

ENGINEERING TRIPOS PART IIB

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Friday 28 April 2006 9 to 10.30

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Module 4A11

TURBOMACHINERY II

*Answer not more than two questions.*

*All questions carry the same number of marks.*

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

*Attachment:- Compressible Flow Data Book (38 pages).*

STATIONERY  
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**

1 (a) Explain why the flow deviation increases as the exit Mach number exceeds unity in a transonic turbine blade passage. For a two dimensional cascade with a throat opening to blade pitch ratio of 0.35, calculate the exit flow angle when the exit Mach number is 1.2, assuming that the throat is choked and the flow across it is uniform, the stagnation pressure loss up to the throat is negligible, and at the exit of the blade the stagnation pressure is 90% of that upstream of the blade. [25%]

(b) If the throat opening to blade pitch ratio of the above turbine cascade increases by 10%, calculate the change of deviation assuming the exit Mach number and the stagnation pressure loss are unchanged. Explain why the exit flow angle changes despite the exit pressure condition remaining constant. [20%]

(c) Explain why a transonic turbine blade can have very high relative turning but a transonic compressor blade usually has very little relative turning. How does a transonic compressor blade achieve high absolute flow turning with a relatively uncambered blade? Why, for high inlet Mach number, is part of the compressor blade sometimes designed to achieve negative turning? [30%]

(d) A 2-D transonic compressor rotor section has inlet relative Mach number 1.4 and inlet relative flow angle  $65^\circ$ . If the Mach number at the throat is 1.55, calculate the flow angle at the throat and the tangential blade blockage  $t/S$  at the throat. Comment on the validity of the assumption that Mach number and flow angle can be treated as uniform across the throat. [25%]

2 (a) Give a physical interpretation for each of the terms in the meridional stream line curvature equation as applied to the regions in between blade rows:

$$V_m \sin \phi \frac{\partial V_m}{\partial m} + \frac{V_m^2}{r_m} \cos \phi - \frac{V_\theta^2}{r} = -\frac{1}{\rho} \frac{\partial p}{\partial r}$$

where the symbols have their usual meanings. State the assumptions made in deriving this equation. [25%]

(b) Derive a simple radial equilibrium equation in the form

$$V_x \frac{dV_x}{dr} = \frac{dh_o}{dr} - T \frac{ds}{dr} - \frac{V_\theta}{r} \frac{d(rV_\theta)}{dr}.$$

Explain carefully the assumptions involved, and discuss why  $h_o$ ,  $s$  and  $rV_\theta$  are convenient quantities for analysing the flow in the regions in between blade rows. [25%]

(c) An axial flow turbine stage has a cylindrical hub and casing. The flow enters and leaves the stage with uniform axial velocity and without swirl. Assume that the loss, radial velocity and the streamline curvature throughout the stage are all negligible. What type of flow must be produced by the stator, and what must the work distribution be along the rotor span? [25%]

(d) Comment on why it is not desirable for the reaction of a turbine to drop below zero. If the stage in part (c) above is designed to have 50% reaction at mid-span, and the blade has a hub-to-tip ratio  $R_h/R_t = 0.6$ , find the reaction at the hub section. [25%]

3 (a) It is found that the secondary flow in some “boring” turbine stators, in particular those with a low hub-to-tip ratio ( $R_h/R_t$ ), is stronger near the hub than near the tip. Discuss the possible causes of this difference and whether any three-dimensional design features can help to reduce this difference. [20%]

(b) Stator lean can be used effectively to alter the radial distribution of the stage reaction. Explain clearly how blade lean works in this case and how the blade needs to be leant if the reaction at the hub is to be increased. [20%]

(c) Comment on the application of Euler equation solvers to two-dimensional blade-to-blade flows in turbine and compressor blade section design. [20%]

(d) Explain why small errors in mass flow conservation in internal flow calculations can have a disproportionate effect on the accuracy of the solution obtained. What techniques are most commonly used in numerical algorithms to address this? [20%]

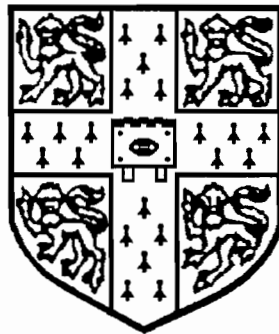
(e) Describe the boundary conditions required for solving the 3-D steady Euler equations in turbomachinery blade passages with subsonic speeds at both inlet and exit. State clearly how many boundary conditions are required and which are commonly used. For a transonic fan rotor, the *relative* flow to the blade is partially subsonic and partially supersonic. How should the inlet boundary conditions be specified? [20%]

**END OF PAPER**

# Compressible Flow Data Book

for Part II of the  
Engineering Tripos

**2004 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)  $T_0 = \text{const.}$  in adiabatic flow with no shaft work

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

**Mach number relations (see tables)**

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

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

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

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

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

# 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

$$V V_s = a^*{}^2$$

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

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

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

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

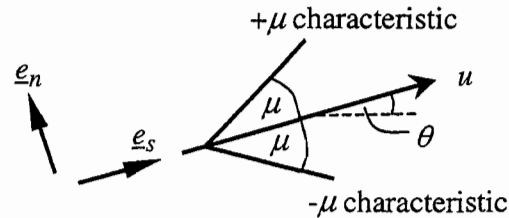
$$\frac{T_s}{T} = \frac{\gamma-1}{(\gamma+1)^2} \frac{2}{M^2} \left( 1 + \frac{\gamma-1}{2} M^2 \right) \left( \frac{2\gamma}{\gamma-1} M^2 - 1 \right)$$

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

# TWO DIMENSIONAL SUPERSONIC FLOW

## Method of Characteristics for 2-D supersonic flow

Applicable to adiabatic ( $h_0 = \text{constant}$ ), isentropic flow



**Mach Number**  $M = u/c$

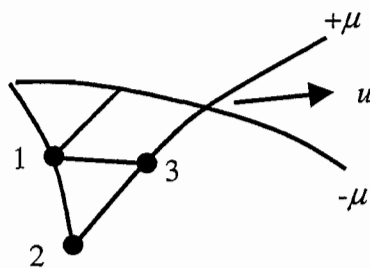
**Mach angle**  $\mu = \sin^{-1}\left(\frac{1}{M}\right)$

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

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

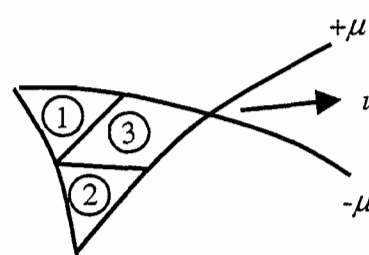
### Calculations

Lattice Method



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

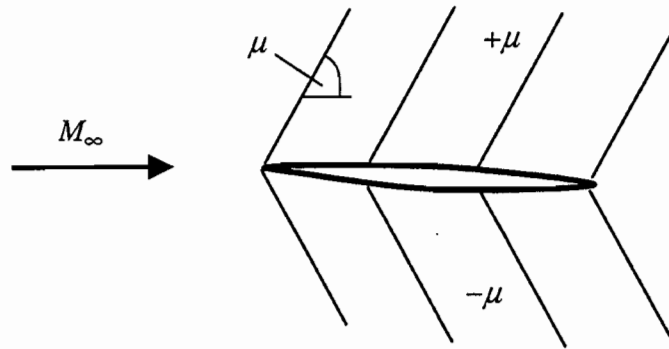
Field (or wave) method



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



**Linearised Method of Characteristics (thin film theory)**

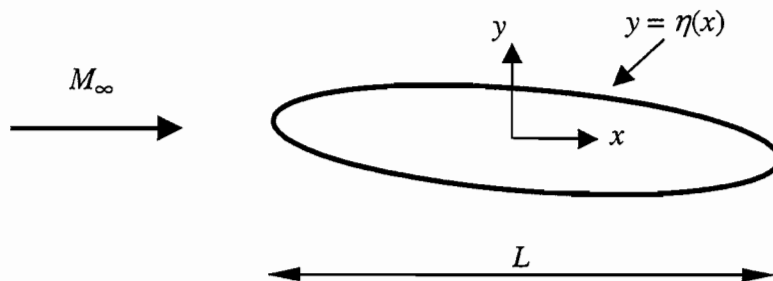


$$\mu \approx \sin^{-1}(1/M_\infty)$$

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

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

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



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

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

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

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

### Oblique Shock Relations (see tables)

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

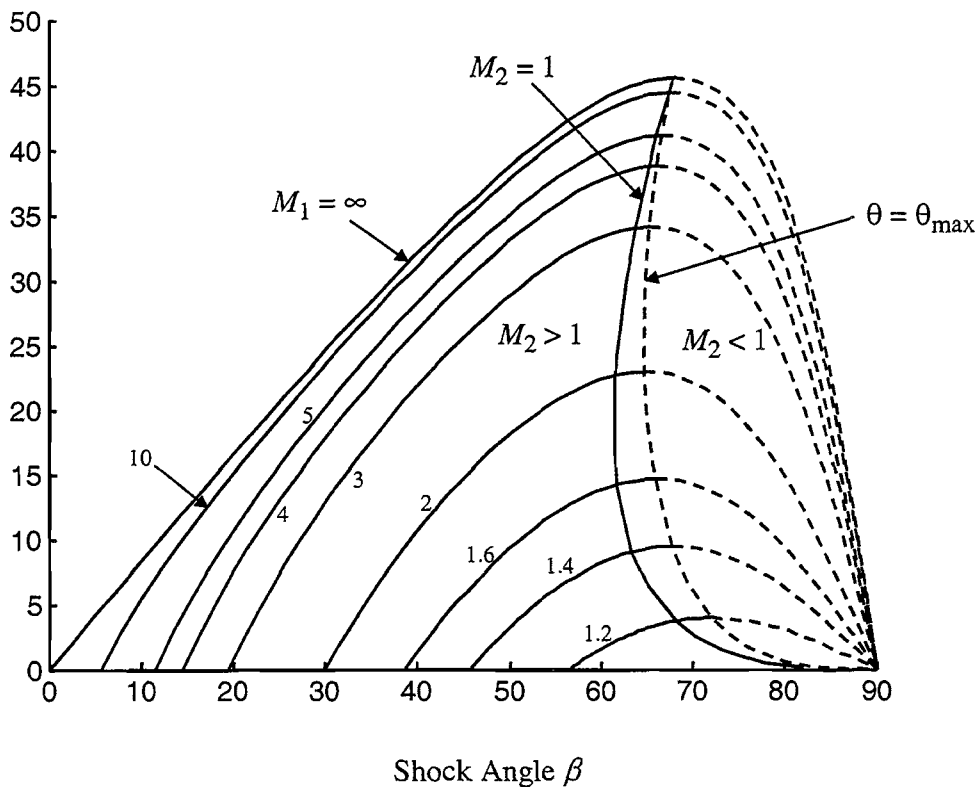
$$\frac{T_2}{T_1} = \frac{\gamma-1}{(\gamma+1)^2} \frac{2}{M_1^2 \sin^2 \beta} \left( 1 + \frac{\gamma-1}{2} M_1^2 \sin^2 \beta \right) \left( \frac{2\gamma}{\gamma-1} M_1^2 \sin^2 \beta - 1 \right)$$

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

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

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

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



# GAS FLOW TABLES ( $\gamma=1.400$ ): SUBSONIC FLOW

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$
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

$$\gamma=1.400$$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2}\rho V^2$
									$p_0$
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 ( $\gamma=1.400$ ): SUPERSONIC FLOW

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$\nu$	$M$
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	0.5859	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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2} \frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$\nu$	$M$
1.260	0.7590	0.3609	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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$v$	$M$
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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$\nu$	$M$
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



$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$\nu$	$M$
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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{P}{P_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A P_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A P}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{\frac{1}{2}\rho V^2}{P_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$v$	$M$
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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$v$	$M$
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

$\gamma=1.400$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$	$M_s$	$\frac{P_{0s}}{P_0}$	$\frac{P_s}{P}$	$\frac{P_{0s}}{P}$	$\frac{T_s}{T}$	$\nu$	$M$
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 ( $\gamma=1.333$ ): SUBSONIC FLOW

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\rho V^2$ $p_0$
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

$$\gamma=1.333$$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2}\rho V^2$ $p_0$
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 ( $\gamma=1.333$ ): SUPERSONIC FLOW

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{Ap}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{max}}{D}$	$\frac{1}{2}\frac{\rho V^2}{p_0}$
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

$$\gamma=1.333$$

$M$	$\frac{T}{T_0}$	$\frac{p}{p_0}$	$\frac{\rho}{\rho_0}$	$\frac{V}{\sqrt{c_p T_0}}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p_0}$	$\frac{\dot{m}\sqrt{c_p T_0}}{A p}$	$\frac{F}{\dot{m}\sqrt{c_p T_0}}$	$\frac{4c_f L_{\max}}{D}$	$\frac{1}{2}\rho V^2$ $p_0$
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 ( $\gamma = 1.4$ )

$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$
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	0.98344		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		4.000	46.543	1.2165	1.1500	1.0578	1.3615	0.99923
	5.286	70.540	1.4539	1.3045	1.1146	0.9423	0.99468		6.000	49.326	1.3433	1.2337	1.0888	1.2879	0.99739
	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		2.000	42.315	1.1036	1.0729	1.0286	1.4821	0.99990
	4.000	53.965	1.2238	1.1549	1.0596	1.1994	0.99916	1.55	4.000	44.642	1.2173	1.1505	1.0580	1.4130	0.99923
	6.000	58.232	1.3702	1.2512	1.0952	1.1089	0.99682		6.000	47.214	1.3430	1.2336	1.0887	1.3414	0.99739
	8.000	66.914	1.6327	1.4145	1.1543	0.9543	0.98812		8.000	50.131	1.4845	1.3236	1.1215	1.2651	0.99375
	8.048	68.470	1.6732	1.4387	1.1630	0.9307	0.98627		10.000	53.598	1.6491	1.4243	1.1578	1.1804	0.98738
	8.000	70.023	1.7114	1.4613	1.1712	0.9085	0.98440		12.000	58.240	1.8597	1.5469	1.2022	1.0758	0.97615
	6.000	78.660	1.8774	1.5569	1.2058	0.8111	0.97506		13.403	66.171	2.1787	1.7206	1.2663	0.9198	0.95362
	4.000	83.028	1.9283	1.5854	1.2163	0.7807	0.97182		12.000	73.688	2.4151	1.8408	1.3120	0.8014	0.93367
	2.000	86.644	1.9523	1.5988	1.2211	0.7662	0.97023		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 p1

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
1.60	2.000	40.724	1.1046	1.0736	1.0289	1.5323	0.99990	1.70	6.000	84.848	3.1778	2.1865	1.4534	0.6547	0.85856	
	4.000	42.931	1.2189	1.1516	1.0584	1.4638	0.99921		4.000	86.619	3.1933	2.1929	1.4562	0.6467	0.85695	
	6.000	45.344	1.3446	1.2346	1.0891	1.3934	0.99736		2.000	88.325	3.2021	2.1965	1.4578	0.6421	0.85602	
	8.000	48.030	1.4843	1.3236	1.1215	1.3195	0.99376		1.75	2.000	36.689	1.1087	1.0765	1.0300	1.6816	0.99989
	10.000	51.116	1.6430	1.4207	1.1565	1.2397	0.98766			4.000	38.651	1.2271	1.1571	1.0605	1.6133	0.99913
	12.000	54.889	1.8320	1.5311	1.1965	1.1483	0.97781			6.000	40.756	1.3561	1.2421	1.0918	1.5441	0.99713
	14.000	60.537	2.0974	1.6777	1.2502	1.0232	0.95590			8.000	43.034	1.4973	1.3317	1.1244	1.4733	0.99334
	14.652	65.828	2.3192	1.7929	1.2936	0.9188	0.94204			10.000	45.531	1.6529	1.4266	1.1586	1.3995	0.98721
	14.000	70.895	2.5000	1.8824	1.3281	0.8320	0.92598			12.000	48.319	1.8263	1.5279	1.1953	1.3210	0.97814
	12.000	75.900	2.6428	1.9504	1.3550	0.7611	0.91256			14.000	51.547	2.0245	1.6384	1.2357	1.2348	0.96524
	10.000	79.102	2.7132	1.9831	1.3682	0.7250	0.90574			16.000	55.589	2.2652	1.7654	1.2831	1.1329	0.94660
	8.000	81.691	2.7676	2.0035	1.3764	0.7018	0.90139			18.000	62.944	2.6670	1.9617	1.3595	0.9645	0.91023
6.000	83.967	2.7870	2.0168	1.3819	0.6862	0.89848	18.121	65.134		2.7745	2.0112	1.3795	0.9189	0.89972		
4.000	86.061	2.8059	2.0254	1.3854	0.6761	0.89660	18.000	67.269		2.8728	2.0554	1.3977	0.8766	0.88991		
2.000	88.054	2.8166	2.0302	1.3873	0.6703	0.89554	16.000	73.757		3.1267	2.1651	1.4441	0.7635	0.86389		
1.65	2.000	39.267	1.1058	1.0744	1.0292	1.5823	0.99990	14.000	76.988	3.2251	2.2060	1.4620	0.7175	0.85362		
	4.000	41.377	1.2212	1.1531	1.0590	1.5140	0.99919	12.000	79.465	3.2868	2.2312	1.4731	0.6878	0.84714		
	6.000	43.665	1.3475	1.2365	1.0898	1.4444	0.99730	10.000	81.570	3.3295	2.2484	1.4808	0.6669	0.84266		
	8.000	46.181	1.4869	1.3252	1.1221	1.3720	0.99367	8.000	83.451	3.3598	2.2606	1.4862	0.6518	0.83947		
	10.000	49.007	1.6429	1.4206	1.1565	1.2952	0.98766	6.000	85.190	3.3811	2.2691	1.4901	0.6409	0.83722		
	12.000	52.312	1.8224	1.5257	1.1945	1.2104	0.97837	4.000	86.838	3.3954	2.2748	1.4926	0.6337	0.83571		
	14.000	56.541	2.0441	1.6490	1.2396	1.1090	0.96384	2.000	88.432	3.4036	2.2780	1.4941	0.6295	0.83485		
	15.855	65.547	2.4653	1.8655	1.3215	0.9184	0.92915	1.80	2.000	35.538	1.1104	1.0776	1.0304	1.7312	0.99988	
	14.000	73.864	2.7642	2.0065	1.3776	0.7782	0.90073		4.000	37.444	1.2306	1.1594	1.0613	1.6624	0.99909	
	12.000	77.411	2.8587	2.0491	1.3951	0.7317	0.89132		6.000	39.481	1.3615	1.2455	1.0931	1.5932	0.99701	
	10.000	80.102	2.9157	2.0744	1.4056	0.7029	0.88557		8.000	41.673	1.5044	1.3360	1.1260	1.5225	0.99310	
	8.000	82.389	2.9539	2.0911	1.4126	0.6833	0.88169		10.000	44.057	1.6611	1.4315	1.1604	1.4494	0.98683	
6.000	84.446	2.9798	2.1024	1.4174	0.6697	0.87904	12.000		46.686	1.8345	1.5326	1.1970	1.3725	0.97766		
4.000	86.364	2.9968	2.1097	1.4205	0.6607	0.87730	14.000		49.661	2.0295	1.6411	1.2367	1.2896	0.96489		
2.000	88.200	3.0065	2.1139	1.4222	0.6556	0.87631	16.000		53.198	2.2568	1.7611	1.2815	1.1958	0.94729		
1.70	2.000	37.927	1.1072	1.0754	1.0295	1.6320	0.99989		18.000	57.995	2.5516	1.9072	1.3379	1.0766	0.92120	
	4.000	39.957	1.2239	1.1550	1.0597	1.5638	0.99916		19.183	64.987	2.9376	2.0839	1.4096	0.9195	0.88335	
	6.000	42.145	1.3514	1.2390	1.0907	1.4946	0.99722		18.000	71.424	3.2297	2.2079	1.4628	0.7956	0.85313	
	8.000	44.528	1.4914	1.3280	1.1231	1.4232	0.99353		16.000	75.324	3.3707	2.2650	1.4882	0.7327	0.83832	
	10.000	47.167	1.6466	1.4228	1.1573	1.3482	0.98750	14.000	78.020	3.4505	2.2965	1.5025	0.6958	0.82990		
	12.000	50.168	1.8216	1.5252	1.1943	1.2674	0.97841	12.000	80.214	3.5041	2.3174	1.5121	0.6703	0.82423		
	14.000	53.771	2.0273	1.6399	1.2362	1.1757	0.96504	10.000	82.128	3.5424	2.3322	1.5189	0.6518	0.82018		
	16.000	58.794	2.2999	1.7831	1.2898	1.0569	0.94369	8.000	83.865	3.5702	2.3428	1.5239	0.6381	0.81725		
	17.012	65.319	2.6171	1.9383	1.3502	0.9185	0.91502	6.000	85.485	3.5899	2.3503	1.5274	0.6283	0.81516		
	16.000	71.426	2.8629	2.0510	1.3959	0.8077	0.89090	4.000	87.028	3.6032	2.3554	1.5298	0.6216	0.81376		
	14.000	75.670	2.9984	2.1104	1.4208	0.7439	0.87713	2.000	88.525	3.6108	2.3583	1.5311	0.6178	0.81295		
	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										

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
1.85	2.000	34.466	1.1121	1.0788	1.0309	1.7805	0.99988	1.95	2.000	32.528	1.1160	1.0815	1.0319	1.8790	0.99987
	4.000	36.323	1.2343	1.1619	1.0623	1.7114	0.99905		4.000	34.304	1.2424	1.1674	1.0643	1.8085	0.99896
	6.000	38.302	1.3672	1.2492	1.0945	1.6418	0.99689		6.000	36.191	1.3801	1.2575	1.0975	1.7380	0.99660
	8.000	40.424	1.5123	1.3409	1.1278	1.5711	0.99284		8.000	38.204	1.5302	1.3521	1.1318	1.6666	0.99221
	10.000	42.717	1.6709	1.4373	1.1625	1.4983	0.98638		10.000	40.360	1.6938	1.4509	1.1674	1.5938	0.98528
	12.000	45.223	1.8453	1.5388	1.1992	1.4224	0.97701		12.000	42.688	1.8726	1.5542	1.2049	1.5185	0.97535
	14.000	48.014	2.0395	1.6465	1.2387	1.3415	0.96417		14.000	45.230	2.0693	1.6625	1.2446	1.4396	0.96200
	16.000	51.232	2.2607	1.7631	1.2822	1.2524	0.94697		16.000	48.059	2.2879	1.7770	1.2875	1.3553	0.94470
	18.000	55.227	2.5275	1.8956	1.3333	1.1476	0.92345		18.000	51.320	2.5368	1.9001	1.3351	1.2622	0.92258
	20.000	62.099	2.9519	2.0902	1.4123	0.9818	0.88189		20.000	55.381	2.8378	2.0397	1.3913	1.1520	0.89342
	20.198	64.872	3.1062	2.1565	1.4404	0.9205	0.86601		22.000	62.860	3.3464	2.2553	1.4838	0.9655	0.84087
	20.000	67.544	3.2437	2.2136	1.4653	0.8648	0.85167		22.092	64.716	3.4603	2.3003	1.5043	0.9229	0.82885
	18.000	73.440	3.5019	2.3165	1.5117	0.7560	0.82446		22.000	66.523	3.5655	2.3410	1.5231	0.8829	0.81774
	16.000	76.511	3.6090	2.3576	1.5308	0.7085	0.81314		20.000	72.926	3.8872	2.4601	1.5801	0.7555	0.78384
	14.000	78.861	3.6772	2.3833	1.5429	0.6773	0.80593		18.000	75.964	4.0086	2.5030	1.6015	0.7045	0.77114
	12.000	80.844	3.7252	2.4011	1.5514	0.6548	0.80088		16.000	78.253	4.0857	2.5297	1.6151	0.6710	0.76313
	10.000	82.606	3.7601	2.4140	1.5576	0.6381	0.79719		14.000	80.165	4.1401	2.5484	1.6246	0.6467	0.75750
	8.000	84.222	3.7858	2.4234	1.5622	0.6257	0.79449		12.000	81.849	4.1804	2.5620	1.6317	0.6283	0.75335
	6.000	85.740	3.8042	2.4301	1.5655	0.6166	0.79255		10.000	83.381	4.2106	2.5722	1.6370	0.6142	0.75024
	4.000	87.193	3.8167	2.4346	1.5677	0.6105	0.79124		8.000	84.808	4.2333	2.5798	1.6409	0.6036	0.74791
	2.000	88.606	3.8239	2.4373	1.5689	0.6069	0.79048		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
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	2.00	2.000	31.647	1.1180	1.0829	1.0324	1.9280	0.99986
	8.000	39.272	1.5209	1.3463	1.1297	1.6191	0.99254		4.000	33.390	1.2468	1.1702	1.0654	1.8568	0.99891
	10.000	41.490	1.6818	1.4438	1.1649	1.5464	0.98586		6.000	35.241	1.3871	1.2620	1.0991	1.7856	0.99644
	12.000	43.898	1.8582	1.5460	1.2019	1.4709	0.97624		8.000	37.210	1.5400	1.3581	1.1339	1.7138	0.99186
	14.000	46.550	2.0530	1.6538	1.2414	1.3913	0.96319		10.000	39.314	1.7066	1.4584	1.1702	1.6405	0.98464
	16.000	49.544	2.2718	1.7688	1.2844	1.3052	0.94605		12.000	41.575	1.8884	1.5631	1.2081	1.5651	0.97437
	18.000	53.095	2.5263	1.8951	1.3331	1.2077	0.92356		14.000	44.029	2.0876	1.6724	1.2483	1.4866	0.96064
	20.000	57.900	2.8557	2.0477	1.3946	1.0835	0.89162		16.000	46.731	2.3076	1.7870	1.2913	1.4034	0.94304
	21.167	64.783	3.2805	2.2286	1.4720	0.9216	0.84781		18.000	49.785	2.5546	1.9086	1.3384	1.3131	0.92092
	20.000	71.057	3.6012	2.3546	1.5294	0.7935	0.81397		20.000	53.423	2.8429	2.0420	1.3922	1.2102	0.89291
	18.000	74.861	3.7578	2.4131	1.5572	0.7274	0.79744		22.000	58.457	3.2228	2.2051	1.4616	1.0760	0.85385
	16.000	77.463	3.8466	2.4455	1.5729	0.6884	0.78810		22.974	64.669	3.6458	2.3715	1.5373	0.9243	0.80926
	14.000	79.565	3.9068	2.4671	1.5836	0.6611	0.78178		22.000	70.332	3.9714	2.4899	1.5950	0.8017	0.77503
	12.000	81.383	3.9504	2.4826	1.5913	0.6409	0.77721		20.000	74.270	4.1570	2.5541	1.6276	0.7278	0.75576
	10.000	83.020	3.9828	2.4940	1.5970	0.6257	0.77383		18.000	76.862	4.2589	2.5883	1.6454	0.6854	0.74529
	8.000	84.534	4.0068	2.5024	1.6012	0.6142	0.77133		16.000	78.921	4.3277	2.6110	1.6574	0.6558	0.73827
	6.000	85.965	4.0241	2.5084	1.6042	0.6058	0.76953		14.000	80.684	4.3777	2.6274	1.6662	0.6337	0.73319
	4.000	87.338	4.0359	2.5125	1.6063	0.6001	0.76830		12.000	82.257	4.4153	2.6396	1.6727	0.6168	0.72939
	2.000	88.677	4.0428	2.5149	1.6075	0.5967	0.76759		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 ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
2.05	2.000	30.816	1.1200	1.0843	1.0330	1.9771	0.99985	2.10	4.000	87.778	4.9706	2.8097	1.7691	0.5648	0.67494	
	4.000	32.532	1.2512	1.1732	1.0665	1.9050	0.99885		2.000	88.894	4.9764	2.8113	1.7701	0.5622	0.67438	
	6.000	34.350	1.3943	1.2666	1.1008	1.8330	0.99627		2.15	2.000	29.293	1.1243	1.0672	1.0341	2.0749	0.99984
	8.000	36.281	1.5502	1.3644	1.1362	1.7605	0.99148			4.000	30.960	1.2606	1.1794	1.0688	2.0008	0.99874
	10.000	38.341	1.7201	1.4664	1.1730	1.6868	0.98396			6.000	32.725	1.4094	1.2763	1.1043	1.9271	0.99580
	12.000	40.547	1.9053	1.5726	1.2116	1.6111	0.97330			8.000	34.596	1.5719	1.3777	1.1410	1.8529	0.99065
	14.000	42.928	2.1076	1.6831	1.2522	1.5326	0.95914			10.000	36.584	1.7490	1.4833	1.1791	1.7778	0.98246
	16.000	45.528	2.3300	1.7983	1.2956	1.4500	0.94112			12.000	38.702	1.9417	1.5929	1.2190	1.7011	0.97093
	18.000	48.428	2.5774	1.9195	1.3427	1.3614	0.91878			14.000	40.971	2.1518	1.7065	1.2610	1.6221	0.95574
	20.000	51.785	2.8600	2.0497	1.3953	1.2630	0.89120			16.000	43.422	2.3813	1.8241	1.3055	1.5397	0.93666
	22.000	56.032	3.2057	2.1980	1.4585	1.1444	0.85565			18.000	46.104	2.6337	1.9461	1.3533	1.4527	0.91343
	23.814	64.638	3.8367	2.4419	1.5712	0.9257	0.78913			20.000	49.106	2.9150	2.0740	1.4055	1.3588	0.88564
	22.000	72.193	4.2777	2.5946	1.6487	0.7626	0.74336			22.000	52.618	3.2384	2.2115	1.4644	1.2534	0.85222
	20.000	75.324	4.4215	2.6416	1.6738	0.7056	0.72876			24.000	57.217	3.6452	2.3712	1.5372	1.1223	0.80932
	18.000	77.614	4.5107	2.6700	1.6894	0.6688	0.71981			25.376	64.616	4.2352	2.5804	1.6413	0.9289	0.74772
	16.000	79.498	4.5734	2.6898	1.7003	0.6422	0.71356			22.000	71.164	4.6641	2.7180	1.7160	0.7794	0.70458
	14.000	81.138	4.6199	2.7043	1.7084	0.6219	0.70894			20.000	74.564	4.8442	2.7725	1.7472	0.7122	0.68703
	12.000	82.617	4.6553	2.7152	1.7145	0.6062	0.70545			18.000	78.817	5.0234	2.8249	1.7782	0.6413	0.65994
	10.000	83.983	4.6824	2.7236	1.7192	0.5939	0.70278			16.000	80.444	5.0776	2.8405	1.7876	0.6188	0.65484
	8.000	85.269	4.7029	2.7299	1.7228	0.5846	0.70077			14.000	81.896	5.1191	2.8523	1.7947	0.6012	0.65097
6.000	86.497	4.7179	2.7344	1.7254	0.5776	0.69930	12.000	83.224	5.1512	2.8613	1.8003	0.5874	0.65798			
4.000	87.685	4.7283	2.7376	1.7272	0.5728	0.69829	10.000	84.464	5.1761	2.8683	1.8046	0.5765	0.65568			
2.000	88.849	4.7343	2.7394	1.7282	0.5700	0.69770	8.000	85.639	5.1951	2.8736	1.8078	0.5680	0.65392			
2.10	2.000	30.033	1.1222	1.0858	1.0335	2.0280	0.99984	2.20	2.000	28.592	1.1266	1.0888	1.0347	2.1237	0.99983	
	4.000	31.723	1.2558	1.1763	1.0676	1.9530	0.99880		4.000	30.238	1.2654	1.1826	1.0700	2.0485	0.99867	
	6.000	33.513	1.4017	1.2714	1.1025	1.8801	0.99609		6.000	31.981	1.4173	1.2813	1.1061	1.9738	0.99569	
	8.000	35.412	1.5608	1.3709	1.1386	1.8069	0.99108		8.000	33.827	1.5832	1.3845	1.1435	1.8987	0.99020	
	10.000	37.433	1.7342	1.4746	1.1760	1.7325	0.98324		10.000	35.785	1.7641	1.4921	1.1823	1.8228	0.98165	
	12.000	39.592	1.9230	1.5825	1.2152	1.6564	0.97216		12.000	37.869	1.9611	1.6036	1.2229	1.7454	0.96964	
	14.000	41.912	2.1290	1.6944	1.2565	1.5777	0.95750		14.000	40.095	2.1756	1.7190	1.2656	1.6657	0.95387	
	16.000	44.430	2.3547	1.8107	1.3004	1.4954	0.93899		16.000	42.489	2.4095	1.8380	1.3109	1.5831	0.93417	
	18.000	47.210	2.6041	1.9322	1.3478	1.4078	0.91626		18.000	45.092	2.6658	1.9611	1.3593	1.4963	0.91035	
	20.000	50.365	2.8848	2.0607	1.3999	1.3122	0.88870		20.000	47.975	2.9494	2.0891	1.4118	1.4035	0.88215	
	22.000	54.169	3.2152	2.2019	1.4602	1.2019	0.85466		22.000	51.277	3.2704	2.2245	1.4701	1.3013	0.84887	
	24.000	59.767	3.6739	2.3820	1.5424	1.0493	0.80628		24.000	55.356	3.6552	2.3750	1.5390	1.1805	0.80826	
	24.614	64.621	4.0332	2.5116	1.6058	0.9273	0.76858		26.000	62.695	4.2918	2.5992	1.6512	0.9795	0.74193	
	24.000	69.104	4.3238	2.6098	1.6568	0.8245	0.73867		26.103	64.620	4.4426	2.6484	1.6775	0.9305	0.72663	
	22.000	73.521	4.5644	2.6870	1.6987	0.7345	0.71445		26.000	66.480	4.5807	2.6921	1.7015	0.8949	0.71283	
	20.000	76.189	4.6852	2.7244	1.7197	0.6870	0.70251		24.000	72.560	4.9728	2.8103	1.7695	0.7490	0.67473	
	18.000	78.257	4.7652	2.7488	1.7336	0.6543	0.69468		22.000	75.420	5.1222	2.8531	1.7953	0.6936	0.66068	
	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										

Oblique Shock p4

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
2.20	20.000	77.549	5.2175	2.8799	1.8117	0.6568	0.65185	2.30	16.000	40.816	2.4701	1.8678	1.3224	1.6676	0.92872
	18.000	79.308	5.2856	2.8987	1.8234	0.6296	0.64562		18.000	43.299	2.7360	1.9936	1.3724	1.5804	0.90351
	16.000	80.839	5.3369	2.9127	1.8323	0.6086	0.64096		20.000	46.007	3.0276	2.1230	1.4261	1.4885	0.87413
	14.000	82.216	5.3764	2.9235	1.8391	0.5921	0.63739		22.000	49.026	3.3514	2.2573	1.4847	1.3894	0.84035
	12.000	83.483	5.4073	2.9318	1.8444	0.5789	0.63462		24.000	52.536	3.7216	2.3998	1.5508	1.2788	0.80125
	10.000	84.670	5.4313	2.9382	1.8485	0.5686	0.63247		26.000	57.077	4.1819	2.5625	1.6319	1.1425	0.75319
	8.000	85.798	5.4497	2.9431	1.8517	0.5605	0.63083		27.454	64.653	4.8739	2.7813	1.7524	0.9338	0.68417
	6.000	86.883	5.4633	2.9468	1.8540	0.5545	0.62962		26.000	71.264	5.3682	2.9212	1.8377	0.7743	0.63813
	4.000	87.938	5.4727	2.9493	1.8556	0.5503	0.62879		24.000	74.512	5.5649	2.9736	1.8714	0.7060	0.62065
	2.000	88.973	5.4782	2.9507	1.8565	0.5479	0.62830		22.000	76.770	5.6817	3.0039	1.8915	0.6635	0.61049
2.25	2.000	27.926	1.1288	1.0903	1.0353	2.1725	0.99982	20.000	78.582	5.7631	3.0246	1.9054	0.6328	0.60352	
	4.000	29.555	1.2703	1.1859	1.0712	2.0962	0.99861	18.000	80.133	5.8238	3.0399	1.9158	0.6092	0.59838	
	6.000	31.277	1.4254	1.2864	1.1080	2.0203	0.99548	16.000	81.509	5.8705	3.0515	1.9238	0.5906	0.59445	
	8.000	33.102	1.5949	1.3916	1.1461	1.9443	0.98973	14.000	82.764	5.9071	3.0606	1.9301	0.5757	0.59139	
	10.000	35.034	1.7798	1.5011	1.1856	1.8674	0.98079	12.000	83.928	5.9360	3.0677	1.9350	0.5638	0.58899	
	12.000	37.088	1.9812	1.6147	1.2270	1.7891	0.96827	10.000	85.026	5.9586	3.0732	1.9389	0.5543	0.58712	
	14.000	39.277	2.2004	1.7319	1.2705	1.7088	0.95189	8.000	86.074	5.9761	3.0775	1.9419	0.5469	0.58568	
	16.000	41.623	2.4392	1.8527	1.3166	1.6257	0.93152	6.000	87.085	5.9890	3.0807	1.9441	0.5413	0.58461	
	18.000	44.161	2.7000	1.9770	1.3657	1.5388	0.90703	4.000	88.070	5.9980	3.0828	1.9456	0.5374	0.58387	
	20.000	46.948	2.9871	2.1055	1.4187	1.4466	0.87829	2.000	89.039	6.0033	3.0841	1.9465	0.5352	0.58344	
	22.000	50.091	3.3085	2.2400	1.4770	1.3464	0.84486	2.35	2.000	26.692	1.1334	1.0935	1.0365	2.2698	0.99980
	24.000	53.837	3.6830	2.3854	1.5440	1.2318	0.80532		4.000	28.289	1.2804	1.1926	1.0736	2.1911	0.99846
	26.000	59.122	4.1839	2.5632	1.6323	1.0792	0.75298		6.000	29.979	1.4420	1.2970	1.1118	2.1129	0.99502
	28.000	64.633	4.6556	2.7153	1.7145	0.9321	0.70542		8.000	31.765	1.6189	1.4062	1.1513	2.0346	0.98872
	30.000	69.627	5.0238	2.8250	1.7783	0.8115	0.66991		10.000	33.657	1.8124	1.5199	1.1924	1.9567	0.97895
	32.000	73.634	5.2707	2.8946	1.8209	0.7254	0.64698		12.000	35.662	2.0232	1.6376	1.2354	1.8755	0.96534
	34.000	76.145	5.4009	2.9301	1.8433	0.6775	0.63519		14.000	37.790	2.2526	1.7589	1.2807	1.7934	0.94765
	36.000	78.098	5.4884	2.9534	1.8583	0.6441	0.62739		16.000	40.060	2.5021	1.8833	1.3285	1.7089	0.92580
38.000	79.744	5.5523	2.9703	1.8693	0.6189	0.62175	18.000		42.497	2.7736	2.0108	1.3794	1.6212	0.89981	
40.000	81.192	5.6011	2.9830	1.8776	0.5993	0.61749	20.000		45.140	3.0705	2.1413	1.4339	1.5291	0.86971	
42.000	82.504	5.6391	2.9929	1.8842	0.5836	0.61418	22.000		48.059	3.3981	2.2759	1.4931	1.4308	0.83542	
44.000	83.716	5.6688	3.0006	1.8893	0.5711	0.61161	24.000		51.393	3.7677	2.4168	1.5590	1.3227	0.79639	
46.000	84.856	5.6921	3.0065	1.8932	0.5612	0.60960	26.000		55.500	4.2092	2.5717	1.6367	1.1954	0.75038	
48.000	85.942	5.7100	3.0111	1.8963	0.5535	0.60806	28.000		62.973	4.9459	2.8024	1.7648	0.9810	0.67729	
50.000	86.988	5.7233	3.0145	1.8986	0.5477	0.60692	28.082		64.679	5.0977	2.8462	1.7911	0.9354	0.66296	
52.000	88.007	5.7324	3.0168	1.9002	0.5437	0.60614	28.000		66.328	5.2377	2.8855	1.8152	0.8927	0.65000	
54.000	89.008	5.7378	3.0182	1.9011	0.5413	0.60568	26.000		72.454	5.6907	3.0082	1.8930	0.7474	0.60972	
2.30	2.000	27.294	1.1311	1.0919	1.0359	2.2212	0.99981		24.000	75.251	5.8587	3.0486	1.9218	0.6895	0.59544
	4.000	28.906	1.2753	1.1892	1.0724	2.1437	0.99854	22.000	77.317	5.9657	3.0750	1.9401	0.6510	0.58653	
	6.000	30.611	1.4336	1.2916	1.1099	2.0667	0.99526	20.000	79.014	6.0423	3.0936	1.9532	0.6224	0.58024	
	8.000	32.415	1.6068	1.3988	1.1487	1.9896	0.98923	18.000	80.483	6.1001	3.1075	1.9631	0.6002	0.57554	
	10.000	34.326	1.7959	1.5104	1.1890	1.9117	0.97989	16.000	81.798	6.1451	3.1182	1.9707	0.5826	0.57191	
	12.000	36.354	2.0019	1.6260	1.2311	1.8325	0.96684	14.000	83.001	6.1806	3.1266	1.9768	0.5683	0.56907	
14.000	38.510	2.2261	1.7452	1.2755	1.7514	0.94982	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 ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
2.35	6.000	87.174	6.2606	3.1453	1.9904	0.5353	0.56272	2.45	26.000	53.045	4.3053	2.6037	1.6535	1.2861	0.74055
	4.000	88.129	6.2694	3.1474	1.9919	0.5315	0.56203		28.000	57.780	4.8455	2.7729	1.7475	1.1385	0.68691
	2.000	89.068	6.2745	3.1486	1.9928	0.5293	0.56162		29.253	64.744	5.5614	2.9727	1.8708	0.9386	0.62095
2.40	2.000	26.120	1.1358	1.0951	1.0371	2.3184	0.99979	24.000	76.446	6.4516	3.1891	2.0230	0.6623	0.54787	
	4.000	27.702	1.2856	1.1960	1.0749	2.2383	0.99839	22.000	78.236	6.5451	3.2101	2.0389	0.6294	0.54076	
	6.000	29.377	1.4505	1.3023	1.1138	2.1589	0.99478	20.000	79.752	6.6146	3.2254	2.0508	0.6042	0.53555	
	8.000	31.149	1.6314	1.4137	1.1540	2.0794	0.98818	18.000	81.089	6.6682	3.2372	2.0599	0.5842	0.53157	
	10.000	33.023	1.8292	1.5295	1.1959	1.9994	0.97797	16.000	82.299	6.7105	3.2464	2.0671	0.5681	0.52845	
	12.000	35.007	2.0450	1.6495	1.2398	1.9181	0.96377	14.000	83.416	6.7442	3.2536	2.0728	0.5550	0.52599	
	14.000	37.112	2.2798	1.7729	1.2860	1.8350	0.94538	12.000	84.462	6.7710	3.2594	2.0774	0.5444	0.52403	
	16.000	39.351	2.5351	1.8993	1.3348	1.7497	0.92274	10.000	85.455	6.7923	3.2640	2.0810	0.5359	0.52249	
	18.000	41.748	2.8128	2.0285	1.3866	1.6613	0.89592	8.000	86.408	6.8088	3.2675	2.0838	0.5292	0.52129	
	20.000	44.336	3.1155	2.1604	1.4421	1.5889	0.86505	6.000	87.331	6.8211	3.2701	2.0859	0.5242	0.52041	
	22.000	47.174	3.4480	2.2955	1.5021	1.4709	0.83015	4.000	88.232	6.8296	3.2719	2.0873	0.5207	0.51979	
	24.000	50.371	3.8196	2.4357	1.5682	1.3644	0.79093	2.000	89.119	6.8346	3.2730	2.0882	0.5186	0.51943	
	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	2.50	2.000	25.050	1.1405	1.0984	1.0384	2.4155	0.99977
	28.000	69.291	5.7130	3.0119	1.8968	0.8201	0.60781		4.000	26.609	1.2961	1.2029	1.0775	2.3326	0.99922
	26.000	73.400	6.0048	3.0845	1.9468	0.7260	0.58331		6.000	28.259	1.4679	1.3133	1.1177	2.2505	0.99427
	24.000	75.889	6.1539	3.1203	1.9722	0.6751	0.57121		8.000	30.005	1.6568	1.4289	1.1595	2.1685	0.98703
22.000	77.803	6.2534	3.1436	1.9892	0.6397	0.56329	10.000		31.851	1.8639	1.5493	1.2031	2.0859	0.97589	
20.000	79.402	6.3260	3.1605	2.0016	0.6129	0.55758	12.000		33.802	2.0900	1.6737	1.2488	2.0022	0.96046	
18.000	80.800	6.3816	3.1732	2.0111	0.5919	0.55326	14.000		35.866	2.3364	1.8015	1.2969	1.9169	0.94057	
16.000	82.059	6.4251	3.1831	2.0185	0.5751	0.54990	16.000		38.057	2.6042	1.9322	1.3478	1.8295	0.91625	
14.000	83.217	6.4596	3.1909	2.0244	0.5615	0.54726	18.000		40.389	2.8949	2.0652	1.4018	1.7394	0.88767	
12.000	84.299	6.4870	3.1971	2.0290	0.5505	0.54517	20.000		42.890	3.2109	2.2002	1.4594	1.6458	0.85510	
10.000	85.324	6.5087	3.2019	2.0327	0.5416	0.54352	22.000		45.602	3.5558	2.3373	1.5213	1.5475	0.81877	
8.000	86.306	6.5254	3.2057	2.0356	0.5348	0.54225	24.000		48.600	3.9361	2.4775	1.5987	1.4426	0.77871	
6.000	87.255	6.5379	3.2085	2.0377	0.5296	0.54131	26.000		52.036	4.3657	2.6235	1.6641	1.3268	0.73441	
4.000	88.182	6.5466	3.2104	2.0392	0.5260	0.54065	28.000		56.335	4.8444	2.7844	1.7542	1.1888	0.68317	
2.000	89.094	6.5517	3.2115	2.0400	0.5238	0.54027	29.797		64.782	5.8014	3.0342	1.9120	0.9402	0.60027	
							26.000		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	
2.45	2.000	25.572	1.1381	1.0968	1.0377	2.3670	0.99978		24.000	76.939	6.7526	3.2555	2.0742	0.6509	0.52537
	4.000	27.143	1.2908	1.1994	1.0762	2.2855	0.99831	22.000	78.625	6.8414	3.2744	2.0893	0.6201	0.51894	
	6.000	28.805	1.4591	1.3078	1.1157	2.2048	0.99453	20.000	80.070	6.9082	3.2885	2.1007	0.5962	0.51417	
	8.000	30.563	1.6440	1.4212	1.1567	2.1241	0.98761	18.000	81.353	6.9602	3.2994	2.1095	0.5770	0.51048	
	10.000	32.422	1.8463	1.5393	1.1994	2.0428	0.97695	16.000	82.518	7.0014	3.3080	2.1165	0.5616	0.50759	
	12.000	34.388	2.0672	1.6615	1.2442	1.9603	0.96215	14.000	83.598	7.0343	3.3148	2.1221	0.5489	0.50528	
	14.000	36.472	2.3078	1.7871	1.2914	1.8762	0.94302	12.000	84.612	7.0607	3.3202	2.1266	0.5387	0.50345	
	16.000	38.685	2.5692	1.9156	1.3412	1.7898	0.91955	10.000	85.576	7.0816	3.3245	2.1301	0.5304	0.50200	
	18.000	41.047	2.8532	2.0466	1.3941	1.7006	0.89187	8.000	86.502	7.0979	3.3278	2.1329	0.5240	0.50088	
	20.000	43.588	3.1623	2.1800	1.4506	1.6077	0.86018	6.000	87.400	7.1100	3.3303	2.1350	0.5191	0.50005	
22.000	46.358	3.5007	2.3160	1.5115	1.5097	0.82459	4.000	88.277	7.1184	3.3320	2.1364	0.5157	0.49947		
24.000	49.445	3.8759	2.4560	1.5781	1.4042	0.78502	2.000	89.142	7.1234	3.3330	2.1372	0.5137	0.49913		

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
2.55	2.000	24.550	1.1429	1.1001	1.0390	2.4639	0.99976	2.60	30.814	64.866	6.2972	3.1538	1.9967	0.9433	0.55984	
	4.000	26.099	1.3015	1.2065	1.0788	2.3796	0.99814		30.000	69.778	6.7777	3.2609	2.0785	0.8111	0.52354	
	6.000	27.739	1.4768	1.3189	1.1198	2.2961	0.99399		28.000	73.590	7.0906	3.3263	2.1317	0.7189	0.50138	
	8.000	29.474	1.6699	1.4367	1.1623	2.2126	0.98642		26.000	75.955	7.2555	3.3596	2.1596	0.6673	0.49015	
	10.000	31.307	1.8817	1.5593	1.2067	2.1288	0.97479		24.000	77.778	7.3665	3.3815	2.1785	0.6311	0.48276	
	12.000	33.244	2.1133	1.6861	1.2534	2.0438	0.95871		22.000	79.299	7.4481	3.3974	2.1923	0.6035	0.47742	
	14.000	35.293	2.3656	1.8162	1.3025	1.9573	0.93803		20.000	80.626	7.5108	3.4095	2.2029	0.5817	0.47336	
	16.000	37.463	2.6399	1.9490	1.3545	1.8687	0.91283		18.000	81.815	7.5602	3.4189	2.2113	0.5641	0.47020	
	18.000	39.770	2.9378	2.0840	1.4097	1.7776	0.88333		16.000	82.906	7.5997	3.4264	2.2180	0.5497	0.46768	
	20.000	42.236	3.2611	2.2207	1.4685	1.6832	0.84985		14.000	83.922	7.6316	3.4324	2.2234	0.5378	0.46566	
	22.000	44.899	3.6130	2.3591	1.5315	1.5845	0.81272		12.000	84.879	7.6572	3.4372	2.2277	0.5282	0.46405	
	24.000	47.822	3.9955	2.4998	1.5999	1.4797	0.77209		10.000	85.792	7.6775	3.4411	2.2312	0.5204	0.46277	
	26.000	51.130	4.4319	2.6449	1.6756	1.3655	0.72772		8.000	86.671	7.6934	3.4440	2.2338	0.5143	0.46178	
	28.000	55.131	4.9401	2.8007	1.7638	1.2334	0.67784		6.000	87.524	7.7053	3.4462	2.2359	0.5096	0.46103	
	30.000	61.449	5.6866	3.0051	1.8923	1.0385	0.61007		4.000	88.359	7.7135	3.4478	2.2372	0.5064	0.46053	
	30.317	64.823	6.0466	3.0946	1.9539	0.9418	0.57989		2.000	89.183	7.7184	3.4487	2.2381	0.5045	0.46022	
	30.000	67.966	6.3519	3.1864	2.0060	0.8568	0.55557									
	28.000	72.844	6.7595	3.2589	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		2.65	2.000	23.613	1.1479	1.1034	1.0403	2.5607	0.99973
22.000	78.978	7.1423	3.3368	2.1404	0.6115	0.49783	4.000	25.144		1.3124	1.2136	1.0814	2.4734	0.99796		
20.000	80.360	7.2068	3.3499	2.1514	0.5887	0.49343	6.000	26.766		1.4950	1.3302	1.1239	2.3869	0.99341		
18.000	81.594	7.2575	3.3600	2.1600	0.5703	0.49002	8.000	28.482		1.6966	1.4525	1.1680	2.3007	0.98514		
16.000	82.720	7.2978	3.3680	2.1668	0.5554	0.48732	10.000	30.295		1.9182	1.5798	1.2142	2.2139	0.97247		
14.000	83.766	7.3301	3.3744	2.1723	0.5432	0.48517	12.000	32.210		2.1610	1.7113	1.2628	2.1262	0.95502		
12.000	84.750	7.3561	3.3795	2.1767	0.5333	0.48345	14.000	34.232		2.4260	1.8462	1.3141	2.0370	0.93270		
10.000	85.688	7.3767	3.3835	2.1802	0.5253	0.48209	16.000	36.368		2.7141	1.9835	1.3683	1.9459	0.90566		
8.000	86.590	7.3927	3.3866	2.1829	0.5190	0.48104	18.000	38.632		3.0267	2.1226	1.4259	1.8524	0.87423		
6.000	87.464	7.4047	3.3890	2.1849	0.5142	0.48025	20.000	41.043		3.3657	2.2630	1.4873	1.7560	0.83884		
4.000	88.320	7.4131	3.3906	2.1864	0.5109	0.47971	22.000	43.627		3.7335	2.4042	1.5529	1.6559	0.80080		
2.000	89.163	7.4180	3.3916	2.1872	0.5090	0.47939	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		
2.60	2.000	24.071	1.1454	1.1017	1.0396	2.5123	0.99975	31.288		64.910	6.5531	3.2118	2.0403	0.9447	0.54016	
	4.000	25.611	1.3070	1.2100	1.0801	2.4265	0.99805	30.000		70.983	7.1564	3.3397	2.1428	0.7814	0.49687	
	6.000	27.241	1.4858	1.3245	1.1218	2.3416	0.99371	28.000		74.230	7.4211	3.3922	2.1877	0.7039	0.47918	
	8.000	28.966	1.6831	1.4445	1.1651	2.2568	0.98579	26.000		76.415	7.5742	3.4216	2.2137	0.6565	0.46930	
	10.000	30.789	1.8998	1.5695	1.2105	2.1715	0.97365	24.000		78.138	7.6801	3.4415	2.2316	0.6224	0.46262	
	12.000	32.714	2.1369	1.6986	1.2580	2.0852	0.95690	22.000	79.592	7.7589	3.4562	2.2449	0.5962	0.45771		
	14.000	34.749	2.3955	1.8311	1.3082	1.9973	0.93541	20.000	80.870	7.8200	3.4674	2.2553	0.5752	0.45396		
	16.000	36.901	2.6767	1.9692	1.3613	1.9075	0.90930	18.000	82.020	7.8684	3.4763	2.2634	0.5582	0.45101		
	18.000	39.185	2.9817	2.1032	1.4177	1.8152	0.87884	16.000	83.079	7.9073	3.4833	2.2700	0.5442	0.44866		
	20.000	41.621	3.3126	2.2417	1.4778	1.7199	0.84443	14.000	84.066	7.9387	3.4890	2.2763	0.5327	0.44677		
	22.000	44.242	3.6723	2.3814	1.5421	1.6205	0.80645	12.000	84.998	7.9640	3.4935	2.2796	0.5234	0.44526		
	24.000	47.102	4.0658	2.5229	1.6116	1.5157	0.76520	10.000	85.888	7.9841	3.4972	2.2830	0.5158	0.44406		
26.000	50.305	4.5028	2.6675	1.6880	1.4025	0.72060	8.000	86.746	7.9999	3.5000	2.2857	0.5098	0.44312			
28.000	54.088	5.0067	2.8201	1.7754	1.2744	0.67151	6.000	87.579	8.0116	3.5021	2.2877	0.5053	0.44242			
30.000	59.352	5.6706	3.0010	1.8996	1.1062	0.61145										

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$
2.65	4.000	88.396	8.0198	3.5035	2.2891	0.5021	0.44194	2.75	24.000	45.225	4.2794	2.5951	1.6490	1.6181	0.74319
	2.000	89.200	8.0247	3.5044	2.2899	0.5003	0.44165		26.000	48.206	4.7375	2.7404	1.7288	1.5056	0.69739
2.70	2.000	23.173	1.1503	1.1051	1.0409	2.6090	0.99972	28.000	51.579	5.2490	2.8886	1.8171	1.3832	0.64896	
	4.000	24.696	1.3179	1.2172	1.0827	2.5201	0.99786	30.000	55.674	5.8507	3.0466	1.9204	1.2416	0.59611	
	6.000	26.311	1.5042	1.3360	1.1260	2.4321	0.99311	32.000	62.549	6.7812	3.2616	2.0791	1.0209	0.52329	
	8.000	28.019	1.7102	1.4605	1.1709	2.3444	0.98446	32.173	65.002	7.0807	3.3243	2.1300	0.9476	0.50207	
	10.000	29.824	1.9369	1.5902	1.2180	2.2561	0.97125	32.000	67.323	7.3448	3.3773	2.1748	0.8812	0.48420	
	12.000	31.728	2.1855	1.7241	1.2676	2.1669	0.95309	30.000	72.678	7.8741	3.4773	2.2644	0.7401	0.45066	
	14.000	33.739	2.4569	1.8614	1.3199	2.0763	0.92991	28.000	75.285	8.0870	3.5154	2.3004	0.6789	0.43799	
	16.000	35.862	2.7523	2.0010	1.3754	1.9838	0.90191	26.000	77.202	8.2233	3.5393	2.3235	0.6378	0.43010	
	18.000	38.109	3.0727	2.1423	1.4343	1.8890	0.86948	24.000	78.766	8.3214	3.5561	2.3400	0.6071	0.42454	
	20.000	40.496	3.4200	2.2845	1.4970	1.7915	0.83311	22.000	80.110	8.3960	3.5688	2.3526	0.5829	0.42037	
	22.000	43.049	3.7964	2.4273	1.5641	1.6905	0.79337	20.000	81.303	8.4545	3.5786	2.3625	0.5634	0.41714	
	24.000	45.809	4.2059	2.5706	1.6362	1.5848	0.75072	18.000	82.386	8.5014	3.5864	2.3704	0.5474	0.41457	
	26.000	48.852	4.6560	2.7155	1.7146	1.4723	0.70538	16.000	83.387	8.5392	3.5927	2.3768	0.5343	0.41251	
	28.000	52.334	5.1626	2.8645	1.8022	1.3488	0.65692	14.000	84.324	8.5699	3.5978	2.3820	0.5234	0.41085	
	30.000	56.587	5.7730	3.0271	1.9071	1.2018	0.60265	12.000	85.212	8.5948	3.6019	2.3862	0.5145	0.40951	
	31.741	64.956	6.8143	3.2687	2.0847	0.9462	0.52090	10.000	86.062	8.6146	3.6051	2.3895	0.5072	0.40845	
	30.000	71.913	7.5186	3.4110	2.2042	0.7587	0.47286	8.000	86.882	8.6301	3.6077	2.3922	0.5015	0.40762	
	28.000	74.790	7.7529	3.4551	2.2439	0.6907	0.45808	6.000	87.680	8.6418	3.6096	2.3941	0.4972	0.40700	
	26.000	76.828	7.8967	3.4814	2.2682	0.6468	0.44930	4.000	88.462	8.6499	3.6109	2.3955	0.4942	0.40656	
	24.000	78.466	7.9983	3.4997	2.2854	0.6145	0.44321	2.000	89.234	8.6547	3.6117	2.3963	0.4924	0.40631	
22.000	79.862	8.0748	3.5133	2.2984	0.5893	0.43870	2.80	2.000	22.344	1.1553	1.1085	1.0422	2.7056	0.99969	
20.000	81.095	8.1345	3.5238	2.3085	0.5691	0.43522		4.000	23.854	1.3292	1.2246	1.0854	2.6133	0.99766	
18.000	82.210	8.1821	3.5321	2.3165	0.5527	0.43247		6.000	25.455	1.5230	1.3476	1.1302	2.5222	0.99246	
16.000	83.238	8.2204	3.5388	2.3230	0.5391	0.43027		8.000	27.150	1.7379	1.4768	1.1768	2.4313	0.98304	
14.000	84.199	8.2515	3.5441	2.3282	0.5279	0.42850		10.000	28.940	1.9751	1.6113	1.2257	2.3399	0.96869	
12.000	85.109	8.2765	3.5484	2.3324	0.5188	0.42708		12.000	30.830	2.2357	1.7502	1.2774	2.2476	0.94903	
10.000	85.978	8.2965	3.5518	2.3358	0.5114	0.42595		14.000	32.822	2.5205	1.8923	1.3320	2.1540	0.92409	
8.000	86.816	8.3121	3.5545	2.3385	0.5056	0.42506		16.000	34.923	2.8309	2.0367	1.3900	2.0585	0.89411	
6.000	87.631	8.3238	3.5565	2.3404	0.5012	0.42441		18.000	37.141	3.1677	2.1822	1.4516	1.9610	0.85962	
4.000	88.430	8.3319	3.5579	2.3418	0.4981	0.42395		20.000	39.490	3.5324	2.3283	1.5172	1.8610	0.82123	
2.000	89.218	8.3367	3.5587	2.3426	0.4962	0.42368		22.000	41.990	3.9271	2.4743	1.5872	1.7578	0.77965	
2.75	2.000	22.750	1.1528	1.1068	1.0415	2.6573		0.99971	24.000	44.676	4.3550	2.6200	1.6622	1.6506	0.73549
	4.000	24.267	1.3236	1.2209	1.0841	2.5667		0.99776	26.000	47.604	4.8219	2.7658	1.7434	1.5379	0.68919
	6.000	25.873	1.5135	1.3417	1.1280	2.4772		0.99279	28.000	50.887	5.3398	2.9135	1.8328	1.4163	0.64070
	8.000	27.575	1.7239	1.4686	1.1738	2.3879		0.98377	30.000	54.786	5.9387	3.0683	1.9355	1.2783	0.58877
	10.000	29.372	1.9558	1.6007	1.2219	2.2982		0.96999	32.000	60.433	6.7529	3.2555	2.0743	1.0909	0.52535
	12.000	31.269	2.2104	1.7371	1.2724	2.2074		0.95109	32.587	65.050	7.3524	3.3788	2.1761	0.9490	0.48369
	14.000	33.269	2.4885	1.8768	1.3259	2.1153		0.92704	32.000	69.211	7.8278	3.4689	2.2566	0.8307	0.45348
	16.000	35.381	2.7912	2.0188	1.3825	2.0213		0.89806	30.000	73.328	8.2272	3.5399	2.3241	0.7243	0.42988
	18.000	37.612	3.1197	2.1622	1.4429	1.9253		0.86461	28.000	75.728	8.4241	3.5735	2.3574	0.6684	0.41882
	20.000	39.980	3.4757	2.3063	1.5070	1.8265	0.82724	26.000	77.543	8.5544	3.5952	2.3794	0.6296	0.41169	
22.000	42.504	3.8610	2.4506	1.5755	1.7245	0.78659	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 ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
2.80	18.000	82.550	8.8262	3.6393	2.4252	0.5425	0.39731	2.90	6.000	24.666	1.5421	1.3594	1.1344	2.6117	0.99178	
	16.000	83.525	8.8637	3.6453	2.4316	0.5297	0.39538		8.000	26.350	1.7663	1.4933	1.1828	2.5175	0.98153	
	14.000	84.440	8.8942	3.6501	2.4367	0.5191	0.39382		10.000	28.129	2.0143	1.6328	1.2336	2.4229	0.96597	
	12.000	85.308	8.9188	3.6540	2.4409	0.5103	0.39256		12.000	30.007	2.2873	1.7767	1.2874	2.3273	0.94475	
	10.000	86.140	8.9385	3.6571	2.4442	0.5033	0.39156		14.000	31.985	2.5863	1.9238	1.3444	2.2304	0.91794	
	8.000	86.943	8.9540	3.6595	2.4468	0.4977	0.39078		16.000	34.069	2.9123	2.0729	1.4050	2.1318	0.88591	
	6.000	87.725	8.9656	3.6613	2.4487	0.4935	0.39019		18.000	36.264	3.2663	2.2229	1.4694	2.0313	0.84930	
	4.000	88.492	8.9737	3.6626	2.4501	0.4905	0.38978		20.000	38.584	3.6496	2.3729	1.5380	1.9285	0.80886	
	2.000	89.248	8.9784	3.6633	2.4509	0.4887	0.38954		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
	2.85	2.000	21.954	1.1579	1.1103	1.0429	2.7537		0.99968	2.95	2.000	21.216	1.1630	1.1138	1.0442	2.8500
4.000		23.457	1.3349	1.2283	1.0868	2.6598	0.99755	4.000	22.708		1.3464	1.2357	1.0895	2.7526	0.99732	
6.000		25.052	1.5325	1.3535	1.1323	2.5670	0.99213	6.000	24.294		1.5518	1.3654	1.1366	2.6563	0.99142	
8.000		26.742	1.7520	1.4850	1.1798	2.4744	0.98230	8.000	25.974		1.7807	1.5017	1.1858	2.5604	0.98074	
10.000		28.526	1.9946	1.6220	1.2297	2.3815	0.96735	10.000	27.749		2.0343	1.6437	1.2377	2.4640	0.96454	
12.000		30.410	2.2613	1.7634	1.2824	2.2876	0.94692	12.000	29.621		2.3137	1.7901	1.2925	2.3668	0.94252	
14.000		32.394	2.5532	1.9080	1.3382	2.1923	0.92105	14.000	31.593		2.6199	1.9396	1.3507	2.2682	0.91475	
16.000		34.486	2.8712	2.0547	1.3974	2.0953	0.89006	16.000	33.670		2.9508	2.0911	1.4126	2.1679	0.88168	
18.000		36.682	3.2165	2.2025	1.4604	1.9964	0.85451	18.000	35.856		3.3169	2.2434	1.4785	2.0658	0.84398	
20.000		39.025	3.5904	2.3505	1.5275	1.8950	0.81511	20.000	38.164		3.7098	2.3954	1.5487	1.9615	0.80249	
22.000		41.505	3.9948	2.4982	1.5991	1.7906	0.77258	22.000	40.607		4.1344	2.5464	1.6236	1.8546	0.75809	
24.000		44.160	4.4325	2.6451	1.6757	1.6825	0.72766	24.000	43.211		4.5930	2.6959	1.7037	1.7444	0.71160	
26.000		47.042	4.9089	2.7916	1.7585	1.5692	0.68081	26.000	45.018		5.0902	2.8441	1.7898	1.6297	0.66366	
28.000		50.247	5.4345	2.9391	1.8490	1.4481	0.63219	28.000	49.102		5.6343	2.9916	1.8833	1.5085	0.61460	
30.000		53.992	6.0344	3.0917	1.9518	1.3127	0.58089	30.000	52.618		6.2438	3.1414	1.9876	1.3762	0.56404	
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										

Oblique Shock p9

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	
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	0.99606
	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		
							24.000	42.361		4.7607	2.7474	1.7328	1.8039	0.69513		
							26.000	45.110		5.2806	2.8973	1.8226	1.6874	0.64608		
							28.000	48.102		5.8462	3.0455	1.9196	1.5654	0.59649		
							30.000	51.455		6.4722	3.1938	2.0265	1.4345	0.54630		
							32.000	55.456		7.1967	3.3478	2.1497	1.2858	0.49412		
							34.000	61.505		8.2161	3.5380	2.3222	1.0765	0.43052		
							34.407	65.288		8.7895	3.6335	2.4190	0.9552	0.39922		
							34.000	68.742	9.2596	3.7064	2.4983	0.8514	0.37570			
							32.000	73.184	9.7779	3.7817	2.5856	0.7291	0.35180			
							30.000	75.604	10.0154	3.8146	2.6255	0.6689	0.34151			
							28.000	77.406	10.1703	3.8355	2.6516	0.6276	0.33501			
							26.000	78.880	10.2825	3.8505	2.6705	0.5965	0.33040			
							24.000	80.145	10.3683	3.8617	2.6849	0.5719	0.32694			
							22.000	81.267	10.4361	3.8705	2.6963	0.5518	0.32423			
							20.000	82.284	10.4906	3.8776	2.7055	0.5353	0.32204			
							18.000	83.221	10.5350	3.8833	2.7129	0.5215	0.32034			
							16.000	84.095	10.5714	3.8879	2.7190	0.5100	0.31892			
							14.000	84.921	10.6012	3.8917	2.7240	0.5005	0.31777			
							12.000	85.709	10.6255	3.8948	2.7281	0.4926	0.31683			
							10.000	86.466	10.6450	3.8973	2.7314	0.4861	0.31608			
							8.000	87.199	10.6603	3.8992	2.7340	0.4810	0.31549			
							6.000	87.914	10.6719	3.9007	2.7359	0.4772	0.31505			
							4.000	88.617	10.6799	3.9017	2.7373	0.4744	0.31474			
							2.000	89.310	10.6847	3.9023	2.7381	0.4728	0.31456			
3.00	2.000	20.867	1.1656	1.1155	1.0449	2.8981	0.99963	3.10	2.000	20.205	1.1707	1.1190	1.0462	2.9942	0.99960	
	4.000	22.355	1.3522	1.2395	1.0909	2.7988	0.99721		4.000	21.684	1.3640	1.2471	1.0937	2.8911	0.99696	
	6.000	23.936	1.5616	1.3714	1.1387	2.7008	0.99105									
	8.000	25.611	1.7953	1.5101	1.1888	2.6031	0.97993									
	10.000	27.383	2.0545	1.6546	1.2417	2.5050	0.96308									
	12.000	29.251	2.3404	1.8036	1.2977	2.4060	0.94022									
	14.000	31.218	2.6540	1.9556	1.3571	2.3056	0.91148									
	16.000	33.288	2.9964	2.1095	1.4204	2.2037	0.87734									
	18.000	35.467	3.3685	2.2641	1.4878	2.1000	0.83855									
	20.000	37.764	3.7713	2.4181	1.5596	1.9941	0.79602									
	22.000	40.192	4.2064	2.5708	1.6362	1.8858	0.75068									
	24.000	42.775	4.6761	2.7216	1.7181	1.7744	0.70340									
	26.000	45.552	5.1844	2.8706	1.8060	1.6589	0.65491									
	28.000	48.586	5.7388	3.0184	1.9012	1.5374	0.60560									
	30.000	52.014	6.3559	3.1673	2.0067	1.4059	0.55526									
	32.000	56.182	7.0810	3.3244	2.1300	1.2541	0.50205									
	34.000	63.673	8.2682	3.5470	2.3310	1.0029	0.42755									
	34.073	65.241	8.4917	3.5848	2.3688	0.9540	0.41510									
	34.000	66.749	8.6971	3.6186	2.4035	0.9083	0.40406									
	32.000	72.642	9.3988	3.7271	2.5217	0.7428	0.36908									
	30.000	75.239	9.8517	3.7638	2.5643	0.6779	0.35743									
	28.000	77.126	9.8121	3.7865	2.5913	0.6345	0.35029									
	26.000	78.652	9.8268	3.8024	2.6106	0.6022	0.34530									
	24.000	79.956	10.0139	3.8144	2.6253	0.5768	0.34157									
	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									
	16.000	83.996	10.2184	3.8420	2.6597	0.5136	0.33302									

Oblique Shock p10

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$		
3.10	6.000	23.258	1.5815	1.3835	1.1431	2.7894	0.99027	3.15	28.000	47.216	6.0688	3.1000	1.9577	1.6194	0.57808		
	8.000	24.927	1.8249	1.5271	1.1950	2.6881	0.97822		30.000	50.449	6.7158	3.2475	2.0680	1.4886	0.52806		
	10.000	26.692	2.0956	1.6767	1.2499	2.5864	0.96004		32.000	54.201	7.4487	3.3975	2.1924	1.3441	0.47738		
	12.000	28.554	2.3949	1.8308	1.3081	2.4837	0.93546		34.000	59.196	8.3736	3.5650	2.3489	1.1632	0.42162		
	14.000	30.513	2.7236	1.9879	1.3701	2.3798	0.90473		35.033	65.382	9.4008	3.7274	2.5221	0.9575	0.36898		
	16.000	32.574	3.0831	2.1467	1.4362	2.2743	0.86841		34.000	70.719	10.1474	3.8325	2.6478	0.7974	0.33596		
	18.000	34.739	3.4740	2.3057	1.5067	2.1672	0.82741		32.000	74.089	10.5396	3.8839	2.7137	0.7064	0.32016		
	20.000	37.017	3.8973	2.4637	1.5819	2.0581	0.78278		30.000	76.244	10.7550	3.9111	2.7499	0.6531	0.31190		
	22.000	39.421	4.3543	2.6198	1.6621	1.9468	0.73556		28.000	77.906	10.9014	3.9292	2.7745	0.6152	0.30644		
	24.000	41.968	4.8470	2.7733	1.7477	1.8329	0.68676		26.000	79.289	11.0097	3.9424	2.7927	0.5860	0.30248		
	26.000	44.692	5.3788	2.9241	1.8395	1.7154	0.63718		24.000	80.490	11.0936	3.9524	2.8068	0.5627	0.29947		
	28.000	47.646	5.9563	3.0727	1.9385	1.5928	0.58731		22.000	81.560	11.1602	3.9604	2.8180	0.5436	0.29710		
	30.000	50.935	6.5922	3.2205	2.0470	1.4620	0.53722		20.000	82.535	11.2142	3.9668	2.8270	0.5278	0.29520		
	32.000	54.800	7.3197	3.3723	2.1705	1.3157	0.48586		18.000	83.436	11.2583	3.9720	2.8344	0.5145	0.29366		
	34.000	60.205	8.2768	3.5485	2.3325	1.1241	0.42706		16.000	84.279	11.2945	3.9762	2.8405	0.5035	0.29240		
	34.726	65.335	9.0925	3.6810	2.4701	0.9564	0.38385		14.000	85.076	11.3243	3.9797	2.8455	0.4942	0.29138		
	34.000	69.872	9.7174	3.7732	2.5754	0.8203	0.35449		12.000	85.838	11.3486	3.9825	2.8496	0.4865	0.29054		
	32.000	73.661	10.1577	3.8339	2.6495	0.7171	0.33553		10.000	86.571	11.3682	3.9848	2.8529	0.4803	0.28987		
	30.000	75.938	10.3831	3.8636	2.6874	0.6607	0.32634		8.000	87.281	11.3835	3.9866	2.8555	0.4754	0.28935		
	28.000	77.666	10.5334	3.8831	2.7126	0.6212	0.32040		6.000	87.976	11.3951	3.9879	2.8574	0.4716	0.28895		
	25.000	79.091	10.6435	3.8971	2.7311	0.5911	0.31614		4.000	88.657	11.4032	3.9889	2.8588	0.4690	0.28867		
	24.000	80.324	10.7282	3.9077	2.7454	0.5671	0.31291		2.000	89.330	11.4080	3.9894	2.8596	0.4674	0.28851		
	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		3.20	2.000	19.587	1.1760	1.1226	1.0475	3.0901	0.99957	
	16.000	84.189	10.9301	3.9327	2.7793	0.5067	0.30539			4.000	21.059	1.3759	1.2548	1.0965	2.9831	0.99670	
	14.000	85.001	10.9599	3.9363	2.7843	0.4973	0.30430			6.000	22.628	1.6017	1.3958	1.1475	2.8776	0.98944	
	12.000	85.775	10.9842	3.9393	2.7884	0.4895	0.30341			8.000	24.292	1.8552	1.5443	1.2013	2.7725	0.97642	
10.000	86.520	11.0037	3.9416	2.7917	0.4832	0.30270	10.000	26.052		2.1377	1.6990	1.2582	2.6670	0.95684			
8.000	87.242	11.0190	3.9435	2.7942	0.4781	0.30215	12.000	27.909		2.4507	1.8583	1.3188	2.5605	0.93048			
6.000	87.945	11.0306	3.9449	2.7962	0.4743	0.30173	14.000	29.863		2.7952	2.0206	1.3834	2.4528	0.89766			
4.000	88.637	11.0387	3.9458	2.7975	0.4716	0.30144	16.000	31.915		3.1723	2.1842	1.4524	2.3437	0.85914			
2.000	89.321	11.0434	3.9464	2.7983	0.4701	0.30127	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			
3.15	2.000	19.891	1.1734	1.1208	1.0469	3.0421	0.99958	24.000		41.238	5.0245	2.8252	1.7784	1.8893	0.66984		
	4.000	21.366	1.3699	1.2510	1.0951	2.9371	0.99683	26.000	43.920	5.5816	2.9780	1.8743	1.7695	0.61919			
	6.000	22.937	1.5915	1.3896	1.1453	2.8336	0.98986	28.000	46.811	6.1840	3.1274	1.9774	1.6454	0.56880			
	8.000	24.603	1.8399	1.5357	1.1981	2.7304	0.97734	30.000	49.994	6.8427	3.2747	2.0895	1.5144	0.51885			
	10.000	26.366	2.1166	1.6878	1.2540	2.6267	0.95846	32.000	53.651	7.5832	3.4233	2.2152	1.3711	0.46873			
	12.000	28.225	2.4226	1.8445	1.3134	2.5222	0.93300	34.000	58.350	8.4906	3.5846	2.3686	1.1976	0.41516			
	14.000	30.181	2.7592	2.0042	1.3767	2.4165	0.90123	35.327	65.428	9.7141	3.7727	2.5748	0.9585	0.35463			
	16.000	32.238	3.1273	2.1654	1.4443	2.3092	0.86382	34.000	71.408	10.5657	3.8872	2.7181	0.7791	0.31914			
	18.000	34.398	3.5279	2.3266	1.5163	2.2003	0.82172	32.000	74.475	10.9242	3.9320	2.7783	0.6967	0.30560			
	20.000	36.668	3.9617	2.4866	1.5933	2.0895	0.77603	30.000	76.526	11.1314	3.9570	2.8131	0.6461	0.29812			
	22.000	39.061	4.4302	2.6444	1.6753	1.9767	0.72789	28.000	78.130	11.2746	3.9739	2.8372	0.6096	0.29310			
	24.000	41.594	4.9349	2.7992	1.7629	1.8613	0.67833	26.000	79.475	11.3814	3.9864	2.8551	0.5812	0.28942			
26.000	44.296	5.4793	2.9510	1.8567	1.7427	0.62820	24.000	80.646	11.4644	3.9959	2.8690	0.5585	0.28660				

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
3.20	22.000	81.694	11.5307	4.0035	2.8802	0.5398	0.28438	3.30	2.000	19.009	1.1812	1.1262	1.0489	3.1858	0.99953
	20.000	82.649	11.5844	4.0096	2.8892	0.5243	0.28260		4.000	20.475	1.3880	1.2626	1.0993	3.0748	0.99642
	18.000	83.533	11.6285	4.0146	2.8966	0.5113	0.28115		6.000	22.039	1.6222	1.4082	1.1520	2.9653	0.98858
	16.000	84.363	11.6647	4.0187	2.9026	0.5004	0.27996		8.000	23.699	1.8859	1.5617	1.2076	2.8563	0.97453
	14.000	85.147	11.6945	4.0220	2.9076	0.4913	0.27899		10.000	25.457	2.1807	1.7216	1.2666	2.7468	0.95347
	12.000	85.897	11.7188	4.0247	2.9117	0.4837	0.27820		12.000	27.310	2.5078	1.8861	1.3296	2.6364	0.92526
	10.000	86.619	11.7385	4.0269	2.9150	0.4776	0.27757		14.000	29.261	2.8688	2.0536	1.3970	2.5248	0.89031
	8.000	87.320	11.7539	4.0286	2.9176	0.4727	0.27707		16.000	31.308	3.2640	2.2219	1.4690	2.4118	0.84954
	6.000	88.003	11.7655	4.0299	2.9196	0.4690	0.27669		18.000	33.456	3.6947	2.3898	1.5460	2.2974	0.80409
	4.000	88.675	11.7736	4.0308	2.9209	0.4664	0.27643		20.000	35.710	4.1617	2.5557	1.6284	2.1813	0.75527
	2.000	89.340	11.7784	4.0313	2.9217	0.4649	0.27628		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
								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	3.9973	2.8565	0.7502	0.28914	
								32.000	75.148	11.7036	4.0230	2.9092	0.6797	0.27869	
								30.000	77.029	11.8963	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	
3.25	2.000	19.293	1.1786	1.1244	1.0482	3.1380	0.99955	3.35	2.000	18.734	1.1839	1.1280	1.0496	3.2336	0.99951
	4.000	20.762	1.3818	1.2586	1.0979	3.0290	0.99656		4.000	20.197	1.3940	1.2664	1.1007	3.1206	0.99628
	6.000	22.328	1.6119	1.4019	1.1498	2.9215	0.98902		6.000	21.759	1.6326	1.4144	1.1543	3.0090	0.98812
	8.000	23.990	1.8704	1.5530	1.2044	2.8145	0.97549		8.000	23.418	1.9015	1.5704	1.2108	2.8980	0.97354
	10.000	25.749	2.1590	1.7103	1.2624	2.7070	0.95518		10.000	25.175	2.2025	1.7330	1.2709	2.7865	0.95172
	12.000	27.604	2.4791	1.8722	1.3242	2.5986	0.92789		12.000	27.028	2.5370	1.9002	1.3351	2.6741	0.92257
	14.000	29.556	2.8318	2.0370	1.3901	2.4889	0.89402		14.000	28.976	2.9061	2.0701	1.4038	2.5604	0.88654
	16.000	31.606	3.2179	2.2030	1.4607	2.3779	0.85437		16.000	31.022	3.3109	2.2410	1.4774	2.4454	0.84462
	18.000	33.757	3.6384	2.3687	1.5360	2.2653	0.81004		18.000	33.167	3.7520	2.4110	1.5562	2.3290	0.79804
	20.000	36.016	4.0940	2.5326	1.6165	2.1511	0.76227		20.000	35.416	4.2303	2.5788	1.6404	2.2112	0.74822
	22.000	38.390	4.5858	2.6937	1.7024	2.0350	0.71232		22.000	37.776	4.7466	2.7431	1.7303	2.0917	0.69650
	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									

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{p_{02}}{p_{01}}$	
3.35	24.000	40.264	5.3024	2.9033	1.8263	1.9704	0.64409	3.40	34.000	73.352	12.2131	4.0783	2.9946	0.7279	0.26279	
	26.000	42.898	5.8998	3.0588	1.9288	1.8468	0.59200		32.000	75.717	12.4992	4.1080	3.0426	0.6653	0.25440	
	28.000	45.716	6.5433	3.2097	2.0386	1.7198	0.54090		30.000	77.467	12.6849	4.1268	3.0738	0.6225	0.24914	
	30.000	48.782	7.2416	3.3568	2.1573	1.5874	0.49109		28.000	78.891	12.8193	4.1402	3.0963	0.5902	0.24542	
	32.000	52.225	8.0134	3.5024	2.2880	1.4458	0.44232		26.000	80.110	12.9221	4.1503	3.1135	0.5646	0.24263	
	34.000	56.375	8.9114	3.6528	2.4396	1.2844	0.39294		24.000	81.185	13.0033	4.1582	3.1271	0.5437	0.24046	
	36.000	63.380	10.2976	3.8524	2.6730	1.0339	0.32979		22.000	82.156	13.0688	4.1645	3.1381	0.5264	0.23872	
	36.143	65.562	10.6853	3.9023	2.7382	0.9616	0.31454		20.000	83.047	13.1224	4.1697	3.1471	0.5119	0.23732	
	36.000	67.623	11.0286	3.9446	2.7958	0.8957	0.30180		18.000	83.876	13.1665	4.1739	3.1545	0.4997	0.23617	
	34.000	72.950	11.8006	4.0338	2.9255	0.7384	0.27557		16.000	84.656	13.2030	4.1774	3.1606	0.4894	0.23522	
	32.000	75.444	12.0992	4.0662	2.9755	0.6723	0.26624		14.000	85.396	13.2331	4.1802	3.1657	0.4808	0.23445	
	30.000	77.255	12.2891	4.0863	3.0074	0.6279	0.26053		12.000	86.105	13.2578	4.1826	3.1698	0.4736	0.23381	
	28.000	78.719	12.4252	4.1004	3.0302	0.5946	0.25653		10.000	86.789	13.2777	4.1844	3.1731	0.4678	0.23330	
	26.000	79.965	12.5287	4.1110	3.0476	0.5684	0.25355		8.000	87.453	13.2934	4.1859	3.1757	0.4632	0.23290	
	24.000	81.062	12.6102	4.1193	3.0612	0.5471	0.25124		6.000	88.103	13.3052	4.1870	3.1777	0.4596	0.23260	
	22.000	82.050	12.6758	4.1259	3.0722	0.5295	0.24939		4.000	88.741	13.3135	4.1878	3.1791	0.4572	0.23239	
	20.000	82.956	12.7293	4.1313	3.0812	0.5148	0.24790		2.000	89.372	13.3184	4.1883	3.1799	0.4557	0.23227	
	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		3.45	2.000	18.209	1.1892	1.1316	1.0509	3.3292	0.99947	
10.000	86.750	12.8842	4.1466	3.1072	0.4701	0.24366		4.000	19.668	1.4063	1.2743	1.1036	3.2118	0.99597		
8.000	87.422	12.8998	4.1481	3.1098	0.4654	0.24324		6.000	21.226	1.6536	1.4270	1.1588	3.0962	0.98718		
6.000	88.080	12.9116	4.1493	3.1118	0.4618	0.24292		8.000	22.884	1.9331	1.5881	1.2172	2.9809	0.97149		
4.000	88.726	12.9198	4.1501	3.1131	0.4593	0.24270		10.000	24.639	2.2468	1.7559	1.2796	2.8653	0.94812		
2.000	89.365	12.9246	4.1506	3.1140	0.4578	0.24256		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		
3.40	2.000	18.467	1.1866	1.1298	1.0502	3.2814	0.99949	22.000	37.213	4.9123	2.7926	1.7590	2.1468	0.68049		
	4.000	19.928	1.4001	1.2704	1.1022	3.1662	0.99613	24.000	39.683	5.4951	2.9552	1.8595	2.0224	0.62680		
	6.000	21.488	1.6430	1.4207	1.1565	3.0527	0.98756	26.000	42.292	6.1211	3.1125	1.9666	1.8960	0.57385		
	8.000	23.147	1.9173	1.5793	1.2140	2.9395	0.97253	28.000	45.073	6.7941	3.2644	2.0813	1.7667	0.52235		
	10.000	24.902	2.2245	1.7444	1.2752	2.8260	0.94995	30.000	48.080	7.5215	3.4115	2.2047	1.6329	0.47267		
	12.000	26.755	2.5664	1.9143	1.3407	2.7115	0.91981	32.000	51.420	8.3194	3.5558	2.3397	1.4914	0.42466		
	14.000	28.702	2.9440	2.0868	1.4108	2.5958	0.88269	34.000	55.344	9.2294	3.7018	2.4932	1.3339	0.37715		
	16.000	30.746	3.3583	2.2600	1.4860	2.4788	0.83962	36.000	60.903	10.4358	3.8705	2.6662	1.1265	0.32424		
	18.000	32.889	3.8100	2.4322	1.5665	2.3604	0.79194	36.635	65.647	11.3584	3.9837	2.8512	0.9634	0.29020		
	20.000	35.133	4.2998	2.6019	1.6526	2.2407	0.74110	36.000	69.850	12.0718	4.0633	2.9709	0.8302	0.26708		
	22.000	37.489	4.8289	2.7679	1.7446	2.1195	0.68851	34.000	73.716	12.6278	4.1211	3.0642	0.7184	0.25074		
	24.000	39.967	5.3980	2.9293	1.8428	1.9966	0.63546	32.000	75.970	12.9035	4.1485	3.1104	0.6589	0.24313		
	26.000	42.588	6.0096	3.0857	1.9476	1.8716	0.58292	30.000	77.665	13.0858	4.1662	3.1410	0.6175	0.23828		
	28.000	45.386	6.6675	3.2370	2.0598	1.7435	0.53162	28.000	79.054	13.2189	4.1789	3.1633	0.5860	0.23481		
	30.000	48.422	7.3802	3.3842	2.1808	1.6105	0.48186	26.000	80.246	13.3210	4.1885	3.1804	0.5609	0.23220		
	32.000	51.810	8.1645	3.5290	2.3135	1.4690	0.43348	24.000	81.302	13.4020	4.1961	3.1939	0.5404	0.23016		
	34.000	55.838	9.0673	3.6771	2.4659	1.3098	0.38509	22.000	82.256	13.4675	4.2021	3.2049	0.5234	0.22852		
	36.000	61.914	10.3308	3.8568	2.6786	1.0874	0.32845	20.000	83.134	13.5211	4.2071	3.2139	0.5091	0.22719		
	36.393	65.605	11.0193	3.9435	2.7943	0.9625	0.30214	18.000	83.951	13.5654	4.2111	3.2213	0.4971	0.22611		
	36.000	68.960	11.5817	4.0093	2.8887	0.8560	0.28269									

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
3.45	16.000	84.720	13.6020	4.2145	3.2275	0.4869	0.22521	3.55	2.000	17.715	1.1947	1.1353	1.0523	3.4246	0.99943	
	14.000	85.451	13.6322	4.2172	3.2325	0.4784	0.22448		4.000	19.170	1.4187	1.2822	1.1065	3.3029	0.99566	
	12.000	86.151	13.6570	4.2195	3.2367	0.4714	0.22388		6.000	20.726	1.6748	1.4396	1.1634	3.1829	0.98619	
	10.000	86.826	13.6770	4.2213	3.2400	0.4656	0.22340		8.000	22.383	1.9653	1.6059	1.2238	3.0633	0.96935	
	8.000	87.482	13.6928	4.2227	3.2427	0.4610	0.22302		10.000	24.138	2.2920	1.7791	1.2883	2.9433	0.94435	
	6.000	88.125	13.7047	4.2238	3.2447	0.4575	0.22273		12.000	25.989	2.6566	1.9569	1.3576	2.8224	0.91123	
	4.000	88.756	13.7130	4.2245	3.2461	0.4551	0.22253		14.000	27.936	3.0603	2.1370	1.4321	2.7003	0.87077	
	2.000	89.379	13.7180	4.2250	3.2469	0.4536	0.22241		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
3.50	2.000	17.958	1.1920	1.1335	1.0516	3.3769	0.99945	22.000	36.692	5.0827	2.8419	1.7885	2.2005	0.66437		
	4.000	19.415	1.4125	1.2783	1.1050	3.2574	0.99582	24.000	39.149	5.6937	3.0069	1.8935	2.0727	0.60946		
	6.000	20.972	1.6642	1.4333	1.1611	3.1396	0.98669	26.000	41.738	6.3495	3.1659	2.0056	1.9434	0.55575		
	8.000	22.629	1.9491	1.5970	1.2205	3.0222	0.97044	28.000	44.488	7.0535	3.3187	2.1254	1.8117	0.50395		
	10.000	24.384	2.2693	1.7675	1.2839	2.9044	0.94626	30.000	47.447	7.8120	3.4660	2.2539	1.6762	0.45445		
	12.000	26.236	2.6262	1.9426	1.3519	2.7856	0.91415	32.000	50.705	8.6392	3.6092	2.3937	1.5342	0.40714		
	14.000	28.182	3.0211	2.1202	1.4249	2.6657	0.87481	34.000	54.463	9.5691	3.7520	2.5504	1.3790	0.36118		
	16.000	30.225	3.4549	2.2982	1.5033	2.5445	0.82942	36.000	59.399	10.7262	3.9075	2.7450	1.1885	0.31299		
	18.000	32.363	3.9283	2.4747	1.5874	2.4222	0.77952	37.000	65.729	12.0520	4.0612	2.9676	0.9651	0.26768		
	20.000	34.602	4.4421	2.6482	1.6774	2.2986	0.72668	38.000	71.121	12.9969	4.1575	3.1261	0.7943	0.24063		
	22.000	36.947	4.9969	2.8173	1.7737	2.1739	0.67245	39.000	74.353	13.4667	4.2021	3.2048	0.7018	0.22854		
	24.000	39.410	5.5936	2.9811	1.8764	2.0478	0.61813	40.000	76.427	13.7265	4.2257	3.2483	0.6473	0.22221		
	26.000	42.009	6.2345	3.1392	1.9860	1.9199	0.56478	41.000	78.025	13.9033	4.2415	3.2779	0.6083	0.21803		
	28.000	44.774	6.9227	3.2916	2.1032	1.7894	0.51313	42.000	79.351	14.0342	4.2530	3.2998	0.5782	0.21501		
	30.000	47.755	7.6654	3.4388	2.2291	1.6549	0.46353	43.000	80.497	14.1355	4.2618	3.3168	0.5541	0.21271		
	32.000	51.053	8.4777	3.5825	2.3664	1.5131	0.41586	44.000	81.517	14.2163	4.2687	3.3303	0.5343	0.21090		
	34.000	54.888	9.3968	3.7268	2.5214	1.3570	0.36917	45.000	82.442	14.2819	4.2743	3.3413	0.5178	0.20944		
	36.000	60.090	10.5715	3.8879	2.7191	1.1594	0.31891	46.000	83.294	14.3358	4.2789	3.3503	0.5039	0.20826		
	38.000	65.689	11.7027	4.0229	2.9090	0.9643	0.27872	47.000	84.090	14.3804	4.2827	3.3578	0.4922	0.20729		
	40.000	70.545	12.5396	4.1121	3.0494	0.8105	0.25324	48.000	84.839	14.4173	4.2858	3.3640	0.4823	0.20649		
	42.000	74.048	13.0455	4.1623	3.1342	0.7098	0.23934	49.000	85.552	14.4478	4.2883	3.3691	0.4740	0.20583		
	44.000	76.207	13.3126	4.1877	3.1790	0.6529	0.23241	50.000	86.235	14.4729	4.2904	3.3733	0.4671	0.20529		
	46.000	77.851	13.4920	4.2044	3.2090	0.6128	0.22791	51.000	86.895	14.4931	4.2921	3.3767	0.4615	0.20485		
	48.000	79.207	13.6238	4.2165	3.2311	0.5820	0.22468	52.000	87.537	14.5091	4.2934	3.3794	0.4570	0.20451		
	50.000	80.375	13.7255	4.2256	3.2481	0.5574	0.22223	53.000	88.165	14.5212	4.2944	3.3814	0.4535	0.20425		
	52.000	81.413	13.8064	4.2329	3.2617	0.5373	0.22031	54.000	88.782	14.5296	4.2951	3.3828	0.4511	0.20407		
	54.000	82.352	13.8719	4.2387	3.2727	0.5205	0.21877	55.000	89.392	14.5346	4.2956	3.3836	0.4497	0.20397		
	56.000	83.216	13.9256	4.2435	3.2817	0.5065	0.21751									
	58.000	84.022	13.9700	4.2474	3.2891	0.4946	0.21649									
	60.000	84.781	14.0067	4.2506	3.2952	0.4846	0.21564	3.60	2.000	17.479	1.1973	1.1371	1.0530	3.4722	0.99940	
14.000	85.503	14.0371	4.2532	3.3003	0.4762	0.21494	4.000		18.932	1.4250	1.2862	1.1079	3.3482	0.99549		
12.000	86.194	14.0620	4.2554	3.3045	0.4692	0.21438	6.000		20.488	1.6857	1.4461	1.1657	3.2260	0.98567		
10.000	86.862	14.0822	4.2572	3.3079	0.4635	0.21392	8.000		22.144	1.9816	1.6149	1.2271	3.1043	0.96824		
8.000	87.510	14.0980	4.2585	3.3105	0.4590	0.21356	10.000		23.899	2.3149	1.7907	1.2927	2.9821	0.94241		
6.000	88.145	14.1100	4.2596	3.3125	0.4555	0.21329	12.000		25.751	2.6873	1.9711	1.3633	2.8590	0.90827		
4.000	88.769	14.1184	4.2603	3.3139	0.4531	0.21310	14.000		27.698	3.0999	2.1538	1.4393	2.7347	0.86667		
2.000	89.386	14.1234	4.2607	3.3148	0.4516	0.21298	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 ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
3.60	20.000	34.110	4.5883	2.6945	1.7029	2.3552	0.71207	3.65	37.513	65.808	12.7662	4.1349	3.0874	0.9668	0.24688
	22.000	36.448	5.1699	2.8666	1.8035	2.2267	0.65625		36.000	72.054	13.9006	4.2413	3.2775	0.7684	0.21810
	24.000	38.898	5.7953	3.0327	1.9109	2.0973	0.60079		34.000	74.894	14.3206	4.2776	3.3478	0.6877	0.20859
	26.000	41.478	6.4663	3.1924	2.0255	1.9664	0.54674		32.000	76.827	14.5690	4.2984	3.3894	0.6371	0.20324
	28.000	44.215	7.1862	3.3457	2.1479	1.8335	0.49483		30.000	78.345	14.7420	4.3126	3.4183	0.6000	0.19962
	30.000	47.153	7.9510	3.4930	2.2791	1.6971	0.44543		28.000	79.617	14.8713	4.3231	3.4400	0.5712	0.19697
	32.000	50.376	8.8038	3.6357	2.4215	1.5547	0.39847		26.000	80.723	14.9723	4.3311	3.4569	0.5480	0.19493
	34.000	54.066	9.7460	3.7772	2.5802	1.4002	0.35321		24.000	81.712	15.0533	4.3376	3.4705	0.5287	0.19332
	36.000	58.793	10.8943	3.9283	2.7733	1.2149	0.30670		22.000	82.610	15.1191	4.3427	3.4815	0.5127	0.19202
	37.306	65.769	12.4065	4.0985	3.0271	0.9660	0.25708		20.000	83.440	15.1734	4.3470	3.4906	0.4992	0.19096
	36.000	71.617	13.4496	4.2005	3.2019	0.7805	0.22897		18.000	84.215	15.2184	4.3505	3.4981	0.4877	0.19009
	34.000	74.634	13.8916	4.2405	3.2760	0.6945	0.21831		16.000	84.947	15.2557	4.3534	3.5043	0.4781	0.18937
	32.000	76.633	14.1452	4.2626	3.3184	0.6420	0.21249		14.000	85.644	15.2866	4.3558	3.5095	0.4699	0.18878
	30.000	78.190	14.3199	4.2776	3.3477	0.6041	0.20861		12.000	86.313	15.3120	4.3577	3.5137	0.4632	0.18829
	28.000	79.487	14.4500	4.2885	3.3695	0.5746	0.20578		10.000	86.959	15.3325	4.3593	3.5172	0.4576	0.18790
	26.000	80.614	14.5512	4.2969	3.3864	0.5510	0.20362		8.000	87.587	15.3487	4.3606	3.5199	0.4532	0.18759
	24.000	81.617	14.6320	4.3036	3.3989	0.5315	0.20191		6.000	88.201	15.3609	4.3615	3.5219	0.4499	0.18736
	22.000	82.528	14.6976	4.3090	3.4109	0.5152	0.20054		4.000	88.807	15.3695	4.3622	3.5234	0.4475	0.18720
	20.000	83.369	14.7517	4.3134	3.4200	0.5015	0.19942		2.000	89.405	15.3746	4.3625	3.5242	0.4461	0.18710
	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	3.70	2.000	17.027	1.2029	1.1408	1.0544	3.5674	0.99936	
12.000	86.275	14.8895	4.3245	3.4430	0.4651	0.19660		4.000	18.478	1.4377	1.2942	1.1108	3.4388	0.99515	
10.000	86.928	14.9099	4.3262	3.4465	0.4595	0.19619		6.000	20.032	1.7073	1.4589	1.1703	3.3121	0.98461	
8.000	87.562	14.9260	4.3274	3.4491	0.4551	0.19586		8.000	21.688	2.0146	1.6330	1.2337	3.1858	0.96594	
6.000	88.184	14.9381	4.3284	3.4512	0.4517	0.19562		10.000	23.444	2.3615	1.8141	1.3017	3.0591	0.93840	
4.000	88.794	14.9466	4.3291	3.4526	0.4493	0.19545		12.000	25.297	2.7496	1.9998	1.3749	2.9315	0.90218	
2.000	89.398	14.9517	4.3295	3.4534	0.4479	0.19535		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	
3.65	2.000	17.250	1.2001	1.1390	1.0537	3.5198	0.99938	22.000	35.985	5.3474	2.9156	1.8341	2.2783	0.64001	
	4.000	18.701	1.4312	1.2902	1.1094	3.3936	0.99532	24.000	38.426	6.0027	3.0840	1.9464	2.1453	0.58349	
	6.000	20.256	1.6964	1.4524	1.1680	3.2691	0.98515	26.000	40.991	6.7053	3.2452	2.0662	2.0114	0.52883	
	8.000	21.913	1.9980	1.6239	1.2304	3.1451	0.96710	28.000	43.704	7.4580	3.3993	2.1940	1.8758	0.47677	
	10.000	23.668	2.3381	1.8024	1.2972	3.0207	0.94042	30.000	46.605	8.2664	3.5467	2.3307	1.7375	0.42765	
	12.000	25.520	2.7183	1.9854	1.3691	2.8953	0.90525	32.000	49.768	9.1422	3.6886	2.4785	1.5940	0.38140	
	14.000	27.468	3.1402	2.1707	1.4466	2.7688	0.86248	34.000	53.344	10.1123	3.8277	2.6418	1.4404	0.33742	
	16.000	29.509	3.6043	2.3558	1.5300	2.6412	0.81364	36.000	57.760	11.2596	3.9721	2.8346	1.2623	0.29362	
	18.000	31.645	4.1117	2.5387	1.6196	2.5125	0.76044	37.713	65.847	13.1309	4.1705	3.1485	0.9675	0.23710	
	20.000	33.878	4.6828	2.7176	1.7158	2.3830	0.70470	36.000	72.443	14.3517	4.2802	3.3530	0.7577	0.20791	
	22.000	36.212	5.2580	2.8911	1.8187	2.2527	0.64814	34.000	75.135	14.7539	4.3136	3.4203	0.6814	0.19937	
	24.000	38.658	5.8984	3.0584	1.9286	2.1215	0.59212	32.000	77.009	14.9979	4.3332	3.4612	0.6324	0.19442	
	26.000	41.230	6.5849	3.2189	2.0457	1.9891	0.53777	30.000	78.492	15.1693	4.3467	3.4899	0.5962	0.19104	
	28.000	43.954	7.3210	3.3726	2.1707	1.8549	0.48578	28.000	79.740	15.2983	4.3567	3.5115	0.5680	0.18855	
	30.000	46.873	8.1124	3.5199	2.3047	1.7176	0.43650	26.000	80.828	15.3992	4.3644	3.5283	0.5451	0.18664	
	32.000	50.064	8.9714	3.6622	2.4497	1.5746	0.38990	24.000	81.802	15.4802	4.3706	3.5419	0.5261	0.18512	
34.000	53.694	9.9271	3.8025	2.6107	1.4207	0.34529	22.000	82.688	15.5463	4.3756	3.5530	0.5103	0.18389		
36.000	58.251	11.0727	3.9499	2.8033	1.2394	0.30022									

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
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	85.667	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		
							20.000	33.229		4.8923	2.7867	1.7556	2.4644	0.68241		
3.75	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 ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$
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	0.22855		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	
								16.000	28.281	3.9194	2.4716	1.5858	2.8270	0.78046	
3.90	2.000	16.196	1.2138	1.1482	1.0571	3.7573	0.99926	18.000	30.417	4.4992	2.6664	1.6874	2.6851	0.72095	
	4.000	17.642	1.4633	1.3104	1.1167	3.6191	0.99441	20.000	32.646	5.1304	2.8554	1.7967	2.5430	0.65992	
	6.000	19.196	1.7517	1.4849	1.1797	3.4830	0.98232	22.000	34.969	5.8125	3.0370	1.9139	2.4010	0.59933	
	8.000	20.854	2.0821	1.6694	1.2472	3.3473	0.96105	24.000	37.393	6.5462	3.2103	2.0391	2.2591	0.54068	
	10.000	22.614	2.4570	1.8614	1.3200	3.2111	0.92990	26.000	39.929	7.3323	3.3748	2.1727	2.1172	0.48503	
	12.000	24.472	2.8783	2.0578	1.3987	3.0739	0.88935	28.000	42.598	8.1726	3.5304	2.3149	1.9748	0.43302	
	14.000	26.424	3.3474	2.2557	1.4840	2.9357	0.84077	30.000	45.431	9.0717	3.6778	2.4666	1.8310	0.38488	
	16.000	28.469	3.8655	2.4523	1.5763	2.7967	0.78611	32.000	48.483	10.0386	3.8178	2.6294	1.6838	0.34053	
	18.000	30.605	4.4329	2.6452	1.6758	2.6570	0.72761	34.000	51.859	11.0931	3.9524	2.8067	1.5299	0.29949	
	20.000	32.834	5.0501	2.8326	1.7828	2.5171	0.66743	36.000	55.812	12.2688	4.0863	3.0073	1.3604	0.26054	
	22.000	35.157	5.7171	3.0129	1.8975	2.3771	0.60746								

**Oblique Shock Tables ( $\gamma = 1.4$ )**

$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	$M_1$	$\theta$	$\beta$	$\frac{P_2}{P_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$M_2$	$\frac{P_{02}}{P_{01}}$	
3.95	38.000	61.406	13.8667	4.2383	3.2718	1.1389	0.21889	4.00	28.000	80.359	17.9765	4.5402	3.9594	0.5513	0.14555	
	38.612	66.026	15.0309	4.3358	3.4667	0.9711	0.19376		26.000	81.359	18.0787	4.5464	3.9765	0.5302	0.14419	
	38.000	70.101	15.9275	4.4038	3.6167	0.8345	0.17703		24.000	82.261	18.1615	4.5514	3.9903	0.5126	0.14310	
	36.000	73.928	16.6412	4.4541	3.7361	0.7172	0.16509		22.000	83.087	18.2296	4.5555	4.0017	0.4978	0.14221	
	34.000	76.131	16.9904	4.4776	3.7945	0.6554	0.15965		20.000	83.854	18.2861	4.5588	4.0111	0.4852	0.14148	
	32.000	77.777	17.2203	4.4927	3.8330	0.6125	0.15620		18.000	84.574	18.3331	4.5616	4.0190	0.4746	0.14087	
	30.000	79.120	17.3877	4.5035	3.8609	0.5798	0.15375		16.000	85.256	18.3723	4.5639	4.0255	0.4655	0.14037	
	28.000	80.268	17.5161	4.5117	3.8824	0.5537	0.15191		14.000	85.907	18.4049	4.5659	4.0310	0.4579	0.13996	
	26.000	81.281	17.6179	4.5181	3.8994	0.5324	0.15047		12.000	86.533	18.4317	4.5674	4.0355	0.4515	0.13962	
	24.000	82.192	17.7003	4.5232	3.9132	0.5147	0.14932		10.000	87.139	18.4535	4.5687	4.0391	0.4463	0.13934	
	22.000	83.028	17.7680	4.5274	3.9245	0.4997	0.14838		8.000	87.730	18.4707	4.5697	4.0420	0.4421	0.13912	
	20.000	83.803	17.8241	4.5309	3.9339	0.4870	0.14761		6.000	88.307	18.4837	4.5705	4.0442	0.4390	0.13896	
	18.000	84.529	17.8708	4.5338	3.9417	0.4762	0.14698		4.000	88.876	18.4928	4.5710	4.0457	0.4367	0.13885	
	16.000	85.218	17.9097	4.5362	3.9482	0.4671	0.14645		2.000	89.439	18.4982	4.5713	4.0466	0.4354	0.13878	
	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										