

**İTÜ Uçak ve Uzay Bilimleri Fakültesi**

**UZB 362 SIKIŞTIRILABİLİR AERODİNAMİK**

**Ders Notları**

**SIKIŞTIRILABİLİR AKIM FORMÜLLERİ,  
TABLOLARI ve GRAFİKLERİ**

**Prof. Dr. M. Adil Yükselen**

**Mart 2006**

## İZANTROPİK AKIM BÜYÜKLÜKLERİ

$$\frac{T_0}{T} = 1 + \frac{\gamma - 1}{2} M^2$$

$$\frac{\rho_0}{\rho} = \left( \frac{T_0}{T} \right)^{\frac{1}{\gamma - 1}} = \left( 1 + \frac{\gamma - 1}{2} M^2 \right)^{\frac{1}{\gamma - 1}}$$

$$\frac{p_0}{p} = \left( \frac{T_0}{T} \right)^{\frac{\gamma}{\gamma - 1}} = \left( 1 + \frac{\gamma - 1}{2} M^2 \right)^{\frac{\gamma}{\gamma - 1}}$$

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

$M$	$\frac{p_0}{p}$	$\frac{\rho_0}{\rho}$	$\frac{T_0}{T}$	$\frac{A}{A^*}$
2.0000E-02	1.0003E+00	1.0002E+00	1.0001E+00	2.8942E+01
4.0000E-02	1.0011E+00	1.0008E+00	1.0003E+00	1.4481E+01
6.0000E-02	1.0025E+00	1.0018E+00	1.0007E+00	9.6659E+00
8.0000E-02	1.0045E+00	1.0032E+00	1.0013E+00	7.2616E+00
1.0000E-01	1.0070E+00	1.0050E+00	1.0020E+00	5.8218E+00
1.2000E-01	1.0101E+00	1.0072E+00	1.0029E+00	4.8643E+00
1.4000E-01	1.0138E+00	1.0098E+00	1.0039E+00	4.1824E+00
1.6000E-01	1.0180E+00	1.0128E+00	1.0051E+00	3.6727E+00
1.8000E-01	1.0229E+00	1.0163E+00	1.0065E+00	3.2779E+00
2.0000E-01	1.0283E+00	1.0201E+00	1.0080E+00	2.9635E+00
2.2000E-01	1.0343E+00	1.0244E+00	1.0097E+00	2.7076E+00
2.4000E-01	1.0409E+00	1.0290E+00	1.0115E+00	2.4956E+00
2.6000E-01	1.0481E+00	1.0341E+00	1.0135E+00	2.3173E+00
2.8000E-01	1.0560E+00	1.0397E+00	1.0157E+00	2.1656E+00
3.0000E-01	1.0644E+00	1.0456E+00	1.0180E+00	2.0351E+00
3.2000E-01	1.0735E+00	1.0520E+00	1.0205E+00	1.9219E+00
3.4000E-01	1.0833E+00	1.0588E+00	1.0231E+00	1.8229E+00
3.6000E-01	1.0937E+00	1.0661E+00	1.0259E+00	1.7358E+00
3.8000E-01	1.1048E+00	1.0738E+00	1.0289E+00	1.6587E+00
4.0000E-01	1.1166E+00	1.0819E+00	1.0320E+00	1.5901E+00
4.2000E-01	1.1290E+00	1.0905E+00	1.0353E+00	1.5289E+00
4.4000E-01	1.1422E+00	1.0996E+00	1.0387E+00	1.4740E+00
4.6000E-01	1.1561E+00	1.1092E+00	1.0423E+00	1.4246E+00
4.8000E-01	1.1708E+00	1.1192E+00	1.0461E+00	1.3801E+00
5.0000E-01	1.1862E+00	1.1297E+00	1.0500E+00	1.3398E+00
5.2000E-01	1.2024E+00	1.1407E+00	1.0541E+00	1.3034E+00
5.4000E-01	1.2194E+00	1.1522E+00	1.0583E+00	1.2703E+00
5.6000E-01	1.2373E+00	1.1643E+00	1.0627E+00	1.2403E+00
5.8000E-01	1.2560E+00	1.1768E+00	1.0673E+00	1.2130E+00
6.0000E-01	1.2755E+00	1.1898E+00	1.0720E+00	1.1882E+00

$M$	$\frac{P_0}{p}$	$\frac{\rho_0}{\rho}$	$\frac{T_0}{T}$	$\frac{A}{A^*}$
6.2000E-01	1.2959E+00	1.2034E+00	1.0769E+00	1.1656E+00
6.4000E-01	1.3173E+00	1.2176E+00	1.0819E+00	1.1451E+00
6.6000E-01	1.3396E+00	1.2322E+00	1.0871E+00	1.1265E+00
6.8000E-01	1.3628E+00	1.2475E+00	1.0925E+00	1.1097E+00
7.0000E-01	1.3871E+00	1.2633E+00	1.0980E+00	1.0944E+00
7.2000E-01	1.4124E+00	1.2797E+00	1.1037E+00	1.0806E+00
7.4000E-01	1.4387E+00	1.2967E+00	1.1095E+00	1.0681E+00
7.6000E-01	1.4661E+00	1.3143E+00	1.1155E+00	1.0570E+00
7.8000E-01	1.4947E+00	1.3325E+00	1.1217E+00	1.0471E+00
8.0000E-01	1.5243E+00	1.3514E+00	1.1280E+00	1.0382E+00
8.2000E-01	1.5552E+00	1.3709E+00	1.1345E+00	1.0305E+00
8.4000E-01	1.5873E+00	1.3910E+00	1.1411E+00	1.0237E+00
8.6000E-01	1.6207E+00	1.4118E+00	1.1479E+00	1.0179E+00
8.8000E-01	1.6553E+00	1.4333E+00	1.1549E+00	1.0129E+00
9.0000E-01	1.6913E+00	1.4555E+00	1.1620E+00	1.0089E+00
9.2000E-01	1.7287E+00	1.4784E+00	1.1693E+00	1.0056E+00
9.4000E-01	1.7675E+00	1.5020E+00	1.1767E+00	1.0031E+00
9.6000E-01	1.8078E+00	1.5264E+00	1.1843E+00	1.0014E+00
9.8000E-01	1.8496E+00	1.5515E+00	1.1921E+00	1.0003E+00
1.0000E+00	1.8929E+00	1.5774E+00	1.2000E+00	1.0000E+00
1.0200E+00	1.9379E+00	1.6041E+00	1.2081E+00	1.0003E+00
1.0400E+00	1.9846E+00	1.6316E+00	1.2163E+00	1.0013E+00
1.0600E+00	2.0330E+00	1.6599E+00	1.2247E+00	1.0029E+00
1.0800E+00	2.0831E+00	1.6891E+00	1.2333E+00	1.0051E+00
1.1000E+00	2.1351E+00	1.7191E+00	1.2420E+00	1.0079E+00
1.1200E+00	2.1890E+00	1.7500E+00	1.2509E+00	1.0113E+00
1.1400E+00	2.2449E+00	1.7818E+00	1.2599E+00	1.0153E+00
1.1600E+00	2.3028E+00	1.8145E+00	1.2691E+00	1.0198E+00
1.1800E+00	2.3628E+00	1.8481E+00	1.2785E+00	1.0248E+00
1.2000E+00	2.4250E+00	1.8827E+00	1.2880E+00	1.0304E+00
1.2200E+00	2.4894E+00	1.9183E+00	1.2977E+00	1.0366E+00
1.2400E+00	2.5560E+00	1.9549E+00	1.3075E+00	1.0432E+00
1.2600E+00	2.6251E+00	1.9925E+00	1.3175E+00	1.0504E+00
1.2800E+00	2.6967E+00	2.0311E+00	1.3277E+00	1.0581E+00
1.3000E+00	2.7707E+00	2.0708E+00	1.3380E+00	1.0663E+00
1.3200E+00	2.8474E+00	2.1116E+00	1.3485E+00	1.0750E+00
1.3400E+00	2.9269E+00	2.1535E+00	1.3591E+00	1.0842E+00
1.3600E+00	3.0091E+00	2.1965E+00	1.3699E+00	1.0940E+00
1.3800E+00	3.0942E+00	2.2407E+00	1.3809E+00	1.1042E+00
1.4000E+00	3.1823E+00	2.2861E+00	1.3920E+00	1.1149E+00
1.4200E+00	3.2734E+00	2.3327E+00	1.4033E+00	1.1262E+00
1.4400E+00	3.3678E+00	2.3805E+00	1.4147E+00	1.1379E+00
1.4600E+00	3.4654E+00	2.4296E+00	1.4263E+00	1.1501E+00
1.4800E+00	3.5665E+00	2.4800E+00	1.4381E+00	1.1629E+00
1.5000E+00	3.6710E+00	2.5317E+00	1.4500E+00	1.1762E+00
1.5200E+00	3.7792E+00	2.5848E+00	1.4621E+00	1.1899E+00
1.5400E+00	3.8911E+00	2.6392E+00	1.4743E+00	1.2042E+00
1.5600E+00	4.0068E+00	2.6951E+00	1.4867E+00	1.2190E+00
1.5800E+00	4.1266E+00	2.7524E+00	1.4993E+00	1.2344E+00
1.6000E+00	4.2504E+00	2.8111E+00	1.5120E+00	1.2502E+00

$M$	$\frac{P_0}{p}$	$\frac{\rho_0}{\rho}$	$\frac{T_0}{T}$	$\frac{A}{A^*}$
1.6200E+00	4.3785E+00	2.8714E+00	1.5249E+00	1.2666E+00
1.6400E+00	4.5110E+00	2.9332E+00	1.5379E+00	1.2836E+00
1.6600E+00	4.6479E+00	2.9965E+00	1.5511E+00	1.3010E+00
1.6800E+00	4.7896E+00	3.0614E+00	1.5645E+00	1.3190E+00
1.7000E+00	4.9360E+00	3.1280E+00	1.5780E+00	1.3376E+00
1.7200E+00	5.0874E+00	3.1962E+00	1.5917E+00	1.3567E+00
1.7400E+00	5.2439E+00	3.2662E+00	1.6055E+00	1.3764E+00
1.7600E+00	5.4057E+00	3.3378E+00	1.6195E+00	1.3967E+00
1.7800E+00	5.5729E+00	3.4113E+00	1.6337E+00	1.4175E+00
1.8000E+00	5.7458E+00	3.4865E+00	1.6480E+00	1.4390E+00
1.8200E+00	5.9244E+00	3.5636E+00	1.6625E+00	1.4610E+00
1.8400E+00	6.1091E+00	3.6426E+00	1.6771E+00	1.4836E+00
1.8600E+00	6.2998E+00	3.7235E+00	1.6919E+00	1.5069E+00
1.8800E+00	6.4970E+00	3.8063E+00	1.7069E+00	1.5308E+00
1.9000E+00	6.7006E+00	3.8912E+00	1.7220E+00	1.5553E+00
1.9200E+00	6.9111E+00	3.9781E+00	1.7373E+00	1.5804E+00
1.9400E+00	7.1284E+00	4.0671E+00	1.7527E+00	1.6062E+00
1.9600E+00	7.3530E+00	4.1582E+00	1.7683E+00	1.6326E+00
1.9800E+00	7.5849E+00	4.2514E+00	1.7841E+00	1.6597E+00
2.0000E+00	7.8244E+00	4.3469E+00	1.8000E+00	1.6875E+00
2.0500E+00	8.4581E+00	4.5956E+00	1.8405E+00	1.7600E+00
2.1000E+00	9.1447E+00	4.8590E+00	1.8820E+00	1.8369E+00
2.1500E+00	9.8881E+00	5.1380E+00	1.9245E+00	1.9185E+00
2.2000E+00	1.0693E+01	5.4333E+00	1.9680E+00	2.0050E+00
2.2500E+00	1.1563E+01	5.7457E+00	2.0125E+00	2.0964E+00
2.3000E+00	1.2504E+01	6.0759E+00	2.0580E+00	2.1931E+00
2.3500E+00	1.3521E+01	6.4250E+00	2.1045E+00	2.2953E+00
2.4000E+00	1.4620E+01	6.7937E+00	2.1520E+00	2.4031E+00
2.4500E+00	1.5806E+01	7.1830E+00	2.2005E+00	2.5168E+00
2.5000E+00	1.7086E+01	7.5937E+00	2.2500E+00	2.6367E+00
2.5500E+00	1.8466E+01	8.0270E+00	2.3005E+00	2.7630E+00
2.6000E+00	1.9954E+01	8.4839E+00	2.3520E+00	2.8960E+00
2.6500E+00	2.1557E+01	8.9652E+00	2.4045E+00	3.0359E+00
2.7000E+00	2.3283E+01	9.4723E+00	2.4580E+00	3.1830E+00
2.7500E+00	2.5140E+01	1.0006E+01	2.5125E+00	3.3377E+00
2.8000E+00	2.7138E+01	1.0568E+01	2.5680E+00	3.5001E+00
2.8500E+00	2.9286E+01	1.1159E+01	2.6245E+00	3.6707E+00
2.9000E+00	3.1594E+01	1.1780E+01	2.6820E+00	3.8498E+00
2.9500E+00	3.4073E+01	1.2433E+01	2.7405E+00	4.0376E+00
3.0000E+00	3.6733E+01	1.3119E+01	2.8000E+00	4.2346E+00
3.0500E+00	3.9586E+01	1.3839E+01	2.8605E+00	4.4410E+00
3.1000E+00	4.2646E+01	1.4595E+01	2.9220E+00	4.6573E+00
3.1500E+00	4.5925E+01	1.5388E+01	2.9845E+00	4.8838E+00
3.2000E+00	4.9437E+01	1.6219E+01	3.0480E+00	5.1210E+00
3.2500E+00	5.3196E+01	1.7091E+01	3.1125E+00	5.3691E+00
3.3000E+00	5.7219E+01	1.8005E+01	3.1780E+00	5.6286E+00
3.3500E+00	6.1520E+01	1.8961E+01	3.2445E+00	5.9000E+00
3.4000E+00	6.6117E+01	1.9963E+01	3.3120E+00	6.1837E+00
3.4500E+00	7.1029E+01	2.1011E+01	3.3805E+00	6.4801E+00
3.5000E+00	7.6272E+01	2.2108E+01	3.4500E+00	6.7896E+00

$M$	$\frac{P_0}{p}$	$\frac{\rho_0}{\rho}$	$\frac{T_0}{T}$	$\frac{A}{A^*}$
3.5500E+00	8.1868E+01	2.3255E+01	3.5205E+00	7.1128E+00
3.6000E+00	8.7837E+01	2.4453E+01	3.5920E+00	7.4501E+00
3.6500E+00	9.4200E+01	2.5706E+01	3.6645E+00	7.8020E+00
3.7000E+00	1.0098E+02	2.7015E+01	3.7380E+00	8.1691E+00
3.7500E+00	1.0820E+02	2.8381E+01	3.8125E+00	8.5517E+00
3.8000E+00	1.1589E+02	2.9807E+01	3.8880E+00	8.9506E+00
3.8500E+00	1.2407E+02	3.1295E+01	3.9645E+00	9.3661E+00
3.9000E+00	1.3277E+02	3.2847E+01	4.0420E+00	9.7990E+00
3.9500E+00	1.4201E+02	3.4465E+01	4.1205E+00	1.0250E+01
4.0000E+00	1.5184E+02	3.6151E+01	4.2000E+00	1.0719E+01
4.0500E+00	1.6227E+02	3.7908E+01	4.2805E+00	1.1207E+01
4.1000E+00	1.7334E+02	3.9739E+01	4.3620E+00	1.1715E+01
4.1500E+00	1.8509E+02	4.1644E+01	4.4445E+00	1.2243E+01
4.2000E+00	1.9755E+02	4.3628E+01	4.5280E+00	1.2792E+01
4.2500E+00	2.1075E+02	4.5692E+01	4.6125E+00	1.3362E+01
4.3000E+00	2.2475E+02	4.7839E+01	4.6980E+00	1.3955E+01
4.3500E+00	2.3957E+02	5.0072E+01	4.7845E+00	1.4571E+01
4.4000E+00	2.5526E+02	5.2392E+01	4.8720E+00	1.5210E+01
4.4500E+00	2.7186E+02	5.4804E+01	4.9605E+00	1.5873E+01
4.5000E+00	2.8941E+02	5.7310E+01	5.0500E+00	1.6562E+01
4.5500E+00	3.0798E+02	5.9912E+01	5.1405E+00	1.7277E+01
4.6000E+00	3.2759E+02	6.2614E+01	5.2320E+00	1.8018E+01
4.6500E+00	3.4832E+02	6.5418E+01	5.3245E+00	1.8786E+01
4.7000E+00	3.7020E+02	6.8328E+01	5.4180E+00	1.9583E+01
4.7500E+00	3.9330E+02	7.1346E+01	5.5125E+00	2.0408E+01
4.8000E+00	4.1766E+02	7.4477E+01	5.6080E+00	2.1264E+01
4.8500E+00	4.4337E+02	7.7722E+01	5.7045E+00	2.2150E+01
4.9000E+00	4.7046E+02	8.1086E+01	5.8020E+00	2.3067E+01
4.9500E+00	4.9901E+02	8.4571E+01	5.9005E+00	2.4017E+01
5.0000E+00	5.2909E+02	8.8182E+01	6.0000E+00	2.5000E+01
5.1000E+00	5.9410E+02	9.5792E+01	6.2020E+00	2.7070E+01
5.2000E+00	6.6608E+02	1.0395E+02	6.4080E+00	2.9283E+01
5.3000E+00	7.4566E+02	1.1267E+02	6.6180E+00	3.1649E+01
5.4000E+00	8.3352E+02	1.2200E+02	6.8320E+00	3.4175E+01
5.5000E+00	9.3038E+02	1.3197E+02	7.0500E+00	3.6869E+01
5.6000E+00	1.0370E+03	1.4260E+02	7.2720E+00	3.9740E+01
5.7000E+00	1.1543E+03	1.5394E+02	7.4980E+00	4.2797E+01
5.8000E+00	1.2830E+03	1.6602E+02	7.7280E+00	4.6050E+01
5.9000E+00	1.4242E+03	1.7888E+02	7.9620E+00	4.9507E+01
6.0000E+00	1.5789E+03	1.9255E+02	8.2000E+00	5.3180E+01
6.1000E+00	1.7481E+03	2.0707E+02	8.4420E+00	5.7077E+01
6.2000E+00	1.9329E+03	2.2248E+02	8.6880E+00	6.1210E+01
6.3000E+00	2.1347E+03	2.3884E+02	8.9380E+00	6.5590E+01
6.4000E+00	2.3547E+03	2.5617E+02	9.1920E+00	7.0227E+01
6.5000E+00	2.5942E+03	2.7452E+02	9.4500E+00	7.5134E+01
6.6000E+00	2.8548E+03	2.9395E+02	9.7120E+00	8.0323E+01
6.7000E+00	3.1380E+03	3.1449E+02	9.9780E+00	8.5805E+01
6.8000E+00	3.4454E+03	3.3620E+02	1.0248E+01	9.1594E+01
6.9000E+00	3.7787E+03	3.5913E+02	1.0522E+01	9.7702E+01
7.0000E+00	4.1398E+03	3.8332E+02	1.0800E+01	1.0414E+02

$M$	$\frac{p_0}{p}$	$\frac{\rho_0}{\rho}$	$\frac{T_0}{T}$	$\frac{A}{A^*}$
7.1000E+00	4.5307E+03	4.0883E+02	1.1082E+01	1.1093E+02
7.2000E+00	4.9533E+03	4.3572E+02	1.1368E+01	1.1808E+02
7.3000E+00	5.4098E+03	4.6405E+02	1.1658E+01	1.2560E+02
7.4000E+00	5.9026E+03	4.9386E+02	1.1952E+01	1.3352E+02
7.5000E+00	6.4339E+03	5.2522E+02	1.2250E+01	1.4184E+02
7.6000E+00	7.0064E+03	5.5819E+02	1.2552E+01	1.5058E+02
7.7000E+00	7.6227E+03	5.9283E+02	1.2858E+01	1.5977E+02
7.8000E+00	8.2855E+03	6.2922E+02	1.3168E+01	1.6940E+02
7.9000E+00	8.9979E+03	6.6740E+02	1.3482E+01	1.7951E+02
8.0000E+00	9.7629E+03	7.0745E+02	1.3800E+01	1.9011E+02
9.0000E+00	2.1103E+04	1.2269E+03	1.7200E+01	3.2719E+02
1.0000E+01	4.2439E+04	2.0209E+03	2.1000E+01	5.3594E+02
1.1000E+01	8.0334E+04	3.1879E+03	2.5200E+01	8.4191E+02
1.2000E+01	1.4446E+05	4.8478E+03	2.9800E+01	1.2762E+03
1.3000E+01	2.4862E+05	7.1441E+03	3.4800E+01	1.8761E+03
1.4000E+01	4.1190E+05	1.0246E+04	4.0200E+01	2.6854E+03
1.5000E+01	6.6016E+05	1.4351E+04	4.6000E+01	3.7552E+03
1.6000E+01	1.0277E+06	1.9687E+04	5.2200E+01	5.1446E+03
1.7000E+01	1.5589E+06	2.6512E+04	5.8800E+01	6.9205E+03
1.8000E+01	2.3110E+06	3.5121E+04	6.5800E+01	9.1593E+03
1.9000E+01	3.3557E+06	4.5843E+04	7.3200E+01	1.1946E+04
2.0000E+01	4.7830E+06	5.9049E+04	8.1000E+01	1.5377E+04
2.2000E+01	9.2509E+06	9.4590E+04	9.7800E+01	2.4607E+04
2.4000E+01	1.6913E+07	1.4555E+05	1.1620E+02	3.7832E+04
2.6000E+01	2.9486E+07	2.1649E+05	1.3620E+02	5.6236E+04
2.8000E+01	4.9360E+07	3.1280E+05	1.5780E+02	8.1212E+04
3.0000E+01	7.9777E+07	4.4075E+05	1.8100E+02	1.1439E+05
3.2000E+01	1.2504E+08	6.0759E+05	2.0580E+02	1.5763E+05
3.4000E+01	1.9077E+08	8.2159E+05	2.3220E+02	2.1309E+05
3.6000E+01	2.8417E+08	1.0921E+06	2.6020E+02	2.8319E+05
3.8000E+01	4.1433E+08	1.4297E+06	2.8980E+02	3.7065E+05
4.0000E+01	5.9261E+08	1.8461E+06	3.2100E+02	4.7853E+05
4.2000E+01	8.3301E+08	2.3545E+06	3.5380E+02	6.1021E+05
4.4000E+01	1.1526E+09	2.9692E+06	3.8820E+02	7.6943E+05
4.6000E+01	1.5722E+09	3.7062E+06	4.2420E+02	9.6031E+05
4.8000E+01	2.1164E+09	4.5828E+06	4.6180E+02	1.1873E+06
5.0000E+01	2.8147E+09	5.6182E+06	5.0100E+02	1.4555E+06

**NORMAL ŞOK BÜYÜKLÜKLERİ**

$$M_2^2 = \frac{I + \frac{\gamma - I}{2} M_1^2}{\gamma M_1^2 - \frac{\gamma - I}{2}}$$

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

$$\frac{\rho_2}{\rho_1} = \frac{(\gamma + I) M_1^2}{2 + (\gamma - I) M_1^2}$$

$$\frac{T_2}{T_1} = \frac{p_2 / p_1}{\rho_2 / \rho_1} = \left[ I + \frac{2\gamma}{\gamma + I} (M_1^2 - I) \right] \cdot \left[ \frac{2 + (\gamma - I) M_1^2}{(\gamma + I) M_1^2} \right]$$

$$\frac{p_{o2}}{p_1} = \frac{p_{o2}}{p_2} \cdot \frac{p_2}{p_1} = \left[ \frac{(\gamma + I)^2 M_1^2}{2\gamma M_1^2 - (\gamma - I)} \right]^{\frac{\gamma}{\gamma - I}} \left[ I + \frac{2\gamma}{\gamma + I} (M_1^2 - I) \right]$$

$$\frac{p_{o2}}{p_{o1}} = \frac{p_{o2}}{p_2} \cdot \frac{p_2}{p_1} \cdot \frac{p_1}{p_{o1}} = \left[ \frac{2 + (\gamma - I) M_1^2}{2 + (\gamma - I) M_1^2} \right]^{\frac{\gamma}{\gamma - I}} \left[ I + \frac{2\gamma}{\gamma + I} (M_1^2 - I) \right]$$

$M_1$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$\frac{p_{o2}}{p_{o1}}$	$\frac{p_{o2}}{p_1}$	$M_2$
1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.8929E+00	1.0000E+00
1.0200E+00	1.0471E+00	1.0334E+00	1.0132E+00	9.9999E-01	1.9379E+00	9.8052E-01
1.0400E+00	1.0952E+00	1.0671E+00	1.0263E+00	9.9992E-01	1.9844E+00	9.6203E-01
1.0600E+00	1.1442E+00	1.1009E+00	1.0393E+00	9.9975E-01	2.0325E+00	9.4445E-01
1.0800E+00	1.1941E+00	1.1349E+00	1.0522E+00	9.9943E-01	2.0819E+00	9.2771E-01
1.1000E+00	1.2450E+00	1.1691E+00	1.0649E+00	9.9893E-01	2.1328E+00	9.1177E-01
1.1200E+00	1.2968E+00	1.2034E+00	1.0776E+00	9.9821E-01	2.1851E+00	8.9656E-01
1.1400E+00	1.3495E+00	1.2378E+00	1.0903E+00	9.9726E-01	2.2388E+00	8.8204E-01
1.1600E+00	1.4032E+00	1.2723E+00	1.1029E+00	9.9605E-01	2.2937E+00	8.6816E-01
1.1800E+00	1.4578E+00	1.3069E+00	1.1154E+00	9.9457E-01	2.3500E+00	8.5488E-01
1.2000E+00	1.5133E+00	1.3416E+00	1.1280E+00	9.9280E-01	2.4075E+00	8.4217E-01
1.2200E+00	1.5698E+00	1.3764E+00	1.1405E+00	9.9073E-01	2.4663E+00	8.2999E-01
1.2400E+00	1.6272E+00	1.4112E+00	1.1531E+00	9.8836E-01	2.5263E+00	8.1830E-01
1.2600E+00	1.6855E+00	1.4460E+00	1.1657E+00	9.8568E-01	2.5875E+00	8.0709E-01
1.2800E+00	1.7448E+00	1.4808E+00	1.1783E+00	9.8268E-01	2.6500E+00	7.9631E-01
1.3000E+00	1.8050E+00	1.5157E+00	1.1909E+00	9.7937E-01	2.7136E+00	7.8596E-01
1.3200E+00	1.8661E+00	1.5505E+00	1.2035E+00	9.7575E-01	2.7784E+00	7.7600E-01
1.3400E+00	1.9282E+00	1.5854E+00	1.2162E+00	9.7182E-01	2.8444E+00	7.6641E-01
1.3600E+00	1.9912E+00	1.6202E+00	1.2290E+00	9.6758E-01	2.9115E+00	7.5718E-01
1.3800E+00	2.0551E+00	1.6549E+00	1.2418E+00	9.6304E-01	2.9798E+00	7.4829E-01

$M_1$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$\frac{p_{o2}}{p_{o1}}$	$\frac{P_{o2}}{p_1}$	$M_2$
1.4000E+00	2.1200E+00	1.6897E+00	1.2547E+00	9.5819E-01	3.0492E+00	7.3971E-01
1.4200E+00	2.1858E+00	1.7243E+00	1.2676E+00	9.5306E-01	3.1198E+00	7.3144E-01
1.4400E+00	2.2525E+00	1.7589E+00	1.2807E+00	9.4765E-01	3.1915E+00	7.2345E-01
1.4600E+00	2.3202E+00	1.7934E+00	1.2938E+00	9.4196E-01	3.2643E+00	7.1574E-01
1.4800E+00	2.3888E+00	1.8278E+00	1.3069E+00	9.3600E-01	3.3382E+00	7.0829E-01
1.5000E+00	2.4583E+00	1.8621E+00	1.3202E+00	9.2979E-01	3.4133E+00	7.0109E-01
1.5200E+00	2.5288E+00	1.8963E+00	1.3336E+00	9.2332E-01	3.4894E+00	6.9413E-01
1.5400E+00	2.6002E+00	1.9303E+00	1.3470E+00	9.1662E-01	3.5667E+00	6.8739E-01
1.5600E+00	2.6725E+00	1.9643E+00	1.3606E+00	9.0970E-01	3.6450E+00	6.8087E-01
1.5800E+00	2.7458E+00	1.9981E+00	1.3742E+00	9.0255E-01	3.7244E+00	6.7455E-01
1.6000E+00	2.8200E+00	2.0317E+00	1.3880E+00	8.9520E-01	3.8050E+00	6.6844E-01
1.6200E+00	2.8951E+00	2.0653E+00	1.4018E+00	8.8765E-01	3.8866E+00	6.6251E-01
1.6400E+00	2.9712E+00	2.0986E+00	1.4158E+00	8.7992E-01	3.9693E+00	6.5677E-01
1.6600E+00	3.0482E+00	2.1318E+00	1.4299E+00	8.7201E-01	4.0531E+00	6.5119E-01
1.6800E+00	3.1261E+00	2.1649E+00	1.4440E+00	8.6394E-01	4.1379E+00	6.4579E-01
1.7000E+00	3.2050E+00	2.1977E+00	1.4583E+00	8.5572E-01	4.2238E+00	6.4054E-01
1.7200E+00	3.2848E+00	2.2304E+00	1.4727E+00	8.4736E-01	4.3108E+00	6.3545E-01
1.7400E+00	3.3655E+00	2.2629E+00	1.4873E+00	8.3886E-01	4.3989E+00	6.3051E-01
1.7600E+00	3.4472E+00	2.2952E+00	1.5019E+00	8.3024E-01	4.4880E+00	6.2570E-01
1.7800E+00	3.5298E+00	2.3273E+00	1.5167E+00	8.2151E-01	4.5782E+00	6.2104E-01
1.8000E+00	3.6133E+00	2.3592E+00	1.5316E+00	8.1268E-01	4.6695E+00	6.1650E-01
1.8200E+00	3.6978E+00	2.3909E+00	1.5466E+00	8.0376E-01	4.7618E+00	6.1209E-01
1.8400E+00	3.7832E+00	2.4224E+00	1.5617E+00	7.9476E-01	4.8552E+00	6.0780E-01
1.8600E+00	3.8695E+00	2.4537E+00	1.5770E+00	7.8569E-01	4.9497E+00	6.0363E-01
1.8800E+00	3.9568E+00	2.4848E+00	1.5924E+00	7.7655E-01	5.0452E+00	5.9957E-01
1.9000E+00	4.0450E+00	2.5157E+00	1.6079E+00	7.6736E-01	5.1418E+00	5.9562E-01
1.9200E+00	4.1341E+00	2.5463E+00	1.6236E+00	7.5812E-01	5.2394E+00	5.9177E-01
1.9400E+00	4.2242E+00	2.5767E+00	1.6394E+00	7.4884E-01	5.3381E+00	5.8802E-01
1.9600E+00	4.3152E+00	2.6069E+00	1.6553E+00	7.3954E-01	5.4378E+00	5.8437E-01
1.9800E+00	4.4071E+00	2.6369E+00	1.6713E+00	7.3021E-01	5.5386E+00	5.8082E-01
2.0000E+00	4.5000E+00	2.6667E+00	1.6875E+00	7.2087E-01	5.6404E+00	5.7735E-01
2.0500E+00	4.7363E+00	2.7400E+00	1.7285E+00	6.9751E-01	5.8996E+00	5.6906E-01
2.1000E+00	4.9783E+00	2.8119E+00	1.7705E+00	6.7420E-01	6.1654E+00	5.6128E-01
2.1500E+00	5.2263E+00	2.8823E+00	1.8132E+00	6.5105E-01	6.4377E+00	5.5395E-01
2.2000E+00	5.4800E+00	2.9512E+00	1.8569E+00	6.2814E-01	6.7165E+00	5.4706E-01
2.2500E+00	5.7396E+00	3.0186E+00	1.9014E+00	6.0553E-01	7.0018E+00	5.4055E-01
2.3000E+00	6.0050E+00	3.0845E+00	1.9468E+00	5.8329E-01	7.2937E+00	5.3441E-01
2.3500E+00	6.2763E+00	3.1490E+00	1.9931E+00	5.6148E-01	7.5920E+00	5.2861E-01
2.4000E+00	6.5533E+00	3.2119E+00	2.0403E+00	5.4014E-01	7.8969E+00	5.2312E-01
2.4500E+00	6.8363E+00	3.2733E+00	2.0885E+00	5.1931E-01	8.2083E+00	5.1792E-01
2.5000E+00	7.1250E+00	3.3333E+00	2.1375E+00	4.9901E-01	8.5261E+00	5.1299E-01
2.5500E+00	7.4196E+00	3.3919E+00	2.1875E+00	4.7928E-01	8.8505E+00	5.0831E-01
2.6000E+00	7.7200E+00	3.4490E+00	2.2383E+00	4.6012E-01	9.1813E+00	5.0387E-01
2.6500E+00	8.0262E+00	3.5047E+00	2.2902E+00	4.4156E-01	9.5186E+00	4.9965E-01
2.7000E+00	8.3383E+00	3.5590E+00	2.3429E+00	4.2359E-01	9.8624E+00	4.9563E-01
2.7500E+00	8.6562E+00	3.6119E+00	2.3966E+00	4.0623E-01	1.0213E+01	4.9181E-01
2.8000E+00	8.9800E+00	3.6636E+00	2.4512E+00	3.8946E-01	1.0569E+01	4.8817E-01
2.8500E+00	9.3096E+00	3.7139E+00	2.5067E+00	3.7330E-01	1.0933E+01	4.8469E-01
2.9000E+00	9.6450E+00	3.7629E+00	2.5632E+00	3.5773E-01	1.1302E+01	4.8138E-01
2.9500E+00	9.9862E+00	3.8106E+00	2.6206E+00	3.4275E-01	1.1678E+01	4.7821E-01



$M_1$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$\frac{p_{o2}}{p_{o1}}$	$\frac{P_{o2}}{P_{o1}}$	$M_2$
3.0000E+00	1.0333E+01	3.8571E+00	2.6790E+00	3.2834E-01	1.2061E+01	4.7519E-01
3.0500E+00	1.0686E+01	3.9025E+00	2.7383E+00	3.1450E-01	1.2450E+01	4.7230E-01
3.1000E+00	1.1045E+01	3.9466E+00	2.7986E+00	3.0121E-01	1.2846E+01	4.6953E-01
3.1500E+00	1.1410E+01	3.9896E+00	2.8598E+00	2.8846E-01	1.3247E+01	4.6689E-01
3.2000E+00	1.1780E+01	4.0315E+00	2.9220E+00	2.7623E-01	1.3656E+01	4.6435E-01
3.2500E+00	1.2156E+01	4.0723E+00	2.9851E+00	2.6451E-01	1.4071E+01	4.6192E-01
3.3000E+00	1.2538E+01	4.1120E+00	3.0492E+00	2.5328E-01	1.4492E+01	4.5959E-01
3.3500E+00	1.2926E+01	4.1507E+00	3.1142E+00	2.4252E-01	1.4920E+01	4.5735E-01
3.4000E+00	1.3320E+01	4.1884E+00	3.1802E+00	2.3223E-01	1.5354E+01	4.5520E-01
3.4500E+00	1.3720E+01	4.2251E+00	3.2472E+00	2.2237E-01	1.5795E+01	4.5314E-01
3.5000E+00	1.4125E+01	4.2609E+00	3.3151E+00	2.1295E-01	1.6242E+01	4.5115E-01
3.5500E+00	1.4536E+01	4.2957E+00	3.3839E+00	2.0393E-01	1.6696E+01	4.4925E-01
3.6000E+00	1.4953E+01	4.3296E+00	3.4537E+00	1.9531E-01	1.7156E+01	4.4741E-01
3.6500E+00	1.5376E+01	4.3627E+00	3.5245E+00	1.8707E-01	1.7622E+01	4.4565E-01
3.7000E+00	1.5805E+01	4.3949E+00	3.5962E+00	1.7919E-01	1.8095E+01	4.4395E-01
3.7500E+00	1.6240E+01	4.4262E+00	3.6689E+00	1.7166E-01	1.8574E+01	4.4231E-01
3.8000E+00	1.6680E+01	4.4568E+00	3.7426E+00	1.6447E-01	1.9060E+01	4.4073E-01
3.8500E+00	1.7126E+01	4.4866E+00	3.8172E+00	1.5760E-01	1.9553E+01	4.3921E-01
3.9000E+00	1.7578E+01	4.5156E+00	3.8928E+00	1.5103E-01	2.0051E+01	4.3774E-01
3.9500E+00	1.8036E+01	4.5439E+00	3.9694E+00	1.4475E-01	2.0556E+01	4.3633E-01
4.0000E+00	1.8500E+01	4.5714E+00	4.0469E+00	1.3876E-01	2.1068E+01	4.3496E-01
4.0500E+00	1.8970E+01	4.5983E+00	4.1254E+00	1.3303E-01	2.1586E+01	4.3364E-01
4.1000E+00	1.9445E+01	4.6245E+00	4.2048E+00	1.2756E-01	2.2111E+01	4.3236E-01
4.1500E+00	1.9926E+01	4.6500E+00	4.2852E+00	1.2233E-01	2.2642E+01	4.3113E-01
4.2000E+00	2.0413E+01	4.6749E+00	4.3666E+00	1.1733E-01	2.3179E+01	4.2994E-01
4.2500E+00	2.0906E+01	4.6992E+00	4.4489E+00	1.1256E-01	2.3723E+01	4.2878E-01
4.3000E+00	2.1405E+01	4.7229E+00	4.5322E+00	1.0800E-01	2.4273E+01	4.2767E-01
4.3500E+00	2.1910E+01	4.7460E+00	4.6165E+00	1.0364E-01	2.4830E+01	4.2659E-01
4.4000E+00	2.2420E+01	4.7685E+00	4.7017E+00	9.9481E-02	2.5393E+01	4.2554E-01
4.4500E+00	2.2936E+01	4.7904E+00	4.7879E+00	9.5501E-02	2.5963E+01	4.2453E-01
4.5000E+00	2.3458E+01	4.8119E+00	4.8751E+00	9.1698E-02	2.6539E+01	4.2355E-01
4.5500E+00	2.3986E+01	4.8328E+00	4.9632E+00	8.8062E-02	2.7121E+01	4.2260E-01
4.6000E+00	2.4520E+01	4.8532E+00	5.0523E+00	8.4586E-02	2.7710E+01	4.2168E-01
4.6500E+00	2.5060E+01	4.8731E+00	5.1424E+00	8.1263E-02	2.8305E+01	4.2079E-01
4.7000E+00	2.5605E+01	4.8926E+00	5.2334E+00	7.8086E-02	2.8907E+01	4.1992E-01
4.7500E+00	2.6156E+01	4.9116E+00	5.3254E+00	7.5047E-02	2.9516E+01	4.1908E-01
4.8000E+00	2.6713E+01	4.9301E+00	5.4184E+00	7.2140E-02	3.0130E+01	4.1826E-01
4.8500E+00	2.7276E+01	4.9482E+00	5.5124E+00	6.9359E-02	3.0751E+01	4.1747E-01
4.9000E+00	2.7845E+01	4.9659E+00	5.6073E+00	6.6699E-02	3.1379E+01	4.1670E-01
4.9500E+00	2.8420E+01	4.9831E+00	5.7032E+00	6.4153E-02	3.2013E+01	4.1595E-01
5.0000E+00	2.9000E+01	5.0000E+00	5.8000E+00	6.1716E-02	3.2653E+01	4.1523E-01
5.1000E+00	3.0178E+01	5.0326E+00	5.9966E+00	5.7151E-02	3.3954E+01	4.1384E-01
5.2000E+00	3.1380E+01	5.0637E+00	6.1971E+00	5.2966E-02	3.5280E+01	4.1252E-01
5.3000E+00	3.2605E+01	5.0934E+00	6.4014E+00	4.9126E-02	3.6632E+01	4.1127E-01
5.4000E+00	3.3853E+01	5.1218E+00	6.6097E+00	4.5600E-02	3.8009E+01	4.1009E-01
5.5000E+00	3.5125E+01	5.1489E+00	6.8218E+00	4.2361E-02	3.9412E+01	4.0897E-01
5.6000E+00	3.6420E+01	5.1749E+00	7.0378E+00	3.9383E-02	4.0841E+01	4.0791E-01
5.7000E+00	3.7738E+01	5.1998E+00	7.2577E+00	3.6643E-02	4.2296E+01	4.0690E-01
5.8000E+00	3.9080E+01	5.2236E+00	7.4814E+00	3.4120E-02	4.3777E+01	4.0594E-01
5.9000E+00	4.0445E+01	5.2464E+00	7.7091E+00	3.1795E-02	4.5283E+01	4.0503E-01

$M_1$	$\frac{p_2}{p_1}$	$\frac{\rho_2}{\rho_1}$	$\frac{T_2}{T_1}$	$\frac{p_{o2}}{p_{o1}}$	$\frac{p_{o2}}{p_1}$	$M_2$
6.0000E+00	4.1833E+01	5.2683E+00	7.9406E+00	2.9651E-02	4.6815E+01	4.0416E-01
6.1000E+00	4.3245E+01	5.2893E+00	8.1760E+00	2.7672E-02	4.8373E+01	4.0333E-01
6.2000E+00	4.4680E+01	5.3094E+00	8.4153E+00	2.5845E-02	4.9957E+01	4.0254E-01
6.3000E+00	4.6138E+01	5.3287E+00	8.6584E+00	2.4156E-02	5.1566E+01	4.0179E-01
6.4000E+00	4.7620E+01	5.3473E+00	8.9055E+00	2.2594E-02	5.3201E+01	4.0107E-01
6.5000E+00	4.9125E+01	5.3651E+00	9.1564E+00	2.1148E-02	5.4862E+01	4.0038E-01
6.6000E+00	5.0653E+01	5.3822E+00	9.4113E+00	1.9808E-02	5.6549E+01	3.9972E-01
6.7000E+00	5.2205E+01	5.3987E+00	9.6700E+00	1.8566E-02	5.8261E+01	3.9909E-01
6.8000E+00	5.3780E+01	5.4145E+00	9.9326E+00	1.7414E-02	5.9999E+01	3.9849E-01
6.9000E+00	5.5378E+01	5.4298E+00	1.0199E+01	1.6345E-02	6.1763E+01	3.9791E-01
7.0000E+00	5.7000E+01	5.4444E+00	1.0469E+01	1.5351E-02	6.3553E+01	3.9736E-01
7.1000E+00	5.8645E+01	5.4586E+00	1.0744E+01	1.4428E-02	6.5368E+01	3.9683E-01
7.2000E+00	6.0313E+01	5.4722E+00	1.1022E+01	1.3569E-02	6.7209E+01	3.9632E-01
7.3000E+00	6.2005E+01	5.4853E+00	1.1304E+01	1.2769E-02	6.9076E+01	3.9583E-01
7.4000E+00	6.3720E+01	5.4980E+00	1.1590E+01	1.2023E-02	7.0969E+01	3.9536E-01
7.5000E+00	6.5458E+01	5.5102E+00	1.1879E+01	1.1329E-02	7.2887E+01	3.9491E-01
7.6000E+00	6.7220E+01	5.5220E+00	1.2173E+01	1.0680E-02	7.4831E+01	3.9447E-01
7.7000E+00	6.9005E+01	5.5334E+00	1.2471E+01	1.0075E-02	7.6801E+01	3.9405E-01
7.8000E+00	7.0813E+01	5.5443E+00	1.2772E+01	9.5102E-03	7.8797E+01	3.9365E-01
7.9000E+00	7.2645E+01	5.5550E+00	1.3077E+01	8.9819E-03	8.0818E+01	3.9326E-01
8.0000E+00	7.4500E+01	5.5652E+00	1.3387E+01	8.4878E-03	8.2865E+01	3.9289E-01
9.0000E+00	9.4333E+01	5.6512E+00	1.6693E+01	4.9639E-03	1.0475E+02	3.8980E-01
1.0000E+01	1.1650E+02	5.7143E+00	2.0387E+01	3.0448E-03	1.2922E+02	3.8758E-01
1.1000E+01	1.4100E+02	5.7619E+00	2.4471E+01	1.9451E-03	1.5626E+02	3.8592E-01
1.2000E+01	1.6783E+02	5.7987E+00	2.8943E+01	1.2866E-03	1.8587E+02	3.8466E-01
1.3000E+01	1.9700E+02	5.8276E+00	3.3805E+01	8.7709E-04	2.1806E+02	3.8368E-01
1.4000E+01	2.2850E+02	5.8507E+00	3.9055E+01	6.1380E-04	2.5282E+02	3.8289E-01
1.5000E+01	2.6233E+02	5.8696E+00	4.4694E+01	4.3953E-04	2.9016E+02	3.8226E-01
1.6000E+01	2.9850E+02	5.8851E+00	5.0722E+01	3.2119E-04	3.3008E+02	3.8174E-01
1.7000E+01	3.3700E+02	5.8980E+00	5.7138E+01	2.3899E-04	3.7257E+02	3.8131E-01
1.8000E+01	3.7783E+02	5.9088E+00	6.3944E+01	1.8072E-04	4.1763E+02	3.8095E-01
1.9000E+01	4.2100E+02	5.9180E+00	7.1139E+01	1.3865E-04	4.6527E+02	3.8065E-01
2.0000E+01	4.6650E+02	5.9259E+00	7.8722E+01	1.0777E-04	5.1548E+02	3.8039E-01
2.2000E+01	5.6450E+02	5.9387E+00	9.5055E+01	6.7414E-05	6.2364E+02	3.7997E-01
2.4000E+01	6.7183E+02	5.9484E+00	1.1294E+02	4.3877E-05	7.4209E+02	3.7965E-01
2.6000E+01	7.8850E+02	5.9559E+00	1.3239E+02	2.9534E-05	8.7085E+02	3.7940E-01
2.8000E+01	9.1450E+02	5.9620E+00	1.5339E+02	2.0460E-05	1.0099E+03	3.7920E-01
3.0000E+01	1.0498E+03	5.9669E+00	1.7594E+02	1.4531E-05	1.1593E+03	3.7904E-01
3.2000E+01	1.1945E+03	5.9708E+00	2.0006E+02	1.0548E-05	1.3189E+03	3.7891E-01
3.4000E+01	1.3485E+03	5.9742E+00	2.2572E+02	7.8044E-06	1.4889E+03	3.7880E-01
3.6000E+01	1.5118E+03	5.9769E+00	2.5294E+02	5.8738E-06	1.6691E+03	3.7871E-01
3.8000E+01	1.6845E+03	5.9793E+00	2.8172E+02	4.4885E-06	1.8597E+03	3.7864E-01
4.0000E+01	1.8665E+03	5.9813E+00	3.1206E+02	3.4771E-06	2.0606E+03	3.7857E-01
4.2000E+01	2.0578E+03	5.9830E+00	3.4394E+02	2.7271E-06	2.2717E+03	3.7852E-01
4.4000E+01	2.2585E+03	5.9845E+00	3.7739E+02	2.1630E-06	2.4932E+03	3.7847E-01
4.6000E+01	2.4685E+03	5.9859E+00	4.1239E+02	1.7332E-06	2.7249E+03	3.7842E-01
4.8000E+01	2.6878E+03	5.9870E+00	4.4894E+02	1.4019E-06	2.9670E+03	3.7839E-01
5.0000E+01	2.9165E+03	5.9880E+00	4.8706E+02	1.1438E-06	3.2194E+03	3.7835E-01

**ISI İLAVELİ AKIM BÜYÜKLÜKLERİ**

$$\frac{p}{p^*} = \frac{1 + \gamma}{1 + \gamma M^2}$$

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

$$\frac{\rho}{\rho^*} = \frac{1 + \gamma M^2}{1 + \gamma} \cdot \frac{1}{M^2}$$

$$\frac{p_o}{p_o^*} = \frac{1 + \gamma}{1 + \gamma M^2} \cdot \left[ \frac{2 + (\gamma - 1)M^2}{\gamma + 1} \right]^{\frac{\gamma}{\gamma - 1}}$$

$$\frac{T_o}{T_o^*} = \frac{(1 + \gamma)M^2}{(1 + \gamma M^2)^2} \cdot [2 + (\gamma - 1)M^2]$$

$M$	$\frac{p}{p^*}$	$\frac{T}{T^*}$	$\frac{\rho}{\rho^*}$	$\frac{p_o}{p_o^*}$	$\frac{T_o}{T_o^*}$
2.0000E-02	2.3987E+00	2.3014E-03	1.0423E+03	1.2675E+00	1.9180E-03
4.0000E-02	2.3946E+00	9.1749E-03	2.6100E+02	1.2665E+00	7.6482E-03
6.0000E-02	2.3880E+00	2.0529E-02	1.1632E+02	1.2647E+00	1.7119E-02
8.0000E-02	2.3787E+00	3.6212E-02	6.5688E+01	1.2623E+00	3.0215E-02
1.0000E-01	2.3669E+00	5.6020E-02	4.2250E+01	1.2591E+00	4.6777E-02
1.2000E-01	2.3526E+00	7.9698E-02	2.9519E+01	1.2554E+00	6.6606E-02
1.4000E-01	2.3359E+00	1.0695E-01	2.1842E+01	1.2510E+00	8.9471E-02
1.6000E-01	2.3170E+00	1.3743E-01	1.6859E+01	1.2461E+00	1.1511E-01
1.8000E-01	2.2959E+00	1.7078E-01	1.3443E+01	1.2406E+00	1.4324E-01
2.0000E-01	2.2727E+00	2.0661E-01	1.1000E+01	1.2346E+00	1.7355E-01
2.2000E-01	2.2477E+00	2.4452E-01	9.1921E+00	1.2281E+00	2.0574E-01
2.4000E-01	2.2209E+00	2.8411E-01	7.8171E+00	1.2213E+00	2.3948E-01
2.6000E-01	2.1925E+00	3.2496E-01	6.7470E+00	1.2140E+00	2.7446E-01
2.8000E-01	2.1626E+00	3.6667E-01	5.8980E+00	1.2064E+00	3.1035E-01
3.0000E-01	2.1314E+00	4.0887E-01	5.2130E+00	1.1985E+00	3.4686E-01
3.2000E-01	2.0991E+00	4.5119E-01	4.6523E+00	1.1904E+00	3.8369E-01
3.4000E-01	2.0657E+00	4.9327E-01	4.1877E+00	1.1822E+00	4.2056E-01
3.6000E-01	2.0314E+00	5.3482E-01	3.7984E+00	1.1737E+00	4.5723E-01
3.8000E-01	1.9964E+00	5.7553E-01	3.4688E+00	1.1652E+00	4.9346E-01

$M$	$\frac{p}{p^*}$	$\frac{T}{T^*}$	$\frac{\rho}{\rho^*}$	$\frac{P_o}{P_o^*}$	$\frac{T_o}{T_o^*}$
4.0000E-01	1.9608E+00	6.1515E-01	3.1875E+00	1.1566E+00	5.2903E-01
4.2000E-01	1.9247E+00	6.5346E-01	2.9454E+00	1.1480E+00	5.6376E-01
4.4000E-01	1.8882E+00	6.9025E-01	2.7355E+00	1.1394E+00	5.9748E-01
4.6000E-01	1.8515E+00	7.2538E-01	2.5525E+00	1.1308E+00	6.3007E-01
4.8000E-01	1.8147E+00	7.5871E-01	2.3918E+00	1.1224E+00	6.6139E-01
5.0000E-01	1.7778E+00	7.9012E-01	2.2500E+00	1.1141E+00	6.9136E-01
5.2000E-01	1.7409E+00	8.1955E-01	2.1243E+00	1.1059E+00	7.1990E-01
5.4000E-01	1.7043E+00	8.4695E-01	2.0122E+00	1.0979E+00	7.4695E-01
5.6000E-01	1.6678E+00	8.7227E-01	1.9120E+00	1.0901E+00	7.7249E-01
5.8000E-01	1.6316E+00	8.9552E-01	1.8219E+00	1.0826E+00	7.9648E-01
6.0000E-01	1.5957E+00	9.1670E-01	1.7407E+00	1.0753E+00	8.1892E-01
6.2000E-01	1.5603E+00	9.3584E-01	1.6673E+00	1.0682E+00	8.3983E-01
6.4000E-01	1.5253E+00	9.5298E-01	1.6006E+00	1.0615E+00	8.5920E-01
6.6000E-01	1.4908E+00	9.6816E-01	1.5399E+00	1.0550E+00	8.7708E-01
6.8000E-01	1.4569E+00	9.8144E-01	1.4844E+00	1.0489E+00	8.9350E-01
7.0000E-01	1.4235E+00	9.9290E-01	1.4337E+00	1.0431E+00	9.0850E-01
7.2000E-01	1.3907E+00	1.0026E+00	1.3871E+00	1.0376E+00	9.2212E-01
7.4000E-01	1.3585E+00	1.0106E+00	1.3442E+00	1.0325E+00	9.3442E-01
7.6000E-01	1.3270E+00	1.0171E+00	1.3047E+00	1.0278E+00	9.4546E-01
7.8000E-01	1.2961E+00	1.0220E+00	1.2682E+00	1.0234E+00	9.5528E-01
8.0000E-01	1.2658E+00	1.0255E+00	1.2344E+00	1.0193E+00	9.6395E-01
8.2000E-01	1.2362E+00	1.0276E+00	1.2030E+00	1.0157E+00	9.7152E-01
8.4000E-01	1.2073E+00	1.0285E+00	1.1738E+00	1.0124E+00	9.7807E-01
8.6000E-01	1.1791E+00	1.0283E+00	1.1467E+00	1.0095E+00	9.8363E-01
8.8000E-01	1.1515E+00	1.0269E+00	1.1214E+00	1.0070E+00	9.8828E-01
9.0000E-01	1.1246E+00	1.0245E+00	1.0977E+00	1.0049E+00	9.9207E-01
9.2000E-01	1.0984E+00	1.0212E+00	1.0756E+00	1.0031E+00	9.9506E-01
9.4000E-01	1.0728E+00	1.0170E+00	1.0549E+00	1.0017E+00	9.9729E-01
9.6000E-01	1.0479E+00	1.0121E+00	1.0354E+00	1.0008E+00	9.9883E-01
9.8000E-01	1.0236E+00	1.0064E+00	1.0172E+00	1.0002E+00	9.9971E-01
1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
1.0200E+00	9.7698E-01	9.9304E-01	9.8382E-01	1.0002E+00	9.9973E-01
1.0400E+00	9.5456E-01	9.8554E-01	9.6857E-01	1.0008E+00	9.9895E-01
1.0600E+00	9.3275E-01	9.7755E-01	9.5417E-01	1.0017E+00	9.9769E-01
1.0800E+00	9.1152E-01	9.6913E-01	9.4056E-01	1.0031E+00	9.9601E-01
1.1000E+00	8.9087E-01	9.6031E-01	9.2769E-01	1.0049E+00	9.9392E-01
1.1200E+00	8.7078E-01	9.5115E-01	9.1550E-01	1.0070E+00	9.9148E-01
1.1400E+00	8.5123E-01	9.4169E-01	9.0394E-01	1.0095E+00	9.8871E-01
1.1600E+00	8.3222E-01	9.3196E-01	8.9298E-01	1.0124E+00	9.8564E-01
1.1800E+00	8.1374E-01	9.2200E-01	8.8258E-01	1.0157E+00	9.8230E-01
1.2000E+00	7.9576E-01	9.1185E-01	8.7269E-01	1.0194E+00	9.7872E-01
1.2200E+00	7.7827E-01	9.0153E-01	8.6328E-01	1.0235E+00	9.7492E-01
1.2400E+00	7.6127E-01	8.9108E-01	8.5432E-01	1.0279E+00	9.7092E-01
1.2600E+00	7.4473E-01	8.8052E-01	8.4578E-01	1.0328E+00	9.6675E-01
1.2800E+00	7.2865E-01	8.6988E-01	8.3765E-01	1.0380E+00	9.6243E-01
1.3000E+00	7.1301E-01	8.5917E-01	8.2988E-01	1.0437E+00	9.5798E-01
1.3200E+00	6.9780E-01	8.4843E-01	8.2247E-01	1.0497E+00	9.5341E-01
1.3400E+00	6.8301E-01	8.3766E-01	8.1538E-01	1.0561E+00	9.4873E-01
1.3600E+00	6.6863E-01	8.2689E-01	8.0861E-01	1.0629E+00	9.4398E-01
1.3800E+00	6.5464E-01	8.1613E-01	8.0212E-01	1.0701E+00	9.3914E-01

$M$	$\frac{p}{p^*}$	$\frac{T}{T^*}$	$\frac{\rho}{\rho^*}$	$\frac{P_o}{P_o^*}$	$\frac{T_o}{T_o^*}$
1.4000E+00	6.4103E-01	8.0539E-01	7.9592E-01	1.0777E+00	9.3425E-01
1.4200E+00	6.2779E-01	7.9469E-01	7.8997E-01	1.0856E+00	9.2931E-01
1.4400E+00	6.1491E-01	7.8405E-01	7.8427E-01	1.0940E+00	9.2434E-01
1.4600E+00	6.0237E-01	7.7346E-01	7.7880E-01	1.1028E+00	9.1933E-01
1.4800E+00	5.9018E-01	7.6294E-01	7.7356E-01	1.1120E+00	9.1431E-01
1.5000E+00	5.7831E-01	7.5250E-01	7.6852E-01	1.1215E+00	9.0928E-01
1.5200E+00	5.6676E-01	7.4215E-01	7.6368E-01	1.1315E+00	9.0424E-01
1.5400E+00	5.5552E-01	7.3189E-01	7.5902E-01	1.1419E+00	8.9920E-01
1.5600E+00	5.4458E-01	7.2173E-01	7.5455E-01	1.1527E+00	8.9418E-01
1.5800E+00	5.3393E-01	7.1168E-01	7.5024E-01	1.1640E+00	8.8917E-01
1.6000E+00	5.2356E-01	7.0174E-01	7.4609E-01	1.1756E+00	8.8419E-01
1.6200E+00	5.1346E-01	6.9190E-01	7.4210E-01	1.1877E+00	8.7922E-01
1.6400E+00	5.0363E-01	6.8219E-01	7.3825E-01	1.2002E+00	8.7429E-01
1.6600E+00	4.9405E-01	6.7259E-01	7.3454E-01	1.2131E+00	8.6939E-01
1.6800E+00	4.8472E-01	6.6312E-01	7.3096E-01	1.2264E+00	8.6453E-01
1.7000E+00	4.7562E-01	6.5377E-01	7.2751E-01	1.2402E+00	8.5971E-01
1.7200E+00	4.6677E-01	6.4455E-01	7.2418E-01	1.2545E+00	8.5493E-01
1.7400E+00	4.5813E-01	6.3545E-01	7.2096E-01	1.2692E+00	8.5019E-01
1.7600E+00	4.4972E-01	6.2649E-01	7.1785E-01	1.2843E+00	8.4551E-01
1.7800E+00	4.4152E-01	6.1765E-01	7.1484E-01	1.2999E+00	8.4087E-01
1.8000E+00	4.3353E-01	6.0894E-01	7.1193E-01	1.3159E+00	8.3628E-01
1.8200E+00	4.2573E-01	6.0036E-01	7.0912E-01	1.3324E+00	8.3174E-01
1.8400E+00	4.1813E-01	5.9191E-01	7.0640E-01	1.3494E+00	8.2726E-01
1.8600E+00	4.1072E-01	5.8359E-01	7.0377E-01	1.3669E+00	8.2283E-01
1.8800E+00	4.0349E-01	5.7540E-01	7.0122E-01	1.3849E+00	8.1845E-01
1.9000E+00	3.9643E-01	5.6734E-01	6.9875E-01	1.4033E+00	8.1414E-01
1.9200E+00	3.8955E-01	5.5941E-01	6.9636E-01	1.4222E+00	8.0987E-01
1.9400E+00	3.8283E-01	5.5160E-01	6.9404E-01	1.4417E+00	8.0567E-01
1.9600E+00	3.7628E-01	5.4392E-01	6.9180E-01	1.4616E+00	8.0152E-01
1.9800E+00	3.6988E-01	5.3636E-01	6.8962E-01	1.4821E+00	7.9742E-01
2.0000E+00	3.6364E-01	5.2893E-01	6.8750E-01	1.5031E+00	7.9339E-01
2.0500E+00	3.4866E-01	5.1087E-01	6.8248E-01	1.5579E+00	7.8355E-01
2.1000E+00	3.3454E-01	4.9356E-01	6.7782E-01	1.6162E+00	7.7406E-01
2.1500E+00	3.2122E-01	4.7696E-01	6.7347E-01	1.6780E+00	7.6493E-01
2.2000E+00	3.0864E-01	4.6106E-01	6.6942E-01	1.7434E+00	7.5613E-01
2.2500E+00	2.9675E-01	4.4582E-01	6.6564E-01	1.8128E+00	7.4768E-01
2.3000E+00	2.8551E-01	4.3122E-01	6.6210E-01	1.8860E+00	7.3954E-01
2.3500E+00	2.7487E-01	4.1723E-01	6.5878E-01	1.9634E+00	7.3173E-01
2.4000E+00	2.6478E-01	4.0384E-01	6.5567E-01	2.0451E+00	7.2421E-01
2.4500E+00	2.5522E-01	3.9100E-01	6.5275E-01	2.1311E+00	7.1699E-01
2.5000E+00	2.4615E-01	3.7870E-01	6.5000E-01	2.2218E+00	7.1006E-01
2.5500E+00	2.3754E-01	3.6691E-01	6.4741E-01	2.3173E+00	7.0340E-01
2.6000E+00	2.2936E-01	3.5561E-01	6.4497E-01	2.4177E+00	6.9700E-01
2.6500E+00	2.2158E-01	3.4478E-01	6.4267E-01	2.5233E+00	6.9084E-01
2.7000E+00	2.1417E-01	3.3439E-01	6.4049E-01	2.6343E+00	6.8494E-01
2.7500E+00	2.0712E-01	3.2442E-01	6.3843E-01	2.7508E+00	6.7926E-01
2.8000E+00	2.0040E-01	3.1486E-01	6.3648E-01	2.8731E+00	6.7380E-01
2.8500E+00	1.9399E-01	3.0568E-01	6.3463E-01	3.0014E+00	6.6855E-01
2.9000E+00	1.8788E-01	2.9687E-01	6.3288E-01	3.1359E+00	6.6350E-01
2.9500E+00	1.8205E-01	2.8841E-01	6.3121E-01	3.2768E+00	6.5865E-01

$M$	$\frac{p}{p^*}$	$\frac{T}{T^*}$	$\frac{\rho}{\rho^*}$	$\frac{P_o}{P_o^*}$	$\frac{T_o}{T_o^*}$
3.0000E+00	1.7647E-01	2.8028E-01	6.2963E-01	3.4245E+00	6.5398E-01
3.0500E+00	1.7114E-01	2.7246E-01	6.2812E-01	3.5790E+00	6.4949E-01
3.1000E+00	1.6604E-01	2.6495E-01	6.2669E-01	3.7408E+00	6.4516E-01
3.1500E+00	1.6117E-01	2.5773E-01	6.2533E-01	3.9101E+00	6.4100E-01
3.2000E+00	1.5649E-01	2.5078E-01	6.2402E-01	4.0871E+00	6.3699E-01
3.2500E+00	1.5202E-01	2.4410E-01	6.2278E-01	4.2721E+00	6.3313E-01
3.3000E+00	1.4773E-01	2.3766E-01	6.2159E-01	4.4655E+00	6.2940E-01
3.3500E+00	1.4361E-01	2.3146E-01	6.2046E-01	4.6674E+00	6.2582E-01
3.4000E+00	1.3966E-01	2.2549E-01	6.1938E-01	4.8783E+00	6.2236E-01
3.4500E+00	1.3587E-01	2.1974E-01	6.1834E-01	5.0984E+00	6.1902E-01
3.5000E+00	1.3223E-01	2.1419E-01	6.1735E-01	5.3280E+00	6.1580E-01
3.5500E+00	1.2873E-01	2.0885E-01	6.1640E-01	5.5676E+00	6.1270E-01
3.6000E+00	1.2537E-01	2.0369E-01	6.1548E-01	5.8173E+00	6.0970E-01
3.6500E+00	1.2213E-01	1.9871E-01	6.1461E-01	6.0776E+00	6.0681E-01
3.7000E+00	1.1901E-01	1.9390E-01	6.1377E-01	6.3488E+00	6.0401E-01
3.7500E+00	1.1601E-01	1.8926E-01	6.1296E-01	6.6314E+00	6.0131E-01
3.8000E+00	1.1312E-01	1.8478E-01	6.1219E-01	6.9256E+00	5.9870E-01
3.8500E+00	1.1034E-01	1.8045E-01	6.1144E-01	7.2318E+00	5.9617E-01
3.9000E+00	1.0765E-01	1.7627E-01	6.1073E-01	7.5505E+00	5.9373E-01
3.9500E+00	1.0506E-01	1.7222E-01	6.1004E-01	7.8820E+00	5.9137E-01
4.0000E+00	1.0256E-01	1.6831E-01	6.0938E-01	8.2268E+00	5.8909E-01
4.0500E+00	1.0015E-01	1.6453E-01	6.0874E-01	8.5853E+00	5.8687E-01
4.1000E+00	9.7823E-02	1.6086E-01	6.0812E-01	8.9579E+00	5.8473E-01
4.1500E+00	9.5574E-02	1.5732E-01	6.0753E-01	9.3451E+00	5.8266E-01
4.2000E+00	9.3400E-02	1.5388E-01	6.0695E-01	9.7473E+00	5.8065E-01
4.2500E+00	9.1298E-02	1.5056E-01	6.0640E-01	1.0165E+01	5.7870E-01
4.3000E+00	8.9266E-02	1.4734E-01	6.0587E-01	1.0599E+01	5.7682E-01
4.3500E+00	8.7300E-02	1.4421E-01	6.0535E-01	1.1049E+01	5.7499E-01
4.4000E+00	8.5397E-02	1.4119E-01	6.0486E-01	1.1516E+01	5.7322E-01
4.4500E+00	8.3555E-02	1.3825E-01	6.0437E-01	1.2000E+01	5.7149E-01
4.5000E+00	8.1772E-02	1.3540E-01	6.0391E-01	1.2502E+01	5.6982E-01
4.5500E+00	8.0044E-02	1.3264E-01	6.0346E-01	1.3023E+01	5.6820E-01
4.6000E+00	7.8370E-02	1.2996E-01	6.0302E-01	1.3563E+01	5.6663E-01
4.6500E+00	7.6747E-02	1.2736E-01	6.0260E-01	1.4122E+01	5.6510E-01
4.7000E+00	7.5174E-02	1.2483E-01	6.0220E-01	1.4702E+01	5.6362E-01
4.7500E+00	7.3648E-02	1.2238E-01	6.0180E-01	1.5302E+01	5.6218E-01
4.8000E+00	7.2167E-02	1.2000E-01	6.0142E-01	1.5923E+01	5.6078E-01
4.8500E+00	7.0731E-02	1.1768E-01	6.0105E-01	1.6567E+01	5.5942E-01
4.9000E+00	6.9336E-02	1.1543E-01	6.0069E-01	1.7232E+01	5.5809E-01
4.9500E+00	6.7982E-02	1.1324E-01	6.0034E-01	1.7921E+01	5.5681E-01
5.0000E+00	6.6667E-02	1.1111E-01	6.0000E-01	1.8634E+01	5.5556E-01
5.1000E+00	6.4147E-02	1.0703E-01	5.9935E-01	2.0133E+01	5.5315E-01
5.2000E+00	6.1767E-02	1.0316E-01	5.9874E-01	2.1734E+01	5.5088E-01
5.3000E+00	5.9515E-02	9.9496E-02	5.9817E-01	2.3444E+01	5.4872E-01
5.4000E+00	5.7383E-02	9.6019E-02	5.9762E-01	2.5268E+01	5.4667E-01
5.5000E+00	5.5363E-02	9.2719E-02	5.9711E-01	2.7211E+01	5.4473E-01
5.6000E+00	5.3447E-02	8.9584E-02	5.9662E-01	2.9281E+01	5.4288E-01
5.7000E+00	5.1628E-02	8.6602E-02	5.9616E-01	3.1482E+01	5.4112E-01
5.8000E+00	4.9900E-02	8.3765E-02	5.9572E-01	3.3822E+01	5.3944E-01
5.9000E+00	4.8257E-02	8.1062E-02	5.9530E-01	3.6308E+01	5.3785E-01

$M$	$\frac{p}{p^*}$	$\frac{T}{T^*}$	$\frac{\rho}{\rho^*}$	$\frac{P_o}{P_o^*}$	$\frac{T_o}{T_o^*}$
6.0000E+00	4.6693E-02	7.8487E-02	5.9491E-01	3.8946E+01	5.3633E-01
6.1000E+00	4.5203E-02	7.6031E-02	5.9453E-01	4.1744E+01	5.3488E-01
6.2000E+00	4.3783E-02	7.3687E-02	5.9417E-01	4.4708E+01	5.3349E-01
6.3000E+00	4.2428E-02	7.1448E-02	5.9383E-01	4.7848E+01	5.3217E-01
6.4000E+00	4.1135E-02	6.9309E-02	5.9351E-01	5.1170E+01	5.3091E-01
6.5000E+00	3.9900E-02	6.7263E-02	5.9320E-01	5.4683E+01	5.2970E-01
6.6000E+00	3.8720E-02	6.5306E-02	5.9290E-01	5.8395E+01	5.2854E-01
6.7000E+00	3.7590E-02	6.3431E-02	5.9262E-01	6.2315E+01	5.2743E-01
6.8000E+00	3.6510E-02	6.1636E-02	5.9234E-01	6.6452E+01	5.2637E-01
6.9000E+00	3.5475E-02	5.9915E-02	5.9208E-01	7.0815E+01	5.2535E-01
7.0000E+00	3.4483E-02	5.8264E-02	5.9184E-01	7.5414E+01	5.2438E-01
7.1000E+00	3.3532E-02	5.6680E-02	5.9160E-01	8.0257E+01	5.2344E-01
7.2000E+00	3.2619E-02	5.5159E-02	5.9137E-01	8.5356E+01	5.2254E-01
7.3000E+00	3.1744E-02	5.3698E-02	5.9115E-01	9.0720E+01	5.2167E-01
7.4000E+00	3.0902E-02	5.2293E-02	5.9094E-01	9.6361E+01	5.2084E-01
7.5000E+00	3.0094E-02	5.0943E-02	5.9074E-01	1.0229E+02	5.2004E-01
7.6000E+00	2.9317E-02	4.9644E-02	5.9055E-01	1.0851E+02	5.1927E-01
7.7000E+00	2.8569E-02	4.8393E-02	5.9036E-01	1.1505E+02	5.1853E-01
7.8000E+00	2.7850E-02	4.7189E-02	5.9018E-01	1.2190E+02	5.1782E-01
7.9000E+00	2.7157E-02	4.6029E-02	5.9001E-01	1.2909E+02	5.1713E-01
8.0000E+00	2.6490E-02	4.4910E-02	5.8984E-01	1.3662E+02	5.1647E-01
9.0000E+00	2.0979E-02	3.5650E-02	5.8848E-01	2.3388E+02	5.1098E-01
1.0000E+01	1.7021E-02	2.8972E-02	5.8750E-01	3.8161E+02	5.0702E-01
1.1000E+01	1.4085E-02	2.4003E-02	5.8678E-01	5.9774E+02	5.0407E-01
1.2000E+01	1.1846E-02	2.0207E-02	5.8623E-01	9.0405E+02	5.0181E-01
1.3000E+01	1.0101E-02	1.7243E-02	5.8580E-01	1.3267E+03	5.0005E-01
1.4000E+01	8.7146E-03	1.4885E-02	5.8546E-01	1.8963E+03	4.9865E-01
1.5000E+01	7.5949E-03	1.2979E-02	5.8519E-01	2.6488E+03	4.9752E-01
1.6000E+01	6.6778E-03	1.1416E-02	5.8496E-01	3.6253E+03	4.9659E-01
1.7000E+01	5.9172E-03	1.0119E-02	5.8478E-01	4.8730E+03	4.9582E-01
1.8000E+01	5.2794E-03	9.0304E-03	5.8462E-01	6.4452E+03	4.9517E-01
1.9000E+01	4.7393E-03	8.1085E-03	5.8449E-01	8.4018E+03	4.9462E-01
2.0000E+01	4.2781E-03	7.3208E-03	5.8438E-01	1.0810E+04	4.9415E-01
2.2000E+01	3.5367E-03	6.0540E-03	5.8419E-01	1.7284E+04	4.9340E-01
2.4000E+01	2.9725E-03	5.0894E-03	5.8406E-01	2.6559E+04	4.9282E-01
2.6000E+01	2.5332E-03	4.3381E-03	5.8395E-01	3.9461E+04	4.9238E-01
2.8000E+01	2.1846E-03	3.7416E-03	5.8386E-01	5.6965E+04	4.9202E-01
3.0000E+01	1.9033E-03	3.2601E-03	5.8380E-01	8.0212E+04	4.9174E-01
3.2000E+01	1.6729E-03	2.8659E-03	5.8374E-01	1.1051E+05	4.9150E-01
3.4000E+01	1.4820E-03	2.5391E-03	5.8369E-01	1.4936E+05	4.9131E-01
3.6000E+01	1.3220E-03	2.2651E-03	5.8365E-01	1.9846E+05	4.9114E-01
3.8000E+01	1.1866E-03	2.0332E-03	5.8362E-01	2.5972E+05	4.9101E-01
4.0000E+01	1.0710E-03	1.8351E-03	5.8359E-01	3.3528E+05	4.9089E-01
4.2000E+01	9.7142E-04	1.6646E-03	5.8357E-01	4.2749E+05	4.9079E-01
4.4000E+01	8.8515E-04	1.5168E-03	5.8355E-01	5.3899E+05	4.9070E-01
4.6000E+01	8.0988E-04	1.3879E-03	5.8353E-01	6.7264E+05	4.9062E-01
4.8000E+01	7.4382E-04	1.2747E-03	5.8351E-01	8.3161E+05	4.9055E-01
5.0000E+01	6.8552E-04	1.1748E-03	5.8350E-01	1.0193E+06	4.9050E-01

**SÜRTÜNMELİ AKIM BÜYÜKLÜKLERİ**

$$\frac{4\bar{f}L^*}{D} = \frac{1-M^2}{\gamma M^2} + \frac{\gamma+1}{2\gamma} \ln \left[ \frac{(\gamma+1)M^2}{2+(\gamma-1)M^2} \right]$$

$$\frac{p}{p^*} = \frac{1}{M} \cdot \left[ \frac{\gamma+1}{2+(\gamma-1)M^2} \right]^{1/2}$$

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

$$\frac{\rho}{\rho^*} = \frac{1}{M} \cdot \left[ \frac{2+(\gamma-1)M^2}{\gamma+1} \right]^{1/2}$$

$$\frac{p_o}{p_o^*} = \frac{1}{M} \cdot \left[ \frac{2+(\gamma-1)M^2}{\gamma+1} \right]^{\frac{\gamma+1}{2(\gamma-1)}}$$

$M$	$\frac{T}{T^*}$	$\frac{p}{p^*}$	$\frac{\rho}{\rho^*}$	$\frac{p_o}{p_o^*}$	$\frac{4\bar{f}L^*}{D}$
2.0000E-02	1.1999E+00	5.4770E+01	4.5645E+01	2.8942E+01	1.7784E+03
4.0000E-02	1.1996E+00	2.7382E+01	2.2825E+01	1.4481E+01	4.4035E+02
6.0000E-02	1.1991E+00	1.8251E+01	1.5220E+01	9.6659E+00	1.9303E+02
8.0000E-02	1.1985E+00	1.3684E+01	1.1418E+01	7.2616E+00	1.0672E+02
1.0000E-01	1.1976E+00	1.0944E+01	9.1378E+00	5.8218E+00	6.6922E+01
1.2000E-01	1.1966E+00	9.1156E+00	7.6182E+00	4.8643E+00	4.5408E+01
1.4000E-01	1.1953E+00	7.8093E+00	6.5333E+00	4.1824E+00	3.2511E+01
1.6000E-01	1.1939E+00	6.8291E+00	5.7200E+00	3.6727E+00	2.4198E+01
1.8000E-01	1.1923E+00	6.0662E+00	5.0879E+00	3.2779E+00	1.8543E+01
2.0000E-01	1.1905E+00	5.4554E+00	4.5826E+00	2.9635E+00	1.4533E+01
2.2000E-01	1.1885E+00	4.9554E+00	4.1694E+00	2.7076E+00	1.1596E+01
2.4000E-01	1.1863E+00	4.5383E+00	3.8255E+00	2.4956E+00	9.3865E+00
2.6000E-01	1.1840E+00	4.1851E+00	3.5347E+00	2.3173E+00	7.6876E+00
2.8000E-01	1.1815E+00	3.8820E+00	3.2857E+00	2.1656E+00	6.3572E+00
3.0000E-01	1.1788E+00	3.6191E+00	3.0702E+00	2.0351E+00	5.2993E+00
3.2000E-01	1.1759E+00	3.3887E+00	2.8818E+00	1.9219E+00	4.4467E+00
3.4000E-01	1.1729E+00	3.1853E+00	2.7158E+00	1.8229E+00	3.7520E+00
3.6000E-01	1.1697E+00	3.0042E+00	2.5684E+00	1.7358E+00	3.1801E+00
3.8000E-01	1.1663E+00	2.8420E+00	2.4367E+00	1.6587E+00	2.7054E+00
4.0000E-01	1.1628E+00	2.6958E+00	2.3184E+00	1.5901E+00	2.3085E+00
4.2000E-01	1.1591E+00	2.5634E+00	2.2115E+00	1.5289E+00	1.9744E+00
4.4000E-01	1.1553E+00	2.4428E+00	2.1145E+00	1.4740E+00	1.6915E+00
4.6000E-01	1.1513E+00	2.3326E+00	2.0261E+00	1.4246E+00	1.4509E+00
4.8000E-01	1.1471E+00	2.2313E+00	1.9451E+00	1.3801E+00	1.2453E+00
5.0000E-01	1.1429E+00	2.1381E+00	1.8708E+00	1.3398E+00	1.0691E+00
5.2000E-01	1.1384E+00	2.0519E+00	1.8024E+00	1.3034E+00	9.1742E-01
5.4000E-01	1.1339E+00	1.9719E+00	1.7391E+00	1.2703E+00	7.8663E-01
5.6000E-01	1.1292E+00	1.8975E+00	1.6805E+00	1.2403E+00	6.7357E-01
5.8000E-01	1.1244E+00	1.8282E+00	1.6260E+00	1.2130E+00	5.7568E-01



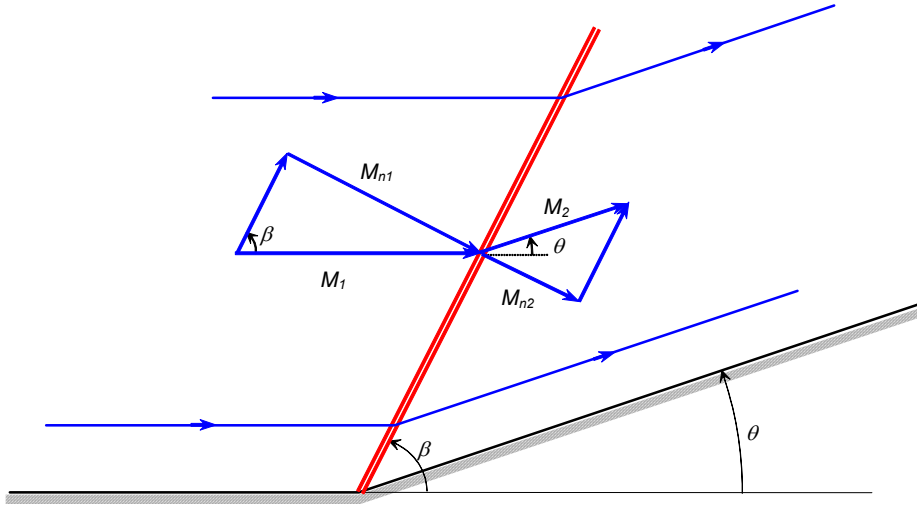
$M$	$\frac{T}{T^*}$	$\frac{p}{p^*}$	$\frac{\rho}{\rho^*}$	$\frac{p_o}{p_o^*}$	$\frac{4fL^*}{D}$
6.0000E-01	1.1194E+00	1.7634E+00	1.5753E+00	1.1882E+00	4.9082E-01
6.2000E-01	1.1143E+00	1.7026E+00	1.5279E+00	1.1656E+00	4.1720E-01
6.4000E-01	1.1091E+00	1.6456E+00	1.4836E+00	1.1451E+00	3.5330E-01
6.6000E-01	1.1038E+00	1.5919E+00	1.4421E+00	1.1265E+00	2.9785E-01
6.8000E-01	1.0984E+00	1.5413E+00	1.4032E+00	1.1097E+00	2.4978E-01
7.0000E-01	1.0929E+00	1.4935E+00	1.3665E+00	1.0944E+00	2.0814E-01
7.2000E-01	1.0873E+00	1.4482E+00	1.3320E+00	1.0806E+00	1.7215E-01
7.4000E-01	1.0815E+00	1.4054E+00	1.2994E+00	1.0681E+00	1.4112E-01
7.6000E-01	1.0757E+00	1.3647E+00	1.2686E+00	1.0570E+00	1.1447E-01
7.8000E-01	1.0698E+00	1.3261E+00	1.2395E+00	1.0471E+00	9.1672E-02
8.0000E-01	1.0638E+00	1.2893E+00	1.2119E+00	1.0382E+00	7.2290E-02
8.2000E-01	1.0578E+00	1.2542E+00	1.1858E+00	1.0305E+00	5.5932E-02
8.4000E-01	1.0516E+00	1.2208E+00	1.1609E+00	1.0237E+00	4.2256E-02
8.6000E-01	1.0454E+00	1.1889E+00	1.1373E+00	1.0179E+00	3.0965E-02
8.8000E-01	1.0391E+00	1.1583E+00	1.1148E+00	1.0129E+00	2.1795E-02
9.0000E-01	1.0327E+00	1.1291E+00	1.0934E+00	1.0089E+00	1.4512E-02
9.2000E-01	1.0263E+00	1.1011E+00	1.0730E+00	1.0056E+00	8.9133E-03
9.4000E-01	1.0198E+00	1.0743E+00	1.0535E+00	1.0031E+00	4.8154E-03
9.6000E-01	1.0132E+00	1.0485E+00	1.0348E+00	1.0014E+00	2.0571E-03
9.8000E-01	1.0066E+00	1.0238E+00	1.0170E+00	1.0003E+00	4.9470E-04
1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	0.0000E+00
1.0200E+00	9.9331E-01	9.7711E-01	9.8369E-01	1.0003E+00	4.5869E-04
1.0400E+00	9.8658E-01	9.5507E-01	9.6805E-01	1.0013E+00	1.7685E-03
1.0600E+00	9.7982E-01	9.3383E-01	9.5306E-01	1.0029E+00	3.8379E-03
1.0800E+00	9.7302E-01	9.1335E-01	9.3868E-01	1.0051E+00	6.5846E-03
1.1000E+00	9.6618E-01	8.9359E-01	9.2486E-01	1.0079E+00	9.9350E-03
1.1200E+00	9.5932E-01	8.7451E-01	9.1159E-01	1.0113E+00	1.3823E-02
1.1400E+00	9.5244E-01	8.5608E-01	8.9883E-01	1.0153E+00	1.8188E-02
1.1600E+00	9.4554E-01	8.3826E-01	8.8655E-01	1.0198E+00	2.2977E-02
1.1800E+00	9.3861E-01	8.2103E-01	8.7473E-01	1.0248E+00	2.8142E-02
1.2000E+00	9.3168E-01	8.0436E-01	8.6335E-01	1.0304E+00	3.3638E-02
1.2200E+00	9.2473E-01	7.8822E-01	8.5238E-01	1.0366E+00	3.9426E-02
1.2400E+00	9.1777E-01	7.7258E-01	8.4181E-01	1.0432E+00	4.5471E-02
1.2600E+00	9.1080E-01	7.5743E-01	8.3161E-01	1.0504E+00	5.1739E-02
1.2800E+00	9.0383E-01	7.4274E-01	8.2176E-01	1.0581E+00	5.8201E-02
1.3000E+00	8.9686E-01	7.2848E-01	8.1226E-01	1.0663E+00	6.4832E-02
1.3200E+00	8.8989E-01	7.1465E-01	8.0308E-01	1.0750E+00	7.1607E-02
1.3400E+00	8.8292E-01	7.0122E-01	7.9421E-01	1.0842E+00	7.8504E-02
1.3600E+00	8.7596E-01	6.8818E-01	7.8563E-01	1.0940E+00	8.5503E-02
1.3800E+00	8.6901E-01	6.7551E-01	7.7734E-01	1.1042E+00	9.2586E-02
1.4000E+00	8.6207E-01	6.6320E-01	7.6931E-01	1.1149E+00	9.9738E-02
1.4200E+00	8.5514E-01	6.5122E-01	7.6154E-01	1.1262E+00	1.0694E-01
1.4400E+00	8.4822E-01	6.3958E-01	7.5402E-01	1.1379E+00	1.1419E-01
1.4600E+00	8.4133E-01	6.2825E-01	7.4673E-01	1.1501E+00	1.2146E-01
1.4800E+00	8.3445E-01	6.1722E-01	7.3967E-01	1.1629E+00	1.2875E-01
1.5000E+00	8.2759E-01	6.0648E-01	7.3283E-01	1.1762E+00	1.3605E-01
1.5200E+00	8.2075E-01	5.9602E-01	7.2619E-01	1.1899E+00	1.4335E-01
1.5400E+00	8.1393E-01	5.8583E-01	7.1975E-01	1.2042E+00	1.5063E-01
1.5600E+00	8.0715E-01	5.7591E-01	7.1351E-01	1.2190E+00	1.5790E-01
1.5800E+00	8.0038E-01	5.6623E-01	7.0745E-01	1.2344E+00	1.6514E-01

$M$	$\frac{T}{T^*}$	$\frac{p}{p^*}$	$\frac{\rho}{\rho^*}$	$\frac{p_o}{p_o^*}$	$\frac{4fL^*}{D}$
1.6000E+00	7.9365E-01	5.5679E-01	7.0156E-01	1.2502E+00	1.7236E-01
1.6200E+00	7.8695E-01	5.4759E-01	6.9584E-01	1.2666E+00	1.7954E-01
1.6400E+00	7.8027E-01	5.3862E-01	6.9029E-01	1.2836E+00	1.8667E-01
1.6600E+00	7.7363E-01	5.2986E-01	6.8489E-01	1.3010E+00	1.9377E-01
1.6800E+00	7.6703E-01	5.2131E-01	6.7965E-01	1.3190E+00	2.0081E-01
1.7000E+00	7.6046E-01	5.1297E-01	6.7455E-01	1.3376E+00	2.0780E-01
1.7200E+00	7.5392E-01	5.0482E-01	6.6959E-01	1.3567E+00	2.1474E-01
1.7400E+00	7.4742E-01	4.9686E-01	6.6476E-01	1.3764E+00	2.2162E-01
1.7600E+00	7.4096E-01	4.8909E-01	6.6007E-01	1.3967E+00	2.2844E-01
1.7800E+00	7.3454E-01	4.8149E-01	6.5550E-01	1.4175E+00	2.3519E-01
1.8000E+00	7.2816E-01	4.7407E-01	6.5105E-01	1.4390E+00	2.4189E-01
1.8200E+00	7.2181E-01	4.6681E-01	6.4672E-01	1.4610E+00	2.4851E-01
1.8400E+00	7.1551E-01	4.5972E-01	6.4250E-01	1.4836E+00	2.5507E-01
1.8600E+00	7.0925E-01	4.5278E-01	6.3839E-01	1.5069E+00	2.6156E-01
1.8800E+00	7.0304E-01	4.4600E-01	6.3439E-01	1.5308E+00	2.6798E-01
1.9000E+00	6.9686E-01	4.3936E-01	6.3048E-01	1.5553E+00	2.7433E-01
1.9200E+00	6.9073E-01	4.3287E-01	6.2668E-01	1.5804E+00	2.8061E-01
1.9400E+00	6.8465E-01	4.2651E-01	6.2297E-01	1.6062E+00	2.8681E-01
1.9600E+00	6.7861E-01	4.2029E-01	6.1935E-01	1.6326E+00	2.9295E-01
1.9800E+00	6.7262E-01	4.1421E-01	6.1582E-01	1.6597E+00	2.9901E-01
2.0000E+00	6.6667E-01	4.0825E-01	6.1237E-01	1.6875E+00	3.0500E-01
2.0500E+00	6.5200E-01	3.9388E-01	6.0412E-01	1.7600E+00	3.1965E-01
2.1000E+00	6.3762E-01	3.8024E-01	5.9635E-01	1.8369E+00	3.3385E-01
2.1500E+00	6.2354E-01	3.6728E-01	5.8902E-01	1.9185E+00	3.4760E-01
2.2000E+00	6.0976E-01	3.5494E-01	5.8210E-01	2.0050E+00	3.6091E-01
2.2500E+00	5.9627E-01	3.4319E-01	5.7557E-01	2.0964E+00	3.7378E-01
2.3000E+00	5.8309E-01	3.3200E-01	5.6938E-01	2.1931E+00	3.8623E-01
2.3500E+00	5.7021E-01	3.2133E-01	5.6353E-01	2.2953E+00	3.9826E-01
2.4000E+00	5.5762E-01	3.1114E-01	5.5798E-01	2.4031E+00	4.0989E-01
2.4500E+00	5.4533E-01	3.0141E-01	5.5272E-01	2.5168E+00	4.2112E-01
2.5000E+00	5.3333E-01	2.9212E-01	5.4772E-01	2.6367E+00	4.3198E-01
2.5500E+00	5.2163E-01	2.8323E-01	5.4298E-01	2.7630E+00	4.4246E-01
2.6000E+00	5.1020E-01	2.7473E-01	5.3846E-01	2.8960E+00	4.5259E-01
2.6500E+00	4.9906E-01	2.6658E-01	5.3417E-01	3.0359E+00	4.6237E-01
2.7000E+00	4.8820E-01	2.5878E-01	5.3007E-01	3.1830E+00	4.7182E-01
2.7500E+00	4.7761E-01	2.5131E-01	5.2617E-01	3.3377E+00	4.8095E-01
2.8000E+00	4.6729E-01	2.4414E-01	5.2245E-01	3.5001E+00	4.8976E-01
2.8500E+00	4.5723E-01	2.3726E-01	5.1890E-01	3.6707E+00	4.9828E-01
2.9000E+00	4.4743E-01	2.3066E-01	5.1551E-01	3.8498E+00	5.0652E-01
2.9500E+00	4.3788E-01	2.2431E-01	5.1227E-01	4.0376E+00	5.1447E-01
3.0000E+00	4.2857E-01	2.1822E-01	5.0918E-01	4.2346E+00	5.2216E-01
3.0500E+00	4.1951E-01	2.1236E-01	5.0621E-01	4.4410E+00	5.2959E-01
3.1000E+00	4.1068E-01	2.0672E-01	5.0337E-01	4.6573E+00	5.3678E-01
3.1500E+00	4.0208E-01	2.0130E-01	5.0065E-01	4.8838E+00	5.4372E-01
3.2000E+00	3.9370E-01	1.9608E-01	4.9804E-01	5.1210E+00	5.5044E-01
3.2500E+00	3.8554E-01	1.9105E-01	4.9554E-01	5.3691E+00	5.5694E-01
3.3000E+00	3.7760E-01	1.8621E-01	4.9314E-01	5.6286E+00	5.6323E-01
3.3500E+00	3.6986E-01	1.8154E-01	4.9084E-01	5.9000E+00	5.6932E-01
3.4000E+00	3.6232E-01	1.7704E-01	4.8862E-01	6.1837E+00	5.7521E-01
3.4500E+00	3.5498E-01	1.7270E-01	4.8650E-01	6.4801E+00	5.8091E-01

$M$	$\frac{T}{T^*}$	$\frac{p}{p^*}$	$\frac{\rho}{\rho^*}$	$\frac{P_o}{P_o^*}$	$\frac{4\bar{f}L^*}{D}$
3.5000E+00	3.4783E-01	1.6851E-01	4.8445E-01	6.7896E+00	5.8643E-01
3.5500E+00	3.4086E-01	1.6446E-01	4.8248E-01	7.1128E+00	5.9178E-01
3.6000E+00	3.3408E-01	1.6055E-01	4.8059E-01	7.4501E+00	5.9695E-01
3.6500E+00	3.2747E-01	1.5678E-01	4.7877E-01	7.8020E+00	6.0197E-01
3.7000E+00	3.2103E-01	1.5313E-01	4.7701E-01	8.1691E+00	6.0684E-01
3.7500E+00	3.1475E-01	1.4961E-01	4.7532E-01	8.5517E+00	6.1155E-01
3.8000E+00	3.0864E-01	1.4620E-01	4.7368E-01	8.9506E+00	6.1612E-01
3.8500E+00	3.0269E-01	1.4290E-01	4.7211E-01	9.3661E+00	6.2055E-01
3.9000E+00	2.9688E-01	1.3971E-01	4.7059E-01	9.7990E+00	6.2485E-01
3.9500E+00	2.9123E-01	1.3662E-01	4.6912E-01	1.0250E+01	6.2902E-01
4.0000E+00	2.8571E-01	1.3363E-01	4.6771E-01	1.0719E+01	6.3306E-01
4.0500E+00	2.8034E-01	1.3073E-01	4.6634E-01	1.1207E+01	6.3699E-01
4.1000E+00	2.7510E-01	1.2793E-01	4.6502E-01	1.1715E+01	6.4080E-01
4.1500E+00	2.7000E-01	1.2521E-01	4.6374E-01	1.2243E+01	6.4451E-01
4.2000E+00	2.6502E-01	1.2257E-01	4.6250E-01	1.2792E+01	6.4810E-01
4.2500E+00	2.6016E-01	1.2001E-01	4.6131E-01	1.3362E+01	6.5159E-01
4.3000E+00	2.5543E-01	1.1753E-01	4.6015E-01	1.3955E+01	6.5499E-01
4.3500E+00	2.5081E-01	1.1513E-01	4.5903E-01	1.4571E+01	6.5828E-01
4.4000E+00	2.4631E-01	1.1279E-01	4.5794E-01	1.5210E+01	6.6149E-01
4.4500E+00	2.4191E-01	1.1053E-01	4.5689E-01	1.5873E+01	6.6460E-01
4.5000E+00	2.3762E-01	1.0833E-01	4.5587E-01	1.6562E+01	6.6763E-01
4.5500E+00	2.3344E-01	1.0619E-01	4.5488E-01	1.7277E+01	6.7058E-01
4.6000E+00	2.2936E-01	1.0411E-01	4.5393E-01	1.8018E+01	6.7345E-01
4.6500E+00	2.2537E-01	1.0209E-01	4.5300E-01	1.8786E+01	6.7624E-01
4.7000E+00	2.2148E-01	1.0013E-01	4.5210E-01	1.9583E+01	6.7895E-01
4.7500E+00	2.1769E-01	9.8225E-02	4.5122E-01	2.0408E+01	6.8159E-01
4.8000E+00	2.1398E-01	9.6371E-02	4.5037E-01	2.1264E+01	6.8417E-01
4.8500E+00	2.1036E-01	9.4567E-02	4.4955E-01	2.2150E+01	6.8667E-01
4.9000E+00	2.0683E-01	9.2812E-02	4.4875E-01	2.3067E+01	6.8911E-01
4.9500E+00	2.0337E-01	9.1105E-02	4.4797E-01	2.4017E+01	6.9149E-01
5.0000E+00	2.0000E-01	8.9443E-02	4.4721E-01	2.5000E+01	6.9380E-01
5.1000E+00	1.9349E-01	8.6249E-02	4.4576E-01	2.7070E+01	6.9826E-01
5.2000E+00	1.8727E-01	8.3220E-02	4.4439E-01	2.9283E+01	7.0249E-01
5.3000E+00	1.8132E-01	8.0344E-02	4.4310E-01	3.1649E+01	7.0652E-01
5.4000E+00	1.7564E-01	7.7611E-02	4.4186E-01	3.4175E+01	7.1035E-01
5.5000E+00	1.7021E-01	7.5012E-02	4.4070E-01	3.6869E+01	7.1400E-01
5.6000E+00	1.6502E-01	7.2540E-02	4.3959E-01	3.9740E+01	7.1748E-01
5.7000E+00	1.6004E-01	7.0185E-02	4.3854E-01	4.2797E+01	7.2080E-01
5.8000E+00	1.5528E-01	6.7941E-02	4.3754E-01	4.6050E+01	7.2397E-01
5.9000E+00	1.5072E-01	6.5800E-02	4.3658E-01	4.9507E+01	7.2699E-01
6.0000E+00	1.4634E-01	6.3758E-02	4.3568E-01	5.3180E+01	7.2988E-01
6.1000E+00	1.4215E-01	6.1807E-02	4.3481E-01	5.7077E+01	7.3264E-01
6.2000E+00	1.3812E-01	5.9943E-02	4.3399E-01	6.1210E+01	7.3528E-01
6.3000E+00	1.3426E-01	5.8161E-02	4.3320E-01	6.5590E+01	7.3780E-01
6.4000E+00	1.3055E-01	5.6455E-02	4.3245E-01	7.0227E+01	7.4022E-01
6.5000E+00	1.2698E-01	5.4823E-02	4.3173E-01	7.5134E+01	7.4254E-01
6.6000E+00	1.2356E-01	5.3259E-02	4.3104E-01	8.0323E+01	7.4477E-01
6.7000E+00	1.2026E-01	5.1760E-02	4.3038E-01	8.5805E+01	7.4690E-01
6.8000E+00	1.1710E-01	5.0322E-02	4.2975E-01	9.1594E+01	7.4895E-01
6.9000E+00	1.1405E-01	4.8943E-02	4.2915E-01	9.7702E+01	7.5091E-01

$M$	$\frac{T}{T^*}$	$\frac{p}{p^*}$	$\frac{\rho}{\rho^*}$	$\frac{p_o}{p_o^*}$	$\frac{4\bar{f}L^*}{D}$
7.0000E+00	1.1111E-01	4.7619E-02	4.2857E-01	1.0414E+02	7.5280E-01
7.1000E+00	1.0828E-01	4.6347E-02	4.2802E-01	1.1093E+02	7.5462E-01
7.2000E+00	1.0556E-01	4.5125E-02	4.2748E-01	1.1808E+02	7.5636E-01
7.3000E+00	1.0293E-01	4.3950E-02	4.2697E-01	1.2560E+02	7.5804E-01
7.4000E+00	1.0040E-01	4.2819E-02	4.2648E-01	1.3352E+02	7.5966E-01
7.5000E+00	9.7959E-02	4.1731E-02	4.2601E-01	1.4184E+02	7.6121E-01
7.6000E+00	9.5602E-02	4.0684E-02	4.2555E-01	1.5058E+02	7.6271E-01
7.7000E+00	9.3327E-02	3.9675E-02	4.2511E-01	1.5977E+02	7.6416E-01
7.8000E+00	9.1130E-02	3.8702E-02	4.2469E-01	1.6940E+02	7.6555E-01
7.9000E+00	8.9008E-02	3.7765E-02	4.2429E-01	1.7951E+02	7.6690E-01
8.0000E+00	8.6957E-02	3.6860E-02	4.2390E-01	1.9011E+02	7.6819E-01
9.0000E+00	6.9767E-02	2.9348E-02	4.2066E-01	3.2719E+02	7.7899E-01
1.0000E+01	5.7143E-02	2.3905E-02	4.1833E-01	5.3594E+02	7.8683E-01
1.1000E+01	4.7619E-02	1.9838E-02	4.1660E-01	8.4191E+02	7.9270E-01
1.2000E+01	4.0268E-02	1.6723E-02	4.1528E-01	1.2762E+03	7.9721E-01
1.3000E+01	3.4483E-02	1.4284E-02	4.1424E-01	1.8761E+03	8.0074E-01
1.4000E+01	2.9851E-02	1.2341E-02	4.1342E-01	2.6854E+03	8.0356E-01
1.5000E+01	2.6087E-02	1.0768E-02	4.1276E-01	3.7552E+03	8.0584E-01
1.6000E+01	2.2989E-02	9.4762E-03	4.1222E-01	5.1446E+03	8.0772E-01
1.7000E+01	2.0408E-02	8.4034E-03	4.1176E-01	6.9205E+03	8.0928E-01
1.8000E+01	1.8237E-02	7.5025E-03	4.1139E-01	9.1593E+03	8.1059E-01
1.9000E+01	1.6393E-02	6.7388E-03	4.1107E-01	1.1946E+04	8.1170E-01
2.0000E+01	1.4815E-02	6.0858E-03	4.1079E-01	1.5377E+04	8.1265E-01
2.2000E+01	1.2270E-02	5.0350E-03	4.1035E-01	2.4607E+04	8.1417E-01
2.4000E+01	1.0327E-02	4.2342E-03	4.1002E-01	3.7832E+04	8.1534E-01
2.6000E+01	8.8106E-03	3.6102E-03	4.0976E-01	5.6236E+04	8.1625E-01
2.8000E+01	7.6046E-03	3.1144E-03	4.0955E-01	8.1212E+04	8.1697E-01
3.0000E+01	6.6298E-03	2.7141E-03	4.0938E-01	1.1439E+05	8.1755E-01
3.2000E+01	5.8309E-03	2.3863E-03	4.0924E-01	1.5763E+05	8.1803E-01
3.4000E+01	5.1680E-03	2.1144E-03	4.0913E-01	2.1309E+05	8.1843E-01
3.6000E+01	4.6118E-03	1.8864E-03	4.0904E-01	2.8319E+05	8.1876E-01
3.8000E+01	4.1408E-03	1.6934E-03	4.0895E-01	3.7065E+05	8.1904E-01
4.0000E+01	3.7383E-03	1.5285E-03	4.0889E-01	4.7853E+05	8.1928E-01
4.2000E+01	3.3917E-03	1.3866E-03	4.0883E-01	6.1021E+05	8.1949E-01
4.4000E+01	3.0912E-03	1.2636E-03	4.0878E-01	7.6943E+05	8.1967E-01
4.6000E+01	2.8289E-03	1.1562E-03	4.0873E-01	9.6031E+05	8.1982E-01
4.8000E+01	2.5985E-03	1.0620E-03	4.0869E-01	1.1873E+06	8.1996E-01
5.0000E+01	2.3952E-03	9.7882E-04	4.0866E-01	1.4555E+06	8.2008E-01

## EĞİK ŞOKLAR



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

$$M_{n1} = M_1 \sin \beta$$

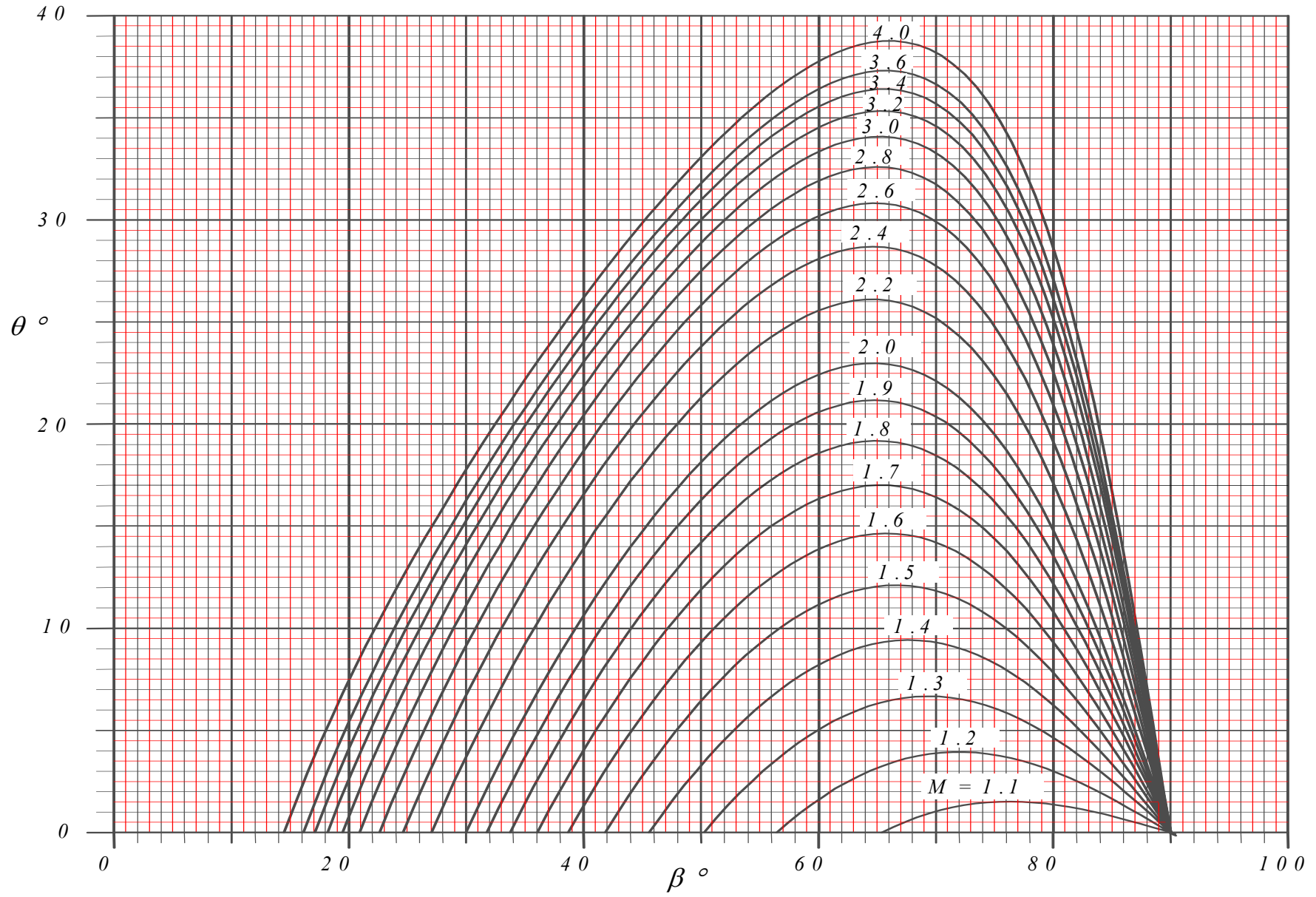
$$M_{n2}^2 = \frac{1 + [(\gamma - 1) / 2] M_{n1}^2}{\gamma M_{n1}^2 - (\gamma - 1) / 2}$$

$$M_2 = \frac{M_{n2}}{\sin(\beta - \theta)}$$

$$\frac{p_2}{p_1} = 1 + \frac{2\gamma}{\gamma + 1} [M_{n1}^2 - 1]$$

$$\frac{\rho_2}{\rho_1} = \frac{(\gamma + 1) M_{n1}^2}{2 + (\gamma - 1) M_{n1}^2}$$

$$\frac{T_2}{T_1} = \frac{p_2}{p_1} \cdot \frac{\rho_1}{\rho_2}$$



**PRANDTL-MEYER GENİŞLEME DALGALARI**

$$\nu(M) = \sqrt{\frac{\gamma+1}{\gamma-1}} \cdot \tan^{-1} \sqrt{\frac{\gamma-1}{\gamma+1}(M^2-1)} - \tan^{-1} \sqrt{M^2-1}$$

$$\mu = \sin^{-1} \frac{1}{M}$$

M	$\nu$ (deg)	$\mu$ (deg)
1.0000E+00	0.0000E+00	9.0000E+01
1.0200E+00	1.2569E-01	7.8635E+01
1.0400E+00	3.5098E-01	7.4058E+01
1.0600E+00	6.3669E-01	7.0630E+01
1.0800E+00	9.6804E-01	6.7808E+01
1.1000E+00	1.3362E+00	6.5380E+01
1.1200E+00	1.7350E+00	6.3234E+01
1.1400E+00	2.1600E+00	6.1306E+01
1.1600E+00	2.6073E+00	5.9550E+01
1.1800E+00	3.0743E+00	5.7936E+01
1.2000E+00	3.5582E+00	5.6443E+01
1.2200E+00	4.0572E+00	5.5052E+01
1.2400E+00	4.5694E+00	5.3751E+01
1.2600E+00	5.0931E+00	5.2528E+01
1.2800E+00	5.6272E+00	5.1375E+01
1.3000E+00	6.1703E+00	5.0285E+01
1.3200E+00	6.7213E+00	4.9251E+01
1.3400E+00	7.2794E+00	4.8268E+01
1.3600E+00	7.8435E+00	4.7332E+01
1.3800E+00	8.4130E+00	4.6439E+01
1.4000E+00	8.9870E+00	4.5585E+01
1.4200E+00	9.5650E+00	4.4767E+01
1.4400E+00	1.0146E+01	4.3983E+01
1.4600E+00	1.0731E+01	4.3230E+01
1.4800E+00	1.1317E+01	4.2507E+01
1.5000E+00	1.1905E+01	4.1810E+01
1.5200E+00	1.2495E+01	4.1140E+01
1.5400E+00	1.3086E+01	4.0493E+01
1.5600E+00	1.3677E+01	3.9868E+01
1.5800E+00	1.4269E+01	3.9265E+01
1.6000E+00	1.4860E+01	3.8682E+01
1.6200E+00	1.5452E+01	3.8118E+01
1.6400E+00	1.6043E+01	3.7572E+01
1.6600E+00	1.6633E+01	3.7043E+01
1.6800E+00	1.7222E+01	3.6530E+01
1.7000E+00	1.7810E+01	3.6032E+01
1.7200E+00	1.8396E+01	3.5549E+01
1.7400E+00	1.8981E+01	3.5080E+01
1.7600E+00	1.9565E+01	3.4624E+01
1.7800E+00	2.0146E+01	3.4180E+01

M	$\nu$ (deg)	$\mu$ (deg)
1.8000E+00	2.0725E+01	3.3749E+01
1.8200E+00	2.1302E+01	3.3329E+01
1.8400E+00	2.1877E+01	3.2921E+01
1.8600E+00	2.2449E+01	3.2523E+01
1.8800E+00	2.3019E+01	3.2135E+01
1.9000E+00	2.3586E+01	3.1757E+01
1.9200E+00	2.4151E+01	3.1388E+01
1.9400E+00	2.4712E+01	3.1028E+01
1.9600E+00	2.5271E+01	3.0677E+01
1.9800E+00	2.5827E+01	3.0335E+01
2.0000E+00	2.6380E+01	3.0000E+01
2.0500E+00	2.7748E+01	2.9196E+01
2.1000E+00	2.9097E+01	2.8437E+01
2.1500E+00	3.0425E+01	2.7718E+01
2.2000E+00	3.1732E+01	2.7036E+01
2.2500E+00	3.3018E+01	2.6388E+01
2.3000E+00	3.4283E+01	2.5771E+01
2.3500E+00	3.5526E+01	2.5184E+01
2.4000E+00	3.6747E+01	2.4624E+01
2.4500E+00	3.7946E+01	2.4090E+01
2.5000E+00	3.9124E+01	2.3578E+01
2.5500E+00	4.0280E+01	2.3089E+01
2.6000E+00	4.1415E+01	2.2620E+01
2.6500E+00	4.2529E+01	2.2170E+01
2.7000E+00	4.3621E+01	2.1738E+01
2.7500E+00	4.4694E+01	2.1324E+01
2.8000E+00	4.5746E+01	2.0925E+01
2.8500E+00	4.6778E+01	2.0541E+01
2.9000E+00	4.7790E+01	2.0171E+01
2.9500E+00	4.8783E+01	1.9815E+01
3.0000E+00	4.9757E+01	1.9471E+01
3.0500E+00	5.0713E+01	1.9139E+01
3.1000E+00	5.1650E+01	1.8819E+01
3.1500E+00	5.2569E+01	1.8509E+01
3.2000E+00	5.3470E+01	1.8210E+01
3.2500E+00	5.4355E+01	1.7920E+01
3.3000E+00	5.5222E+01	1.7640E+01
3.3500E+00	5.6073E+01	1.7368E+01
3.4000E+00	5.6908E+01	1.7105E+01
3.4500E+00	5.7726E+01	1.6849E+01

M	$\nu$ (deg)	$\mu$ (deg)		M	$\nu$ (deg)	$\mu$ (deg)
3.5000E+00	5.8530E+01	1.6602E+01		6.5000E+00	8.8168E+01	8.8499E+00
3.5500E+00	5.9318E+01	1.6361E+01		6.6000E+00	8.8759E+01	8.7147E+00
3.6000E+00	6.0091E+01	1.6128E+01		6.7000E+00	8.9335E+01	8.5837E+00
3.6500E+00	6.0850E+01	1.5901E+01		6.8000E+00	8.9895E+01	8.4565E+00
3.7000E+00	6.1595E+01	1.5680E+01		6.9000E+00	9.0441E+01	8.3331E+00
3.7500E+00	6.2326E+01	1.5466E+01		7.0000E+00	9.0973E+01	8.2132E+00
3.8000E+00	6.3044E+01	1.5258E+01		7.1000E+00	9.1491E+01	8.0967E+00
3.8500E+00	6.3748E+01	1.5055E+01		7.2000E+00	9.1997E+01	7.9836E+00
3.9000E+00	6.4440E+01	1.4857E+01		7.3000E+00	9.2490E+01	7.8735E+00
3.9500E+00	6.5118E+01	1.4665E+01		7.4000E+00	9.2970E+01	7.7664E+00
4.0000E+00	6.5785E+01	1.4478E+01		7.5000E+00	9.3440E+01	7.6623E+00
4.0500E+00	6.6439E+01	1.4295E+01		7.6000E+00	9.3898E+01	7.5608E+00
4.1000E+00	6.7082E+01	1.4117E+01		7.7000E+00	9.4345E+01	7.4621E+00
4.1500E+00	6.7713E+01	1.3943E+01		7.8000E+00	9.4781E+01	7.3659E+00
4.2000E+00	6.8333E+01	1.3774E+01		7.9000E+00	9.5208E+01	7.2721E+00
4.2500E+00	6.8942E+01	1.3609E+01		8.0000E+00	9.5625E+01	7.1808E+00
4.3000E+00	6.9541E+01	1.3448E+01		9.0000E+00	9.9318E+01	6.3794E+00
4.3500E+00	7.0129E+01	1.3290E+01		1.0000E+01	1.0232E+02	5.7392E+00
4.4000E+00	7.0706E+01	1.3137E+01		1.1000E+01	1.0480E+02	5.2159E+00
4.4500E+00	7.1274E+01	1.2986E+01		1.2000E+01	1.0688E+02	4.7802E+00
4.5000E+00	7.1832E+01	1.2840E+01		1.3000E+01	1.0865E+02	4.4117E+00
4.5500E+00	7.2380E+01	1.2696E+01		1.4000E+01	1.1018E+02	4.0960E+00
4.6000E+00	7.2919E+01	1.2556E+01		1.5000E+01	1.1151E+02	3.8226E+00
4.6500E+00	7.3449E+01	1.2419E+01		1.6000E+01	1.1268E+02	3.5833E+00
4.7000E+00	7.3970E+01	1.2284E+01		1.7000E+01	1.1371E+02	3.3723E+00
4.7500E+00	7.4482E+01	1.2153E+01		1.8000E+01	1.1463E+02	3.1847E+00
4.8000E+00	7.4986E+01	1.2025E+01		1.9000E+01	1.1545E+02	3.0170E+00
4.8500E+00	7.5482E+01	1.1899E+01		2.0000E+01	1.1620E+02	2.8660E+00
4.9000E+00	7.5969E+01	1.1776E+01		2.2000E+01	1.1748E+02	2.6053E+00
4.9500E+00	7.6449E+01	1.1655E+01		2.4000E+01	1.1856E+02	2.3880E+00
5.0000E+00	7.6920E+01	1.1537E+01		2.6000E+01	1.1947E+02	2.2042E+00
5.1000E+00	7.7841E+01	1.1308E+01		2.8000E+01	1.2025E+02	2.0467E+00
5.2000E+00	7.8732E+01	1.1087E+01		3.0000E+01	1.2092E+02	1.9102E+00
5.3000E+00	7.9596E+01	1.0876E+01		3.2000E+01	1.2152E+02	1.7908E+00
5.4000E+00	8.0433E+01	1.0672E+01		3.4000E+01	1.2204E+02	1.6854E+00
5.5000E+00	8.1245E+01	1.0476E+01		3.6000E+01	1.2251E+02	1.5918E+00
5.6000E+00	8.2032E+01	1.0287E+01		3.8000E+01	1.2292E+02	1.5080E+00
5.7000E+00	8.2796E+01	1.0104E+01		4.0000E+01	1.2330E+02	1.4325E+00
5.8000E+00	8.3537E+01	9.9282E+00		4.2000E+01	1.2364E+02	1.3643E+00
5.9000E+00	8.4256E+01	9.7583E+00		4.4000E+01	1.2395E+02	1.3023E+00
6.0000E+00	8.4955E+01	9.5941E+00		4.6000E+01	1.2423E+02	1.2457E+00
6.1000E+00	8.5635E+01	9.4353E+00		4.8000E+01	1.2449E+02	1.1937E+00
6.2000E+00	8.6295E+01	9.2818E+00		5.0000E+01	1.2473E+02	1.1460E+00
6.3000E+00	8.6937E+01	9.1332E+00				
6.4000E+00	8.7561E+01	8.9893E+00				