	1.3880	1.2626	1.0993	3.0748	0.99642
	6.000	22.039	1.6222	1.4082	1.1520	2.9653	0.98858
	8.000	23.699	1.8859	1.5617	1.2076	2.8563	0.97453
	10.000	25.457	2.1807	1.7216	1.2666	2.7468	0.95347
	12.000	27.310	2.5078	1.8861	1.3296	2.6364	0.92526
	14.000	29.261	2.8688	2.0536	1.3970	2.5248	0.89031
	16.000	31.308	3.2640	2.2219	1.4690	2.4118	0.84954
	18.000	33.456	3.6947	2.3898	1.5460	2.2974	0.80409
	20.000	35.710	4.1617	2.5557	1.6284	2.1813	0.75527
	22.000	38.077	4.6655	2.7184	1.7163	2.0636	0.70444
	24.000	40.573	5.2081	2.8773	1.8101	1.9439	0.65272
	26.000	43.222	5.7918	3.0318	1.9103	1.8215	0.60108
	28.000	46.062	6.4212	3.1822	2.0178	1.6955	0.55020
	30.000	49.163	7.1057	3.3294	2.1342	1.5638	0.50034
	32.000	52.667	7.8658	3.4758	2.2630	1.4218	0.45116
	34.000	56.963	8.7622	3.6291	2.4144	1.2575	0.40064
	35.882	65.518	10.3564	3.8602	2.6829	0.9606	0.32741
	34.000	72.501	11.3896	3.9873	2.8565	0.7502	0.28914
	32.000	75.148	11.7036	4.0230	2.9092	0.6797	0.27869
	30.000	77.029	11.8983	4.0445	2.9418	0.6336	0.27247
	28.000	78.535	12.0364	4.0595	2.9650	0.5993	0.26817
	26.000	79.812	12.1408	4.0706	2.9825	0.5725	0.26497
	24.000	80.932	12.2227	4.0793	2.9963	0.5507	0.26251
	22.000	81.938	12.2884	4.0862	3.0073	0.5328	0.26055
	20.000	82.859	12.3420	4.0918	3.0163	0.5178	0.25896
	18.000	83.714	12.3860	4.0964	3.0236	0.5052	0.25767
	16.000	84.517	12.4223	4.1001	3.0297	0.4946	0.25662
	14.000	85.278	12.4523	4.1032	3.0348	0.4858	0.25575
	12.000	86.007	12.4767	4.1057	3.0389	0.4785	0.25504
	10.000	86.708	12.4964	4.1077	3.0422	0.4725	0.25448
	8.000	87.390	12.5120	4.1093	3.0448	0.4677	0.25403
	6.000	88.056	12.5237	4.1105	3.0467	0.4641	0.25369
	4.000	88.710	12.5319	4.1114	3.0481	0.4616	0.25346
	2.000	89.357	12.5367	4.1119	3.0489	0.4601	0.25332
3.35	2.000	18.734	1.1839	1.1280	1.0496	3.2336	0.99951
	4.000	20.197	1.3940	1.2664	1.1007	3.1206	0.99628
	6.000	21.759	1.6326	1.4144	1.1543	3.0090	0.98812
	8.000	23.418	1.9015	1.5704	1.2108	2.8980	0.97354
	10.000	25.175	2.2025	1.7330	1.2709	2.7865	0.95172
	12.000	27.028	2.5370	1.9002	1.3351	2.6741	0.92257
	14.000	28.976	2.9061	2.0701	1.4038	2.5604	0.88654
	16.000	31.022	3.3109	2.2410	1.4774	2.4454	0.84462
	18.000	33.167	3.7520	2.4110	1.5562	2.3290	0.79804
	20.000	35.416	4.2303	2.5788	1.6404	2.2112	0.74822
	22.000	37.776	4.7466	2.7431	1.7303	2.0917	0.69650

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.35	24.000	40.264	5.3024	2.9033	1.8263	1.9704	0.64409
	26.000	42.898	5.8998	3.0588	1.9288	1.8468	0.59200
	28.000	45.716	6.5433	3.2097	2.0386	1.7198	0.54090
	30.000	48.782	7.2416	3.3568	2.1573	1.5874	0.49109
	32.000	52.225	8.0134	3.5024	2.2880	1.4458	0.44232
	34.000	56.375	8.9114	3.6528	2.4396	1.2844	0.39294
	36.000	63.380	10.2976	3.8524	2.6730	1.0339	0.32979
	36.143	65.562	10.6853	3.9023	2.7382	0.9616	0.31454
	36.000	67.623	11.0286	3.9446	2.7958	0.8957	0.30180
	34.000	72.950	11.8006	4.0338	2.9255	0.7384	0.27557
	32.000	75.444	12.0992	4.0662	2.9755	0.6723	0.26624
	30.000	77.255	12.2891	4.0863	3.0074	0.6279	0.26053
	28.000	78.719	12.4252	4.1004	3.0302	0.5946	0.25653
	26.000	79.965	12.5287	4.1110	3.0476	0.5684	0.25355
	24.000	81.062	12.6102	4.1193	3.0612	0.5471	0.25124
	22.000	82.050	12.6758	4.1259	3.0722	0.5295	0.24939
	20.000	82.956	12.7293	4.1313	3.0812	0.5148	0.24790
	18.000	83.798	12.7734	4.1357	3.0886	0.5024	0.24668
	16.000	84.588	12.8098	4.1393	3.0947	0.4920	0.24568
	14.000	85.339	12.8398	4.1422	3.0997	0.4832	0.24486
	12.000	86.057	12.8644	4.1446	3.1038	0.4760	0.24420
	10.000	86.750	12.8842	4.1466	3.1072	0.4701	0.24366
	8.000	87.422	12.8998	4.1481	3.1098	0.4654	0.24324
	6.000	88.080	12.9116	4.1493	3.1118	0.4618	0.24292
	4.000	88.726	12.9198	4.1501	3.1131	0.4593	0.24270
	2.000	89.365	12.9246	4.1506	3.1140	0.4578	0.24256
3.40	2.000	18.467	1.1866	1.1298	1.0502	3.2814	0.99949
	4.000	19.928	1.4001	1.2704	1.1022	3.1662	0.99613
	6.000	21.488	1.6430	1.4207	1.1565	3.0527	0.98766
	8.000	23.147	1.9173	1.5793	1.2140	2.9395	0.97253
	10.000	24.902	2.2245	1.7444	1.2752	2.8260	0.94995
	12.000	26.755	2.5664	1.9143	1.3407	2.7115	0.91981
	14.000	28.702	2.9440	2.0868	1.4108	2.5958	0.88269
	16.000	30.746	3.3583	2.2600	1.4860	2.4788	0.83962
	18.000	32.889	3.8100	2.4322	1.5665	2.3604	0.79194
	20.000	35.133	4.2998	2.6019	1.6526	2.2407	0.74110
	22.000	37.489	4.8289	2.7679	1.7446	2.1195	0.68851
	24.000	39.967	5.3980	2.9293	1.8428	1.9966	0.63546
	26.000	42.588	6.0096	3.0857	1.9476	1.8716	0.58292
	28.000	45.386	6.6675	3.2370	2.0598	1.7435	0.53162
	30.000	48.422	7.3802	3.3842	2.1808	1.6105	0.48186
	32.000	51.810	8.1645	3.5290	2.3135	1.4690	0.43348
	34.000	55.838	9.0673	3.6771	2.4659	1.3098	0.38509
	36.000	61.914	10.3308	3.8568	2.6786	1.0874	0.32845
	36.393	65.605	11.0193	3.9435	2.7943	0.9625	0.30214
	36.000	68.960	11.5817	4.0093	2.8887	0.8560	0.28269
3.40	34.000	73.352	12.2131	4.0783	2.9946	0.7279	0.26279
	32.000	75.717	12.4992	4.1080	3.0426	0.6653	0.25440
	30.000	77.467	12.6849	4.1268	3.0738	0.6225	0.24914
	28.000	78.891	12.8193	4.1402	3.0963	0.5902	0.24542
	26.000	80.110	12.9221	4.1503	3.1135	0.5646	0.24263
	24.000	81.185	13.0033	4.1582	3.1271	0.5437	0.24046
	22.000	82.156	13.0688	4.1645	3.1381	0.5264	0.23872
	20.000	83.047	13.1224	4.1697	3.1471	0.5119	0.23732
	18.000	83.876	13.1665	4.1739	3.1545	0.4997	0.23617
	16.000	84.656	13.2030	4.1774	3.1606	0.4894	0.23522
	14.000	85.396	13.2331	4.1802	3.1657	0.4808	0.23445
	12.000	86.105	13.2578	4.1826	3.1698	0.4736	0.23381
	10.000	86.789	13.2777	4.1844	3.1731	0.4678	0.23330
	8.000	87.453	13.2934	4.1859	3.1757	0.4632	0.23290
	6.000	88.103	13.3052	4.1870	3.1777	0.4596	0.23260
	4.000	88.741	13.3135	4.1878	3.1791	0.4572	0.23239
	2.000	89.372	13.3184	4.1883	3.1799	0.4557	0.23227
3.45	2.000	18.209	1.1892	1.1316	1.0509	3.3292	0.99947
	4.000	19.668	1.4063	1.2743	1.1036	3.2118	0.99597
	6.000	21.226	1.6536	1.4270	1.1588	3.0962	0.98718
	8.000	22.884	1.9331	1.5881	1.2172	2.9809	0.97149
	10.000	24.639	2.2468	1.7559	1.2796	2.8653	0.94812
	12.000	26.491	2.5962	1.9284	1.3463	2.7486	0.91701
	14.000	28.438	2.9823	2.1035	1.4178	2.6309	0.87878
	16.000	30.481	3.4063	2.2791	1.4946	2.5118	0.83456
	18.000	32.621	3.8688	2.4535	1.5769	2.3915	0.78577
	20.000	34.863	4.3706	2.6251	1.6649	2.2698	0.73391
	22.000	37.213	4.9123	2.7926	1.7590	2.1468	0.68049
	24.000	39.683	5.4951	2.9552	1.8595	2.0224	0.62680
	26.000	42.292	6.1211	3.1125	1.9666	1.8960	0.57385
	28.000	45.073	6.7941	3.2644	2.0813	1.7667	0.52235
	30.000	48.080	7.5215	3.4115	2.2047	1.6329	0.47267
	32.000	51.420	8.3194	3.5558	2.3397	1.4914	0.42466
	34.000	55.344	9.2294	3.7018	2.4932	1.3339	0.37715
	36.000	60.903	10.4358	3.8705	2.6962	1.1265	0.32424
	36.635	65.647	11.3584	3.9837	2.8512	0.9634	0.29020
	36.000	69.850	12.0718	4.0633	2.9709	0.8302	0.26708
	34.000	73.716	12.6278	4.1211	3.0642	0.7184	0.25074
	32.000	75.970	12.9035	4.1485	3.1104	0.6589	0.24313
	30.000	77.665	13.0858	4.1662	3.1410	0.6175	0.23828
	28.000	79.054	13.2189	4.1789	3.1633	0.5860	0.23481
	26.000	80.246	13.3210	4.1885	3.1804	0.5609	0.23220
	24.000	81.302	13.4020	4.1961	3.1939	0.5404	0.23016
	22.000	82.256	13.4675	4.2021	3.2049	0.5234	0.22852
	20.000	83.134	13.5211	4.2071	3.2139	0.5091	0.22719
	18.000	83.951	13.5654	4.2111	3.2213	0.4971	0.22611

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.45	16.000	84.720	13.6020	4.2145	3.2275	0.4869	0.22521
	14.000	85.451	13.6322	4.2172	3.2325	0.4784	0.22448
	12.000	86.151	13.6570	4.2195	3.2367	0.4714	0.22388
	10.000	86.826	13.6770	4.2213	3.2400	0.4656	0.22340
	8.000	87.482	13.6928	4.2227	3.2427	0.4610	0.22302
	6.000	88.125	13.7047	4.2238	3.2447	0.4575	0.22273
	4.000	88.756	13.7130	4.2245	3.2461	0.4551	0.22253
	2.000	89.379	13.7180	4.2250	3.2469	0.4536	0.22241
3.50	2.000	17.958	1.1920	1.1335	1.0516	3.3769	0.99945
	4.000	19.415	1.4125	1.2783	1.1050	3.2574	0.99582
	6.000	20.972	1.6642	1.4333	1.1611	3.1396	0.98669
	8.000	22.629	1.9491	1.5970	1.2205	3.0222	0.97044
	10.000	24.384	2.2693	1.7675	1.2839	2.9044	0.94626
	12.000	26.236	2.6262	1.9426	1.3519	2.7856	0.91415
	14.000	28.182	3.0211	2.1202	1.4249	2.6657	0.87481
	16.000	30.225	3.4549	2.2982	1.5033	2.5445	0.82942
	18.000	32.363	3.9283	2.4747	1.5874	2.4222	0.77952
	20.000	34.602	4.4421	2.6482	1.6774	2.2986	0.72668
	22.000	36.947	4.9969	2.8173	1.7737	2.1739	0.67245
	24.000	39.410	5.5936	2.9811	1.8764	2.0478	0.61813
	26.000	42.009	6.2345	3.1392	1.9860	1.9199	0.56478
	28.000	44.774	6.9227	3.2916	2.1032	1.7894	0.51313
	30.000	47.755	7.6654	3.4388	2.2291	1.6549	0.46353
	32.000	51.053	8.4777	3.5825	2.3664	1.5131	0.41586
	34.000	54.888	9.3968	3.7268	2.5214	1.3570	0.36917
	36.000	60.090	10.5715	3.8879	2.7191	1.1594	0.31891
	36.867	65.689	11.7027	4.0229	2.9090	0.9643	0.27872
	36.000	70.545	12.5396	4.1121	3.0494	0.8105	0.25324
	34.000	74.048	13.0455	4.1623	3.1342	0.7098	0.23934
	32.000	76.207	13.3126	4.1877	3.1790	0.6529	0.23241
	30.000	77.851	13.4920	4.2044	3.2090	0.6128	0.22791
	28.000	79.207	13.6238	4.2165	3.2311	0.5820	0.22468
	26.000	80.375	13.7255	4.2256	3.2481	0.5574	0.22223
	24.000	81.413	13.8064	4.2329	3.2617	0.5373	0.22031
	22.000	82.352	13.8719	4.2387	3.2727	0.5205	0.21877
	20.000	83.216	13.9256	4.2435	3.2817	0.5065	0.21751
	18.000	84.022	13.9700	4.2474	3.2891	0.4946	0.21649
	16.000	84.781	14.0067	4.2506	3.2952	0.4846	0.21564
	14.000	85.503	14.0371	4.2532	3.3003	0.4762	0.21494
	12.000	86.194	14.0620	4.2554	3.3045	0.4692	0.21438
	10.000	86.862	14.0822	4.2572	3.3079	0.4635	0.21392
	8.000	87.510	14.0980	4.2585	3.3105	0.4590	0.21356
	6.000	88.145	14.1100	4.2596	3.3125	0.4555	0.21329
	4.000	88.769	14.1184	4.2603	3.3139	0.4531	0.21310
	2.000	89.386	14.1234	4.2607	3.3148	0.4516	0.21298

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.55	2.000	17.715	1.1947	1.1353	1.0523	3.4246	0.99943
	4.000	19.170	1.4187	1.2822	1.1065	3.3029	0.99566
	6.000	20.726	1.6748	1.4396	1.1634	3.1829	0.98619
	8.000	22.383	1.9653	1.6059	1.2238	3.0633	0.96935
	10.000	24.138	2.2920	1.7791	1.2883	2.9433	0.94435
	12.000	25.989	2.6566	1.9569	1.3576	2.8224	0.91123
	14.000	27.936	3.0603	2.1370	1.4321	2.7003	0.87077
	16.000	29.977	3.5040	2.3174	1.5121	2.5771	0.82424
	18.000	32.115	3.9887	2.4961	1.5980	2.4526	0.77322
	20.000	34.352	4.5148	2.6714	1.6901	2.3271	0.71939
	22.000	36.692	5.0827	2.8419	1.7885	2.2005	0.66437
	24.000	39.149	5.6937	3.0069	1.8935	2.0727	0.60946
	26.000	41.738	6.3495	3.1659	2.0056	1.9434	0.55575
	28.000	44.488	7.0535	3.3187	2.1254	1.8117	0.50395
	30.000	47.447	7.8120	3.4660	2.2539	1.6762	0.45445
	32.000	50.705	8.6392	3.6092	2.3937	1.5342	0.40714
	34.000	54.463	9.5691	3.7520	2.5504	1.3790	0.36118
	36.000	59.399	10.7262	3.9075	2.7450	1.1885	0.31299
	37.091	65.729	12.0520	4.0612	2.9676	0.9651	0.26768
	36.000	71.121	12.9969	4.1576	3.1261	0.7943	0.24063
	34.000	74.353	13.4667	4.2021	3.2048	0.7018	0.22854
	32.000	76.427	13.7265	4.2257	3.2483	0.6473	0.22221
	30.000	78.025	13.9033	4.2415	3.2779	0.6083	0.21803
	28.000	79.351	14.0342	4.2530	3.2998	0.5782	0.21501
	26.000	80.497	14.1355	4.2618	3.3168	0.5541	0.21271
	24.000	81.517	14.2163	4.2687	3.3303	0.5343	0.21090
	22.000	82.442	14.2819	4.2743	3.3413	0.5178	0.20944
	20.000	83.294	14.3358	4.2789	3.3503	0.5039	0.20826
	18.000	84.090	14.3804	4.2827	3.3578	0.4922	0.20729
	16.000	84.839	14.4173	4.2858	3.3640	0.4823	0.20649
	14.000	85.552	14.4478	4.2883	3.3691	0.4740	0.20583
	12.000	86.235	14.4729	4.2904	3.3733	0.4671	0.20529
	10.000	86.895	14.4931	4.2921	3.3767	0.4615	0.20485
	8.000	87.537	14.5091	4.2934	3.3794	0.4570	0.20451
	6.000	88.165	14.5212	4.2944	3.3814	0.4535	0.20425
	4.000	88.782	14.5296	4.2951	3.3828	0.4511	0.20407
	2.000	89.392	14.5346	4.2956	3.3836	0.4497	0.20397
3.60	2.000	17.479	1.1973	1.1371	1.0530	3.4722	0.99940
	4.000	18.932	1.4250	1.2862	1.1079	3.3482	0.99549
	6.000	20.488	1.6857	1.4461	1.1657	3.2260	0.98567
	8.000	22.144	1.9816	1.6149	1.2271	3.1043	0.96824
	10.000	23.899	2.3149	1.7907	1.2927	2.9821	0.94241
	12.000	25.751	2.6873	1.9711	1.3633	2.8590	0.90827
	14.000	27.698	3.0999	2.1538	1.4393	2.7347	0.86667
	16.000	29.740	3.5540	2.3366	1.5210	2.6092	0.81895
	18.000	31.876	4.0498	2.5174	1.6088	2.4827	0.76685

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.60	20.000	34.110	4.5883	2.6945	1.7029	2.3552	0.71207
	22.000	36.448	5.1699	2.8666	1.8035	2.2267	0.65625
	24.000	38.898	5.7953	3.0327	1.9109	2.0973	0.60079
	26.000	41.478	6.4663	3.1924	2.0255	1.9664	0.54674
	28.000	44.215	7.1862	3.3457	2.1479	1.8335	0.49483
	30.000	47.153	7.9610	3.4930	2.2791	1.6971	0.44543
	32.000	50.376	8.8038	3.6357	2.4215	1.5547	0.39847
	34.000	54.066	9.7460	3.7772	2.5802	1.4002	0.35321
	36.000	58.793	10.8943	3.9283	2.7733	1.2149	0.30670
	37.306	65.769	12.4065	4.0985	3.0271	0.9660	0.25708
	36.000	71.617	13.4496	4.2005	3.2019	0.7805	0.22897
	34.000	74.634	13.8916	4.2405	3.2760	0.6945	0.21831
	32.000	76.633	14.1452	4.2626	3.3184	0.6420	0.21249
	30.000	78.190	14.3199	4.2776	3.3477	0.6041	0.20861
	28.000	79.487	14.4500	4.2885	3.3695	0.5746	0.20578
	26.000	80.614	14.5512	4.2969	3.3864	0.5510	0.20362
	24.000	81.617	14.6320	4.3036	3.3999	0.5315	0.20191
	22.000	82.528	14.6976	4.3090	3.4109	0.5152	0.20054
	20.000	83.369	14.7517	4.3134	3.4200	0.5015	0.19942
	18.000	84.154	14.7965	4.3170	3.4275	0.4899	0.19849
	16.000	84.894	14.8336	4.3200	3.4337	0.4801	0.19774
	14.000	85.599	14.8643	4.3225	3.4388	0.4719	0.19711
	12.000	86.275	14.8895	4.3245	3.4430	0.4651	0.19660
	10.000	86.928	14.9099	4.3262	3.4465	0.4595	0.19619
	8.000	87.562	14.9260	4.3274	3.4491	0.4551	0.19586
	6.000	88.184	14.9381	4.3284	3.4512	0.4517	0.19562
	4.000	88.794	14.9466	4.3291	3.4526	0.4493	0.19545
	2.000	89.398	14.9517	4.3295	3.4534	0.4479	0.19535
3.65	2.000	17.250	1.2001	1.1390	1.0537	3.5198	0.99938
	4.000	18.701	1.4312	1.2902	1.1094	3.3936	0.99532
	6.000	20.256	1.6964	1.4524	1.1680	3.2691	0.98515
	8.000	21.913	1.9980	1.6239	1.2304	3.1451	0.96710
	10.000	23.668	2.3381	1.8024	1.2972	3.0207	0.94042
	12.000	25.520	2.7183	1.9854	1.3691	2.8953	0.90525
	14.000	27.468	3.1402	2.1707	1.4466	2.7688	0.86248
	16.000	29.509	3.6043	2.3558	1.5300	2.6412	0.81364
	18.000	31.645	4.1117	2.5387	1.6196	2.5125	0.76044
	20.000	33.878	4.6628	2.7176	1.7158	2.3830	0.70470
	22.000	36.212	5.2580	2.8911	1.8187	2.2527	0.64814
	24.000	38.658	5.8984	3.0584	1.9286	2.1215	0.59212
	26.000	41.230	6.5849	3.2189	2.0457	1.9891	0.53777
	28.000	43.954	7.3210	3.3726	2.1707	1.8549	0.48578
	30.000	46.873	8.1124	3.5199	2.3047	1.7176	0.43650
	32.000	50.064	8.9714	3.6622	2.4497	1.5746	0.38990
	34.000	53.694	9.9271	3.8025	2.6107	1.4207	0.34529
	36.000	58.251	11.0727	3.9499	2.8033	1.2394	0.30022
3.65	37.513	65.808	12.7662	4.1349	3.0874	0.9668	0.24688
	36.000	72.054	13.9006	4.2413	3.2775	0.7684	0.21810
	34.000	74.894	14.3206	4.2776	3.3478	0.6877	0.20859
	32.000	76.827	14.5690	4.2984	3.3894	0.6371	0.20324
	30.000	78.345	14.7420	4.3126	3.4183	0.6000	0.19962
	28.000	79.617	14.8713	4.3231	3.4400	0.5712	0.19697
	26.000	80.723	14.9723	4.3311	3.4569	0.5480	0.19493
	24.000	81.712	15.0533	4.3376	3.4705	0.5287	0.19332
	22.000	82.610	15.1191	4.3427	3.4815	0.5127	0.19202
	20.000	83.440	15.1734	4.3470	3.4906	0.4992	0.19096
	18.000	84.215	15.2184	4.3505	3.4981	0.4877	0.19009
	16.000	84.947	15.2557	4.3534	3.5043	0.4781	0.18937
	14.000	85.644	15.2866	4.3558	3.5095	0.4699	0.18878
	12.000	86.313	15.3120	4.3577	3.5137	0.4632	0.18829
	10.000	86.959	15.3325	4.3593	3.5172	0.4576	0.18790
	8.000	87.587	15.3487	4.3606	3.5199	0.4532	0.18759
	6.000	88.201	15.3609	4.3615	3.5219	0.4499	0.18736
	4.000	88.807	15.3695	4.3622	3.5234	0.4475	0.18720
	2.000	89.405	15.3746	4.3625	3.5242	0.4461	0.18710
3.70	2.000	17.027	1.2029	1.1408	1.0544	3.5674	0.99936
	4.000	18.478	1.4377	1.2942	1.1108	3.4388	0.99515
	6.000	20.032	1.7073	1.4589	1.1703	3.3121	0.98461
	8.000	21.688	2.0146	1.6330	1.2337	3.1858	0.96594
	10.000	23.444	2.3615	1.8141	1.3017	3.0591	0.93840
	12.000	25.297	2.7496	1.9998	1.3749	2.9315	0.90218
	14.000	27.246	3.1808	2.1877	1.4539	2.8026	0.85825
	16.000	29.287	3.6554	2.3751	1.5391	2.6728	0.80824
	18.000	31.423	4.1745	2.5600	1.6306	2.5420	0.75395
	20.000	33.653	4.7382	2.7406	1.7289	2.4105	0.69731
	22.000	35.985	5.3474	2.9156	1.8341	2.2783	0.64001
	24.000	38.426	6.0027	3.0840	1.9464	2.1453	0.58349
	26.000	40.991	6.7053	3.2452	2.0662	2.0114	0.52883
	28.000	43.704	7.4580	3.3993	2.1940	1.8758	0.47677
	30.000	46.605	8.2664	3.5467	2.3307	1.7375	0.42765
	32.000	49.768	9.1422	3.6886	2.4785	1.5940	0.38140
	34.000	53.344	10.1123	3.8277	2.6418	1.4404	0.33742
	36.000	57.760	11.2596	3.9721	2.8346	1.2623	0.29362
	37.713	65.847	13.1309	4.1705	3.1485	0.9675	0.23710
	36.000	72.443	14.3517	4.2802	3.3530	0.7577	0.20791
	34.000	75.135	14.7539	4.3136	3.4203	0.6814	0.19937
	32.000	77.009	14.9979	4.3332	3.4612	0.6324	0.19442
	30.000	78.492	15.1693	4.3467	3.4899	0.5962	0.19104
	28.000	79.740	15.2983	4.3567	3.5115	0.5680	0.18855
	26.000	80.828	15.3992	4.3644	3.5283	0.5451	0.18664
	24.000	81.802	15.4802	4.3706	3.5419	0.5261	0.18512
	22.000	82.688	15.5463	4.3756	3.5530	0.5103	0.18389

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$	M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.70	20.000	83.507	15.6008	4.3797	3.5621	0.4969	0.18289	3.75	2.000	89.416	16.2379	4.4261	3.6687	0.4428	0.17169
	18.000	84.274	15.6460	4.3831	3.5696	0.4856	0.18206								
	16.000	84.998	15.6836	4.3859	3.5759	0.4760	0.18138								
	14.000	85.687	15.7147	4.3882	3.5811	0.4680	0.18082	3.80	2.000	16.600	1.2083	1.1445	1.0558	3.6624	0.99931
	12.000	86.348	15.7402	4.3901	3.5854	0.4613	0.18035		4.000	18.048	1.4503	1.3022	1.1137	3.5291	0.99479
	10.000	86.988	15.7609	4.3916	3.5889	0.4558	0.17998		6.000	19.602	1.7294	1.4718	1.1750	3.3978	0.98349
	8.000	87.610	15.7772	4.3928	3.5916	0.4515	0.17969		8.000	21.258	2.0480	1.6511	1.2404	3.2669	0.96355
	6.000	88.219	15.7896	4.3937	3.5937	0.4481	0.17947		10.000	23.016	2.4088	1.8377	1.3108	3.1354	0.93423
	4.000	88.817	15.7982	4.3944	3.5951	0.4458	0.17932		12.000	24.872	2.8134	2.0288	1.3867	3.0031	0.89586
	2.000	89.411	15.8033	4.3947	3.5960	0.4444	0.17922		14.000	26.821	3.2631	2.2216	1.4688	2.8697	0.84963
									16.000	28.864	3.7592	2.4137	1.5575	2.7353	0.79728
									18.000	31.000	4.3021	2.6026	1.6530	2.6001	0.74088
3.75	2.000	16.810	1.2055	1.1426	1.0551	3.6149	0.99933		20.000	33.229	4.8923	2.7867	1.7556	2.4644	0.68241
	4.000	18.260	1.4440	1.2982	1.1123	3.4840	0.99497		22.000	35.556	5.5299	2.9644	1.8654	2.3283	0.62373
	6.000	19.814	1.7184	1.4654	1.1727	3.3550	0.98405		24.000	37.989	6.2157	3.1348	1.9828	2.1919	0.56627
	8.000	21.470	2.0312	1.6420	1.2370	3.2264	0.96476		26.000	40.542	6.9510	3.2975	2.1080	2.0548	0.51113
	10.000	23.227	2.3849	1.8258	1.3062	3.0974	0.93634		28.000	43.234	7.7378	3.4523	2.2414	1.9166	0.45902
	12.000	25.081	2.7813	2.0142	1.3808	2.9674	0.89905		30.000	46.105	8.5816	3.5997	2.3840	1.7761	0.41022
	14.000	27.030	3.2217	2.2046	1.4614	2.8363	0.85397		32.000	49.218	9.4923	3.7408	2.5375	1.6313	0.36471
	16.000	29.072	3.7069	2.3943	1.5482	2.7042	0.80280		34.000	52.702	10.4940	3.8780	2.7060	1.4778	0.32194
	18.000	31.207	4.2379	2.5813	1.6417	2.5712	0.74744		36.000	56.894	11.6543	4.0175	2.9009	1.3044	0.28030
	20.000	33.438	4.8148	2.7637	1.7422	2.4376	0.68987		38.000	64.192	13.4871	4.2039	3.2082	1.0293	0.22804
	22.000	35.767	5.4382	2.9401	1.8497	2.3034	0.63185		38.092	65.921	13.8756	4.2390	3.2733	0.9690	0.21868
	24.000	38.204	6.1086	3.1095	1.9645	2.1688	0.57486		38.000	67.568	14.2269	4.2696	3.3321	0.9133	0.21066
	26.000	40.762	6.8272	3.2714	2.0869	2.0333	0.51996		36.000	73.114	15.2586	4.3536	3.5048	0.7394	0.18932
	28.000	43.464	7.5969	3.4259	2.2175	1.8964	0.46786		34.000	75.572	15.6341	4.3822	3.5676	0.6701	0.18228
	30.000	46.350	8.4228	3.5733	2.3572	1.7570	0.41888		32.000	77.342	15.8710	4.3997	3.6073	0.6238	0.17802
	32.000	49.486	9.3159	3.7148	2.5078	1.6129	0.37300		30.000	78.762	16.0402	4.4120	3.6356	0.5892	0.17506
	34.000	53.014	10.3013	3.8529	2.6736	1.4594	0.32964		28.000	79.967	16.1687	4.4212	3.6571	0.5619	0.17286
	36.000	57.310	11.4538	3.9947	2.8672	1.2839	0.28696		26.000	81.022	16.2697	4.4284	3.6740	0.5397	0.17116
	37.906	65.884	13.5007	4.2052	3.2105	0.9683	0.22770		24.000	81.969	16.3512	4.4341	3.6876	0.5213	0.16980
	36.000	72.794	14.8041	4.3176	3.4287	0.7481	0.19834		22.000	82.833	16.4178	4.4387	3.6988	0.5058	0.16870
	34.000	75.361	15.1917	4.3484	3.4936	0.6755	0.19061		20.000	83.634	16.4729	4.4426	3.7080	0.4927	0.16780
	32.000	77.180	15.4318	4.3669	3.5338	0.6280	0.18602		18.000	84.383	16.5186	4.4457	3.7156	0.4816	0.16706
	30.000	78.631	15.6021	4.3798	3.5623	0.5926	0.18286		16.000	85.092	16.5567	4.4484	3.7220	0.4723	0.16644
	28.000	79.856	15.7307	4.3894	3.5838	0.5649	0.18053		14.000	85.767	16.5882	4.4505	3.7273	0.4644	0.16594
	26.000	80.927	15.8316	4.3968	3.6007	0.5423	0.17872		12.000	86.415	16.6141	4.4523	3.7316	0.4578	0.16552
	24.000	81.887	15.9128	4.4028	3.6143	0.5237	0.17728		10.000	87.043	16.6352	4.4537	3.7351	0.4524	0.16518
	22.000	82.762	15.9792	4.4076	3.6254	0.5080	0.17612		8.000	87.653	16.6518	4.4549	3.7379	0.4481	0.16492
	20.000	83.572	16.0339	4.4115	3.6345	0.4948	0.17517		6.000	88.251	16.6643	4.4557	3.7400	0.4448	0.16472
	18.000	84.330	16.0794	4.4148	3.6422	0.4836	0.17439		4.000	88.839	16.6731	4.4563	3.7414	0.4426	0.16458
	16.000	85.045	16.1172	4.4175	3.6485	0.4741	0.17374		2.000	89.421	16.6783	4.4567	3.7423	0.4412	0.16450
	14.000	85.727	16.1485	4.4198	3.6537	0.4662	0.17321								
	12.000	86.382	16.1743	4.4216	3.6580	0.4595	0.17277								
	10.000	87.016	16.1951	4.4231	3.6615	0.4541	0.17242	3.85	2.000	16.395	1.2110	1.1463	1.0564	3.7099	0.99928
	8.000	87.632	16.2116	4.4242	3.6643	0.4498	0.17214		4.000	17.843	1.4568	1.3063	1.1152	3.5741	0.99460
	6.000	88.235	16.2240	4.4251	3.6663	0.4465	0.17193		6.000	19.396	1.7405	1.4783	1.1773	3.4404	0.98291
	4.000	88.829	16.2327	4.4257	3.6678	0.4441	0.17178		8.000	21.053	2.0650	1.6603	1.2438	3.3071	0.96231

Oblique Shock Tables ($\gamma = 1.4$)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$	M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.85	10.000	22.812	2.4328	1.8495	1.3153	3.1734	0.93209	3.90	24.000	37.584	6.4345	3.1853	2.0201	2.2371	0.54918
	12.000	24.668	2.8456	2.0432	1.3927	3.0386	0.89264		26.000	40.126	7.2035	3.3492	2.1508	2.0968	0.49366
	14.000	26.619	3.3050	2.2386	1.4764	2.9028	0.84523		28.000	42.802	8.0258	3.5046	2.2901	1.9558	0.44158
	16.000	28.664	3.8121	2.4330	1.5668	2.7661	0.79172		30.000	45.646	8.9059	3.6519	2.4387	1.8131	0.39322
	18.000	30.799	4.3670	2.6239	1.6643	2.6287	0.73428		32.000	48.716	9.8536	3.7923	2.5983	1.6668	0.34848
	20.000	33.028	4.9706	2.8097	1.7691	2.4909	0.67493		34.000	52.126	10.8901	3.9278	2.7726	1.5130	0.30686
	22.000	35.353	5.6230	2.9887	1.8814	2.3529	0.61558		36.000	56.149	12.0723	4.0633	2.9710	1.3425	0.26706
	24.000	37.783	6.3245	3.1601	2.0013	2.2146	0.55770		38.000	62.087	13.6897	4.2224	3.2421	1.1106	0.22309
	26.000	40.330	7.0764	3.3234	2.1293	2.0760	0.50236		38.445	65.991	14.6407	4.3043	3.4014	0.9704	0.20173
	28.000	43.014	7.8808	3.4785	2.2656	1.9364	0.45026		38.000	69.501	15.4023	4.3647	3.5289	0.8527	0.18658
	30.000	45.871	8.7425	3.6259	2.4111	1.7948	0.40167		36.000	73.678	16.1768	4.4218	3.6584	0.7240	0.17273
	32.000	48.961	9.6715	3.7666	2.5677	1.6493	0.35654		34.000	75.956	16.5334	4.4468	3.7181	0.6600	0.16682
	34.000	52.407	10.6904	3.9030	2.7390	1.4957	0.31434		32.000	77.640	16.7653	4.4626	3.7569	0.6160	0.16313
	36.000	56.508	11.8605	4.0404	2.9355	1.3239	0.27366		30.000	79.006	16.9330	4.4738	3.7849	0.5828	0.16052
	38.000	62.939	13.5472	4.2095	3.2183	1.0767	0.22655		28.000	80.172	17.0613	4.4823	3.8064	0.5563	0.15857
	38.272	65.956	14.2556	4.2721	3.3369	0.9697	0.21003		26.000	81.199	17.1629	4.4890	3.8234	0.5347	0.15705
	38.000	68.733	14.8512	4.3214	3.4366	0.8764	0.19738		24.000	82.121	17.2449	4.4943	3.8371	0.5168	0.15583
	36.000	73.407	15.7160	4.3883	3.5814	0.7314	0.18079		22.000	82.966	17.3122	4.4986	3.8483	0.5016	0.15485
	34.000	75.770	16.0813	4.4150	3.6425	0.6649	0.17436		20.000	83.749	17.3680	4.5022	3.8576	0.4888	0.15404
	32.000	77.495	16.3155	4.4316	3.6816	0.6198	0.17039		18.000	84.483	17.4143	4.5052	3.8654	0.4780	0.15337
	30.000	78.888	16.4839	4.4433	3.7098	0.5859	0.16762		16.000	85.177	17.4529	4.5076	3.8718	0.4688	0.15281
	28.000	80.072	16.6122	4.4522	3.7313	0.5591	0.16555		14.000	85.840	17.4850	4.5097	3.8772	0.4610	0.15235
	26.000	81.112	16.7135	4.4591	3.7482	0.5372	0.16394		12.000	86.477	17.5113	4.5114	3.8816	0.4545	0.15198
	24.000	82.047	16.7952	4.4646	3.7619	0.5190	0.16266		10.000	87.093	17.5327	4.5127	3.8852	0.4492	0.15167
	22.000	82.901	16.8622	4.4691	3.7731	0.5037	0.16162		8.000	87.693	17.5496	4.5138	3.8880	0.4450	0.15143
	20.000	83.692	16.9175	4.4728	3.7823	0.4907	0.16076		6.000	88.280	17.5623	4.5146	3.8901	0.4418	0.15125
	18.000	84.434	16.9636	4.4758	3.7900	0.4798	0.16006		4.000	88.858	17.5713	4.5151	3.8916	0.4395	0.15113
	16.000	85.136	17.0019	4.4784	3.7964	0.4705	0.15947		2.000	89.430	17.5766	4.5155	3.8925	0.4382	0.15105
	14.000	85.804	17.0337	4.4805	3.8017	0.4627	0.15899								
	12.000	86.447	17.0598	4.4822	3.8061	0.4561	0.15859								
	10.000	87.068	17.0810	4.4836	3.8097	0.4508	0.15827	3.95	2.000	16.001	1.2166	1.1500	1.0578	3.8047	0.99923
	8.000	87.674	17.0978	4.4847	3.8125	0.4465	0.15802		4.000	17.447	1.4697	1.3144	1.1182	3.6641	0.99421
	6.000	88.266	17.1104	4.4855	3.8146	0.4433	0.15783		6.000	19.001	1.7630	1.4915	1.1821	3.5255	0.98171
	4.000	88.849	17.1193	4.4861	3.8161	0.4410	0.15770		8.000	20.660	2.0992	1.6786	1.2506	3.3874	0.95977
	2.000	89.426	17.1245	4.4865	3.8169	0.4397	0.15762		10.000	22.422	2.4815	1.8734	1.3246	3.2486	0.92768
									12.000	24.280	2.9112	2.0724	1.4048	3.1090	0.88602
									14.000	26.234	3.3902	2.2727	1.4917	2.9684	0.83626
3.90	2.000	16.196	1.2138	1.1482	1.0571	3.7573	0.99926		16.000	28.281	3.9194	2.4716	1.5858	2.8270	0.78046
	4.000	17.642	1.4633	1.3104	1.1167	3.6191	0.99441		18.000	30.417	4.4992	2.6664	1.6874	2.6851	0.72095
	6.000	19.196	1.7517	1.4849	1.1797	3.4830	0.98232		20.000	32.646	5.1304	2.8554	1.7967	2.5430	0.65992
	8.000	20.854	2.0821	1.6694	1.2472	3.3473	0.96105		22.000	34.969	5.8125	3.0370	1.9139	2.4010	0.59933
	10.000	22.614	2.4570	1.8614	1.3200	3.2111	0.92990		24.000	37.393	6.5462	3.2103	2.0391	2.2591	0.54068
	12.000	24.472	2.8783	2.0578	1.3987	3.0739	0.88935		26.000	39.929	7.3323	3.3748	2.1727	2.1172	0.48503
	14.000	26.424	3.3474	2.2557	1.4840	2.9357	0.84077		28.000	42.598	8.1726	3.5304	2.3149	1.9748	0.43302
	16.000	28.469	3.8655	2.4523	1.5763	2.7967	0.78611		30.000	45.431	9.0717	3.6778	2.4666	1.8310	0.38488
	18.000	30.605	4.4329	2.6452	1.6758	2.6570	0.72761		32.000	48.483	10.0386	3.8178	2.6294	1.6838	0.34053
	20.000	32.834	5.0501	2.8326	1.7828	2.5171	0.66743		34.000	51.859	11.0931	3.9524	2.8067	1.5299	0.29949
	22.000	35.157	5.7171	3.0129	1.8975	2.3771	0.60746		36.000	55.812	12.2888	4.0863	3.0073	1.3604	0.26054

Oblique Shock Tables (γ = 1.4)

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
3.95	38.000	61.406	13.8667	4.2383	3.2718	1.1389	0.21889
	38.612	66.026	15.0309	4.3358	3.4667	0.9711	0.19376
	38.000	70.101	15.9275	4.4038	3.6167	0.8345	0.17703
	36.000	73.928	16.6412	4.4541	3.7361	0.7172	0.16509
	34.000	76.131	16.9904	4.4776	3.7945	0.6554	0.15965
	32.000	77.777	17.2203	4.4927	3.8330	0.6125	0.15620
	30.000	79.120	17.3877	4.5035	3.8609	0.5798	0.15375
	28.000	80.268	17.5161	4.5117	3.8824	0.5537	0.15191
	26.000	81.281	17.6179	4.5181	3.8994	0.5324	0.15047
	24.000	82.192	17.7003	4.5232	3.9132	0.5147	0.14932
	22.000	83.028	17.7680	4.5274	3.9245	0.4997	0.14838
	20.000	83.803	17.8241	4.5309	3.9339	0.4870	0.14761
	18.000	84.529	17.8708	4.5338	3.9417	0.4762	0.14698
	16.000	85.218	17.9097	4.5362	3.9482	0.4671	0.14645
	14.000	85.874	17.9420	4.5381	3.9536	0.4594	0.14601
	12.000	86.505	17.9686	4.5398	3.9581	0.4530	0.14566
	10.000	87.116	17.9902	4.5411	3.9617	0.4477	0.14537
	8.000	87.711	18.0072	4.5421	3.9645	0.4435	0.14514
	6.000	88.294	18.0201	4.5429	3.9667	0.4404	0.14497
	4.000	88.868	18.0291	4.5434	3.9682	0.4381	0.14485
	2.000	89.435	18.0345	4.5438	3.9691	0.4368	0.14478
4.00	2.000	15.813	1.2194	1.1519	1.0586	3.8521	0.99920
	4.000	17.258	1.4763	1.3185	1.1196	3.7089	0.99401
	6.000	18.812	1.7743	1.4980	1.1844	3.5679	0.98110
	8.000	20.471	2.1166	1.6879	1.2540	3.4273	0.95845
	10.000	22.234	2.5061	1.8853	1.3293	3.2860	0.92542
	12.000	24.095	2.9445	2.0870	1.4109	3.1439	0.88264
	14.000	26.050	3.4334	2.2898	1.4994	3.0009	0.83170
	16.000	28.098	3.9741	2.4909	1.5954	2.8570	0.77474
	18.000	30.236	4.5667	2.6877	1.6991	2.7128	0.71422
	20.000	32.464	5.2116	2.8782	1.8107	2.5686	0.65240
	22.000	34.786	5.9090	3.0611	1.9304	2.4246	0.59123
	24.000	37.208	6.6592	3.2352	2.0583	2.2809	0.53224
	26.000	39.740	7.4625	3.4002	2.1947	2.1374	0.47648
	28.000	42.402	8.3215	3.5561	2.3401	1.9935	0.42453
	30.000	45.224	9.2397	3.7034	2.4949	1.8485	0.37666
	32.000	48.258	10.2259	3.8430	2.6609	1.7006	0.33272
	34.000	51.605	11.2995	3.9768	2.8413	1.5463	0.29223
	36.000	55.495	12.5100	4.1091	3.0444	1.3776	0.25409
	38.000	60.827	14.0647	4.2556	3.3049	1.1637	0.21432
	38.774	66.059	15.4261	4.3665	3.5329	0.9717	0.18613
	38.000	70.601	16.4407	4.4403	3.7026	0.8196	0.16833
	36.000	74.161	17.1095	4.4855	3.8144	0.7109	0.15785
	34.000	76.297	17.4525	4.5076	3.8718	0.6511	0.15282
	32.000	77.908	17.6808	4.5220	3.9099	0.6090	0.14959
	30.000	79.227	17.8479	4.5324	3.9379	0.5769	0.14729

M_1	θ	β	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	M_2	$\frac{p_{02}}{p_{01}}$
4.00	28.000	80.359	17.9765	4.5402	3.9594	0.5513	0.14555
	26.000	81.359	18.0787	4.5464	3.9765	0.5302	0.14419
	24.000	82.261	18.1615	4.5514	3.9903	0.5126	0.14310
	22.000	83.087	18.2296	4.5555	4.0017	0.4978	0.14221
	20.000	83.854	18.2861	4.5588	4.0111	0.4852	0.14148
	18.000	84.574	18.3331	4.5616	4.0190	0.4746	0.14087
	16.000	85.256	18.3723	4.5639	4.0255	0.4655	0.14037
	14.000	85.907	18.4049	4.5659	4.0310	0.4579	0.13996
	12.000	86.533	18.4317	4.5674	4.0355	0.4515	0.13962
	10.000	87.139	18.4535	4.5687	4.0391	0.4463	0.13934
	8.000	87.730	18.4707	4.5697	4.0420	0.4421	0.13912
	6.000	88.307	18.4837	4.5705	4.0442	0.4390	0.13896
	4.000	88.876	18.4928	4.5710	4.0457	0.4367	0.13885
	2.000	89.439	18.4982	4.5713	4.0466	0.4354	0.13878

2011 IIA Paper 3A3 (Fluid Mechanics II) Answers

Q1:

a) $\frac{p_s}{p_\infty} = 4.382 \quad \frac{p_{0s}}{p_{0\infty}} = 0.8856$

Q2:

b) $tan\theta = \frac{sin 2\beta}{(\gamma+1) - 2sin^2\beta}$

c) $\beta = 67.8^\circ$

d) $M_2 = 0.9622$ and $M_2 = 0.8829$ (both subsonic)

Q3:

b)ii) $\frac{V_p}{a_1} = -0.670$ iii) $p_2 = 41.87$ kPa

Q4:

a)i) $\frac{A_N}{A} = 0.6257$ ii) $\frac{F}{\dot{m}} = 776.4$ Ns/kg

b)i) $T_{02} = 861.1$ K ii) $\frac{F}{\dot{m}} = 930.1$ Ns/kg iii) $p_3 = 1.536$ bar

Q5:

b) $h_2 = 1.147$ m $v_2 = 3.419$ m/s

c) $x_{full} = 413.6$ m

Q6:

a) $U\left(\frac{u_{i+1,j} - u_{i,j}}{\Delta x}\right) = \mu\left(\frac{u_{i,j-1} - 2u_{i,j} + u_{i,j+1}}{(\Delta y)^2}\right)$

b) $\Delta x \le \frac{U(\Delta y)^2}{2\mu}$ and $\frac{\Delta x}{U} \ge 0$ (i.e. true forward difference in flow direction)

Q7:

a)i) $A = 14\times10^{-6}$ m^2 ii) $flux = -21.6\times10^{-3}$ kg/ms iii) $\frac{\partial\rho}{\partial t} = 1543$ kg/m^{3}s

c) $Y_p = 0.103$

Q8:

a) $u_1 = 136.7$ m/s $\Omega = 759.3$ rad/s

b) $v_2 = 102.5$ m/s $\alpha_2 = 36.9^\circ$ $T_{02} = 323.2$ K

c) $P_{02} = 1.276$ bar

d) $\dot{m} = 36.11$ kg/s

f) $\alpha_2^{rel,hub} = -22.9^\circ$ $\alpha_2^{rel,mid} = -42.5^\circ$ $\alpha_2^{rel,tip} = -53.5^\circ$

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