Compressible Flow Exam Spring 2007
Calculators Allowed

1) (25 pts)

Consider a converging-diverging nozzle with a throat area of 100 cm^2 and an exit area of 240 cm^2 exiting into an altitude simulating test chamber at 50 kPa. The nozzle is supplied with clean dry air (γ=1.4 and R=287 J/kg K) at a fixed stagnation temperature of 300 K and a supply pressure that can be varied.

a. (4 pts) What is the "design" Mach number of this nozzle and what is meant by this phrase?

b. (5 pts) What is the exit Mach number if Po =58 kPa? Sketch and describe the flow exiting the nozzle?

c. (5 pts) What is the exit Mach number if Po =110 kPa? Sketch and describe the flow exiting the nozzle?

d. (5 pts) What is the exit Mach number if Po =1000 kPa? Sketch and describe the flow exiting the nozzle?

e. (6 pts) Determine the maximum mass flow rate and the minimum supply pressure with which this can be achieved? Discuss how the mass flow rate changes as a function of the pressure ratio.

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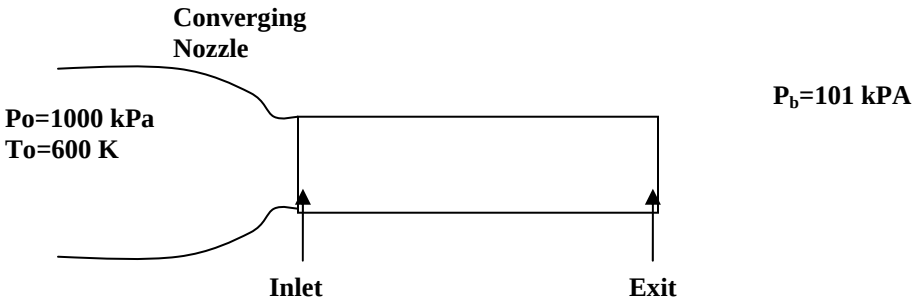
2) (25 pts)

Consider compressible flow through a blow down wind tunnel. The test section (flow duct) has a constant cross sectional area 5 cm x 5 cm and is 10 cm long. Flow through the converging nozzle can be assumed to be isentropic. The air exits the duct into a chamber with a pressure of 101 kPa.



a. (3 pts) Where will the flow choke first and is it possible to have supersonic flow in the duct?

b. (7 pts) If the stagnation conditions in the reservoir upstream of the nozzle are Po=1000 kPa and To= 600 K. Determine the conditions (Mach #, Pressure, and Temperature) at the ducts inlet and exit if the friction factor is 0.025.

c. (5 pts) For the above case now consider that heat can be added or subtracted from the duct and assume that as a first approximation the heat along with the friction can be considered independently and added together. To maintain a constant Mach number through out the duct will you need to add or subtract heat? Draw and explain both Fanno and Rayleigh curves to justify your answer.

d. (3 pts) Returning back to adiabatic flow in the duct describe another way to keep the Mach number constant through out the duct.

e. (7 pts) If the reservoir has a volume of $8m^3$ calculate how long it will take to drop its pressure 500 kPa assuming that the temperature in the tank does not change.

APPENDIX G

Isentropic Flow Parameters ($\gamma = 1.4$) (including Prandtl–Meyer Function)

M	p/p_t	T/T_t	A/A^*	$\rho A/\rho_t A^*$	ν	μ
0.0	1.00000	1.00000	∞	∞		
0.01	0.99993	0.99998	57.87384	57.86979		
0.02	0.99972	0.99992	28.94213	28.93403		
0.03	0.99937	0.99982	19.30054	19.28839		
0.04	0.99888	0.99968	14.48149	14.46528		
0.05	0.99825	0.99950	11.59144	11.57118		
0.06	0.99748	0.99928	9.66591	9.64159		
0.07	0.99658	0.99902	8.29153	8.26315		
0.08	0.99553	0.99872	7.26161	7.22917		
0.09	0.99435	0.99838	6.46134	6.42484		
0.10	0.99303	0.99800	5.82183	5.78126		
0.11	0.99158	0.99759	5.29923	5.25459		
0.12	0.98998	0.99713	4.86432	4.81560		
0.13	0.98826	0.99663	4.49686	4.44406		
0.14	0.98640	0.99610	4.18240	4.12552		
0.15	0.98441	0.99552	3.91034	3.84937		
0.16	0.98228	0.99491	3.67274	3.60767		
0.17	0.98003	0.99426	3.46351	3.39434		
0.18	0.97765	0.99356	3.27793	3.20465		
0.19	0.97514	0.99283	3.11226	3.03487		
0.20	0.97250	0.99206	2.96352	2.88201		
0.21	0.96973	0.99126	2.82929	2.74366		
0.22	0.96685	0.99041	2.70760	2.61783		
0.23	0.96383	0.98953	2.59681	2.50290		
0.24	0.96070	0.98861	2.49556	2.39750		
0.25	0.95745	0.98765	2.40271	2.30048		
0.26	0.95408	0.98666	2.31729	2.21089		
0.27	0.95060	0.98563	2.23847	2.12789		
0.28	0.94700	0.98456	2.16555	2.05078		
0.29	0.94329	0.98346	2.09793	1.97896		
0.30	0.93947	0.98232	2.03507	1.91188		
0.31	0.93554	0.98114	1.97651	1.84910		
0.32	0.93150	0.97993	1.92185	1.79021		
0.33	0.92736	0.97868	1.87074	1.73486		
0.34	0.92312	0.97740	1.82288	1.68273		
0.35	0.91877	0.97609	1.77797	1.63355		
0.36	0.91433	0.97473	1.73578	1.58707		
0.37	0.90979	0.97335	1.69609	1.54308		
0.38	0.90516	0.97193	1.65870	1.50138		
0.39	0.90043	0.97048	1.62343	1.46179		

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
0.40	0.89561	0.96899	1.59014	1.42415		
0.41	0.89071	0.96747	1.58867	1.38833		
0.42	0.88572	0.96592	1.52890	1.35419		
0.43	0.88065	0.96434	1.50072	1.32161		
0.44	0.87550	0.96272	1.47401	1.29049		
0.45	0.87027	0.96108	1.44867	1.26073		
0.46	0.86496	0.95940	1.42463	1.23225		
0.47	0.85958	0.95769	1.40180	1.20495		
0.48	0.85413	0.95595	1.38010	1.17878		
0.49	0.84861	0.95418	1.35947	1.15365		
0.50	0.84302	0.95238	1.33984	1.12951		
0.51	0.83737	0.95055	1.32117	1.10630		
0.52	0.83165	0.94869	1.30339	1.08397		
0.53	0.82588	0.94681	1.28645	1.06246		
0.54	0.82005	0.94489	1.27032	1.04173		
0.55	0.81417	0.94295	1.25495	1.02173		
0.56	0.80823	0.94098	1.24029	1.00244		
0.57	0.80224	0.93898	1.22633	0.98381		
0.58	0.79621	0.93696	1.21301	0.96580		
0.59	0.79013	0.93491	1.20031	0.94840		
0.60	0.78400	0.93284	1.18820	0.93155		
0.61	0.77784	0.93073	1.17665	0.91525		
0.62	0.77164	0.92861	1.16565	0.89946		
0.63	0.76540	0.92646	1.15515	0.88416		
0.64	0.75913	0.92428	1.14515	0.86932		
0.65	0.75283	0.92208	1.13562	0.85493		
0.66	0.74650	0.91986	1.12654	0.84096		
0.67	0.74014	0.91762	1.11789	0.82739		
0.68	0.73376	0.91535	1.10969	0.81422		
0.69	0.72735	0.91306	1.10182	0.80141		
0.70	0.72093	0.91075	1.09437	0.78896		
0.71	0.71448	0.90841	1.08729	0.77685		
0.72	0.70803	0.90606	1.08057	0.76507		
0.73	0.70155	0.90369	1.07419	0.75360		
0.74	0.69507	0.90129	1.06814	0.74243		
0.75	0.68857	0.89888	1.06242	0.73155		
0.76	0.68207	0.89644	1.05700	0.72095		
0.77	0.67556	0.89399	1.05188	0.71061		
0.78	0.66905	0.89152	1.04705	0.70053		
0.79	0.66254	0.88903	1.04251	0.69070		

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
0.80	0.65602	0.88652	1.03823	0.68110		
0.81	0.64951	0.88400	1.03422	0.67173		
0.82	0.64300	0.88146	1.03046	0.66259		
0.83	0.63650	0.87890	1.02696	0.65366		
0.84	0.63000	0.87633	1.02370	0.64493		
0.85	0.62351	0.87374	1.02067	0.63640		
0.86	0.61703	0.87114	1.01787	0.62806		
0.87	0.61057	0.86852	1.01530	0.61991		
0.88	0.60412	0.86589	1.01294	0.61193		
0.89	0.59768	0.86324	1.01080	0.60413		
0.90	0.59126	0.86059	1.00886	0.59650		
0.91	0.58486	0.85791	1.00713	0.58903		
0.92	0.57848	0.85523	1.00560	0.58171		
0.93	0.57211	0.85253	1.00426	0.57455		
0.94	0.56578	0.84982	1.00311	0.56753		
0.95	0.55946	0.84710	1.00215	0.56066		
0.96	0.55317	0.84437	1.00136	0.55392		
0.97	0.54691	0.84162	1.00076	0.54732		
0.98	0.54067	0.83887	1.00034	0.54085		
0.99	0.53446	0.83611	1.00008	0.53451		
1.00	0.52828	0.83333	1.00000	0.52828	0.0	90.0000
1.01	0.52213	0.83055	1.00008	0.52218	0.04472	81.9307
1.02	0.51602	0.82776	1.00033	0.51619	0.12569	78.6351
1.03	0.50994	0.82496	1.00074	0.51031	0.22943	76.1376
1.04	0.50389	0.82215	1.00131	0.50454	0.35098	74.0576
1.05	0.49787	0.81934	1.00203	0.49888	0.48741	72.2472
1.06	0.49189	0.81651	1.00291	0.49332	0.63669	70.6300
1.07	0.48595	0.81368	1.00394	0.48787	0.79729	69.1603
1.08	0.48005	0.81085	1.00512	0.48250	0.96804	67.8084
1.09	0.47418	0.80800	1.00645	0.47724	1.14795	66.5534
1.10	0.46835	0.80515	1.00793	0.47207	1.33620	65.3800
1.11	0.46257	0.80230	1.00955	0.46698	1.53210	64.2767
1.12	0.45682	0.79944	1.01131	0.46199	1.73504	63.2345
1.13	0.45111	0.79657	1.01322	0.45708	1.94448	62.2461
1.14	0.44545	0.79370	1.01527	0.45225	2.15996	61.3056
1.15	0.43983	0.79083	1.01745	0.44751	2.38104	60.4082
1.16	0.43425	0.78795	1.01978	0.44284	2.60735	59.5497
1.17	0.42872	0.78506	1.02224	0.43825	2.83852	58.7267
1.18	0.42322	0.78218	1.02484	0.43374	3.07426	57.9362
1.19	0.41778	0.77929	1.02757	0.42930	3.31425	57.1756

M	p/p_0	T/T_0	A/A^*	pA/p_0A^*	ν	μ
1.20	0.41238	0.77640	1.03044	0.42493	3.55823	56.4427
1.21	0.40702	0.77350	1.03344	0.42063	3.80596	55.7354
1.22	0.40171	0.77061	1.03657	0.41640	4.05720	55.0520
1.23	0.39645	0.76771	1.03983	0.41224	4.31173	54.3909
1.24	0.39123	0.76481	1.04323	0.40814	4.56936	53.7507
1.25	0.38606	0.76190	1.04675	0.40411	4.82989	53.1301
1.26	0.38093	0.75900	1.05041	0.40014	5.09315	52.5280
1.27	0.37586	0.75610	1.05419	0.39622	5.35897	51.9433
1.28	0.37083	0.75319	1.05810	0.39237	5.62720	51.3752
1.29	0.36585	0.75029	1.06214	0.38858	5.89768	50.8226
1.30	0.36091	0.74738	1.06630	0.38484	6.17029	50.2849
1.31	0.35603	0.74448	1.07060	0.38116	6.44488	49.7612
1.32	0.35119	0.74158	1.07502	0.37754	6.72133	49.2509
1.33	0.34640	0.73867	1.07957	0.37396	6.99953	48.7535
1.34	0.34166	0.73577	1.08424	0.37044	7.27937	48.2682
1.35	0.33697	0.73287	1.08904	0.36697	7.56072	47.7946
1.36	0.33233	0.72997	1.09396	0.36355	7.84351	47.3321
1.37	0.32773	0.72707	1.09902	0.36018	8.12762	46.8803
1.38	0.32319	0.72418	1.10419	0.35686	8.41297	46.4387
1.39	0.31869	0.72128	1.10950	0.35359	8.69946	46.0070
1.40	0.31424	0.71839	1.11493	0.35036	8.98702	45.5847
1.41	0.30984	0.71550	1.12048	0.34717	9.27556	45.1715
1.42	0.30549	0.71262	1.12616	0.34403	9.56502	44.7670
1.43	0.30118	0.70973	1.13197	0.34093	9.85531	44.3709
1.44	0.29693	0.70685	1.13790	0.33788	10.14636	43.9830
1.45	0.29272	0.70398	1.14396	0.33486	10.43811	43.6028
1.46	0.28856	0.70110	1.15015	0.33189	10.73050	43.2302
1.47	0.28445	0.69824	1.15646	0.32896	11.02346	42.8649
1.48	0.28039	0.69537	1.16290	0.32606	11.31694	42.5066
1.49	0.27637	0.69251	1.16947	0.32321	11.61087	42.1552
1.50	0.27240	0.68966	1.17617	0.32039	11.90521	41.8103
1.51	0.26848	0.68680	1.18299	0.31761	12.19990	41.4718
1.52	0.26461	0.68396	1.18994	0.31487	12.49489	41.1395
1.53	0.26078	0.68112	1.19702	0.31216	12.79014	40.8132
1.54	0.25700	0.67828	1.20423	0.30949	13.08559	40.4927
1.55	0.25326	0.67545	1.21157	0.30685	13.38121	40.1778
1.56	0.24957	0.67262	1.21904	0.30424	13.67696	39.8683
1.57	0.24593	0.66980	1.22664	0.30167	13.97278	39.5642
1.58	0.24233	0.66699	1.23438	0.29913	14.26865	39.2652
1.59	0.23878	0.66418	1.24224	0.29662	14.56452	38.9713

M	p/p_0	T/T_0	A/A^*	pA/p_0A^*	ν	μ
1.60	0.23527	0.66138	1.25023	0.29414	14.86035	38.6822
1.61	0.23181	0.65858	1.25836	0.29170	15.15612	38.3978
1.62	0.22839	0.65579	1.26663	0.28928	15.45180	38.1181
1.63	0.22501	0.65301	1.27502	0.28690	15.74733	37.8428
1.64	0.22168	0.65023	1.28355	0.28454	16.04271	37.5719
1.65	0.21839	0.64746	1.29222	0.28221	16.33789	37.3052
1.66	0.21515	0.64470	1.30102	0.27991	16.63284	37.0427
1.67	0.21195	0.64194	1.30996	0.27764	16.92755	36.7842
1.68	0.20879	0.63919	1.31904	0.27540	17.22198	36.5296
1.69	0.20567	0.63645	1.32825	0.27318	17.51611	36.2789
1.70	0.20259	0.63371	1.33761	0.27099	17.80991	36.0319
1.71	0.19956	0.63099	1.34710	0.26883	18.10336	35.7885
1.72	0.19656	0.62827	1.35674	0.26669	18.39643	35.5487
1.73	0.19361	0.62556	1.36651	0.26457	18.68911	35.3124
1.74	0.19070	0.62285	1.37643	0.26248	18.98137	35.0795
1.75	0.18782	0.62016	1.38649	0.26042	19.27319	34.8499
1.76	0.18499	0.61747	1.39670	0.25837	19.56456	34.6235
1.77	0.18219	0.61479	1.40705	0.25636	19.85544	34.4003
1.78	0.17944	0.61211	1.41755	0.25436	20.14584	34.1802
1.79	0.17672	0.60945	1.42819	0.25239	20.43571	33.9631
1.80	0.17404	0.60680	1.43898	0.25044	20.72506	33.7490
1.81	0.17140	0.60415	1.44992	0.24851	21.01387	33.5377
1.82	0.16879	0.60151	1.46101	0.24661	21.30211	33.3293
1.83	0.16622	0.59888	1.47225	0.24472	21.58977	33.1237
1.84	0.16369	0.59626	1.48365	0.24286	21.87685	32.9207
1.85	0.16119	0.59365	1.49519	0.24102	22.16332	32.7204
1.86	0.15873	0.59104	1.50689	0.23920	22.44917	32.5227
1.87	0.15631	0.58845	1.51875	0.23739	22.73439	32.3276
1.88	0.15392	0.58586	1.53076	0.23561	23.01896	32.1349
1.89	0.15156	0.58329	1.54293	0.23385	23.30288	31.9447
1.90	0.14924	0.58072	1.55526	0.23211	23.58613	31.7569
1.91	0.14695	0.57816	1.56774	0.23038	23.86871	31.5714
1.92	0.14470	0.57561	1.58039	0.22868	24.15059	31.3882
1.93	0.14247	0.57307	1.59320	0.22699	24.43178	31.2072
1.94	0.14028	0.57054	1.60617	0.22532	24.71226	31.0285
1.95	0.13813	0.56802	1.61931	0.22367	24.99202	30.8519
1.96	0.13600	0.56551	1.63261	0.22203	25.27105	30.6774
1.97	0.13390	0.56301	1.64608	0.22042	25.54935	30.5050
1.98	0.13184	0.56051	1.65972	0.21882	25.82691	30.3347
1.99	0.12981	0.55803	1.67352	0.21724	26.10371	30.1664

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	θ
2.00	0.12780	0.55556	1.68750	0.21567	26.37976	30.0000
2.01	0.12683	0.55309	1.70165	0.21412	26.65504	29.8356
2.02	0.12389	0.55064	1.71597	0.21259	26.92955	29.6730
2.03	0.12197	0.54819	1.73047	0.21107	27.20328	29.5123
2.04	0.12009	0.54576	1.74514	0.20957	27.47622	29.3535
2.05	0.11823	0.54333	1.75999	0.20808	27.74837	29.1964
2.06	0.11640	0.54091	1.77502	0.20661	28.01973	29.0411
2.07	0.11460	0.53851	1.79022	0.20516	28.29028	28.8875
2.08	0.11282	0.53611	1.80561	0.20371	28.56003	28.7357
2.09	0.11107	0.53373	1.82119	0.20229	28.82896	28.5855
2.10	0.10935	0.53135	1.83694	0.20088	29.09708	28.4369
2.11	0.10766	0.52898	1.85289	0.19948	29.36438	28.2899
2.12	0.10599	0.52663	1.86902	0.19809	29.63085	28.1446
2.13	0.10434	0.52428	1.88533	0.19672	29.89649	28.0008
2.14	0.10273	0.52194	1.90184	0.19537	30.16130	27.8585
2.15	0.10113	0.51962	1.91854	0.19403	30.42527	27.7177
2.16	0.09956	0.51730	1.93544	0.19270	30.68841	27.5785
2.17	0.09802	0.51499	1.95252	0.19138	30.95070	27.4406
2.18	0.09649	0.51269	1.96981	0.19008	31.21215	27.3043
2.19	0.09500	0.51041	1.98729	0.18879	31.47275	27.1693
2.20	0.09352	0.50813	2.00497	0.18751	31.73250	27.0357
2.21	0.09207	0.50586	2.02286	0.18624	31.99139	26.9035
2.22	0.09064	0.50361	2.04094	0.18499	32.24943	26.7726
2.23	0.08923	0.50136	2.05923	0.18375	32.50662	26.6430
2.24	0.08785	0.49912	2.07773	0.18252	32.76294	26.5148
2.25	0.08648	0.49689	2.09644	0.18130	33.01841	26.3878
2.26	0.08514	0.49468	2.11535	0.18010	33.27301	26.2621
2.27	0.08382	0.49247	2.13447	0.17890	33.52676	26.1376
2.28	0.08251	0.49027	2.15381	0.17772	33.77963	26.0144
2.29	0.08123	0.48809	2.17336	0.17655	34.03165	25.8923
2.30	0.07997	0.48591	2.19313	0.17539	34.28279	25.7715
2.31	0.07873	0.48374	2.21312	0.17424	34.53307	25.6518
2.32	0.07751	0.48158	2.23332	0.17310	34.78249	25.5332
2.33	0.07631	0.47944	2.25375	0.17198	35.03103	25.4158
2.34	0.07512	0.47730	2.27440	0.17086	35.27871	25.2995
2.35	0.07396	0.47517	2.29528	0.16975	35.52552	25.1843
2.36	0.07281	0.47305	2.31638	0.16866	35.77146	25.0702
2.37	0.07168	0.47095	2.33771	0.16757	36.01653	24.9572
2.38	0.07057	0.46885	2.35928	0.16649	36.26073	24.8452
2.39	0.06948	0.46676	2.38107	0.16543	36.50406	24.7342

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	θ
2.40	0.06840	0.46468	2.40310	0.16437	36.74653	24.6243
2.41	0.06734	0.46262	2.42337	0.16332	36.98818	24.5154
2.42	0.06630	0.46056	2.44387	0.16229	37.22886	24.4075
2.43	0.06527	0.45851	2.47061	0.16126	37.46872	24.3005
2.44	0.06426	0.45647	2.49360	0.16024	37.70772	24.1945
2.45	0.06327	0.45444	2.51683	0.15923	37.94585	24.0895
2.46	0.06229	0.45242	2.54031	0.15823	38.18312	23.9854
2.47	0.06133	0.45041	2.56403	0.15724	38.41952	23.8822
2.48	0.06038	0.44841	2.58801	0.15626	38.65507	23.7800
2.49	0.05945	0.44642	2.61224	0.15529	38.88974	23.6786
2.50	0.05853	0.44444	2.63672	0.15432	39.12356	23.5782
2.51	0.05762	0.44247	2.66146	0.15337	39.35652	23.4786
2.52	0.05674	0.44051	2.68645	0.15242	39.58862	23.3799
2.53	0.05586	0.43856	2.71171	0.15148	39.81987	23.2820
2.54	0.05500	0.43662	2.73723	0.15055	40.05026	23.1850
2.55	0.05415	0.43469	2.76301	0.14963	40.27979	23.0888
2.56	0.05332	0.43277	2.78906	0.14871	40.50847	22.9934
2.57	0.05250	0.43085	2.81538	0.14780	40.73630	22.8988
2.58	0.05169	0.42895	2.84197	0.14691	40.96329	22.8051
2.59	0.05090	0.42705	2.86884	0.14602	41.18942	22.7121
2.60	0.05012	0.42517	2.89598	0.14513	41.41471	22.6199
2.61	0.04935	0.42329	2.92339	0.14426	41.63915	22.5284
2.62	0.04859	0.42143	2.95109	0.14339	41.86275	22.4377
2.63	0.04784	0.41957	2.97907	0.14253	42.08551	22.3478
2.64	0.04711	0.41772	3.00733	0.14168	42.30744	22.2586
2.65	0.04639	0.41589	3.03588	0.14083	42.52852	22.1702
2.66	0.04568	0.41406	3.06472	0.13999	42.74877	22.0824
2.67	0.04498	0.41224	3.09385	0.13916	42.96819	21.9954
2.68	0.04429	0.41043	3.12327	0.13834	43.18678	21.9090
2.69	0.04362	0.40863	3.15299	0.13752	43.40454	21.8234
2.70	0.04295	0.40683	3.18301	0.13671	43.62148	21.7385
2.71	0.04229	0.40505	3.21333	0.13591	43.83759	21.6542
2.72	0.04165	0.40328	3.24395	0.13511	44.05288	21.5706
2.73	0.04102	0.40151	3.27488	0.13432	44.26735	21.4876
2.74	0.04039	0.39976	3.30611	0.13354	44.48100	21.4053
2.75	0.03978	0.39801	3.33766	0.13276	44.69384	21.3237
2.76	0.03917	0.39627	3.36952	0.13199	44.90586	21.2427
2.77	0.03858	0.39454	3.40169	0.13123	45.11708	21.1624
2.78	0.03799	0.39282	3.43418	0.13047	45.32749	21.0825
2.79	0.03742	0.39111	3.46699	0.12972	45.53709	21.0034

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
2.80	0.03685	0.38941	3.50012	0.12897	45.74589	20.9248
2.81	0.03629	0.38771	3.53358	0.12823	45.95389	20.8469
2.82	0.03574	0.38603	3.56737	0.12750	46.16109	20.7695
2.83	0.03520	0.38435	3.60148	0.12678	46.36750	20.6928
2.84	0.03467	0.38268	3.63593	0.12605	46.57312	20.6166
2.85	0.03415	0.38102	3.67072	0.12534	46.77794	20.5410
2.86	0.03363	0.37937	3.70584	0.12463	46.98198	20.4659
2.87	0.03312	0.37773	3.74131	0.12393	47.18523	20.3914
2.88	0.03263	0.37610	3.77711	0.12323	47.38770	20.3175
2.89	0.03213	0.37447	3.81327	0.12254	47.58940	20.2441
2.90	0.03165	0.37286	3.84977	0.12185	47.79031	20.1713
2.91	0.03118	0.37125	3.88662	0.12117	47.99045	20.0990
2.92	0.03071	0.36965	3.92383	0.12049	48.18982	20.0272
2.93	0.03025	0.36806	3.96139	0.11982	48.38842	19.9559
2.94	0.02980	0.36647	3.99932	0.11916	48.58626	19.8852
2.95	0.02935	0.36490	4.03760	0.11850	48.78333	19.8149
2.96	0.02891	0.36333	4.07625	0.11785	48.97965	19.7452
2.97	0.02848	0.36177	4.11527	0.11720	49.17520	19.6760
2.98	0.02805	0.36022	4.15466	0.11655	49.37000	19.6072
2.99	0.02764	0.35868	4.19443	0.11591	49.56405	19.5390
3.00	0.02722	0.35714	4.23457	0.11528	49.75735	19.4712
3.01	0.02682	0.35562	4.27509	0.11465	49.94990	19.4039
3.02	0.02642	0.35410	4.31599	0.11403	50.14171	19.3371
3.03	0.02603	0.35259	4.35728	0.11341	50.33277	19.2708
3.04	0.02564	0.35108	4.39895	0.11279	50.52310	19.2049
3.05	0.02526	0.34959	4.44102	0.11219	50.71270	19.1395
3.06	0.02489	0.34810	4.48347	0.11158	50.90156	19.0745
3.07	0.02452	0.34662	4.52633	0.11098	51.08969	19.0100
3.08	0.02416	0.34515	4.56959	0.11039	51.27710	18.9459
3.09	0.02380	0.34369	4.61325	0.10979	51.46378	18.8823
3.10	0.02345	0.34223	4.65731	0.10921	51.64974	18.8191
3.11	0.02310	0.34078	4.70178	0.10863	51.83499	18.7563
3.12	0.02276	0.33934	4.74667	0.10805	52.01952	18.6939
3.13	0.02243	0.33791	4.79197	0.10748	52.20333	18.6320
3.14	0.02210	0.33648	4.83769	0.10691	52.38644	18.5705
3.15	0.02177	0.33506	4.88383	0.10634	52.56884	18.5094
3.16	0.02146	0.33365	4.93039	0.10578	52.75053	18.4487
3.17	0.02114	0.33225	4.97739	0.10523	52.93153	18.3884
3.18	0.02083	0.33085	5.02481	0.10468	53.11182	18.3285
3.19	0.02053	0.32947	5.07266	0.10413	53.29143	18.2691

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
3.20	0.02023	0.32808	5.12096	0.10359	53.47033	18.2100
3.21	0.01993	0.32671	5.16969	0.10305	53.64855	18.1513
3.22	0.01964	0.32534	5.21887	0.10251	53.82609	18.0929
3.23	0.01936	0.32398	5.26849	0.10198	54.00294	18.0350
3.24	0.01908	0.32263	5.31857	0.10145	54.17910	17.9774
3.25	0.01880	0.32129	5.36909	0.10093	54.35459	17.9202
3.26	0.01853	0.31995	5.42008	0.10041	54.52941	17.8634
3.27	0.01826	0.31862	5.47152	0.09989	54.70355	17.8069
3.28	0.01799	0.31729	5.52343	0.09938	54.87703	17.7508
3.29	0.01773	0.31597	5.57580	0.09887	55.04983	17.6951
3.30	0.01748	0.31466	5.62865	0.09837	55.22198	17.6397
3.31	0.01722	0.31336	5.68196	0.09787	55.39346	17.5847
3.32	0.01698	0.31206	5.73576	0.09737	55.56428	17.5300
3.33	0.01673	0.31077	5.79003	0.09688	55.73445	17.4756
3.34	0.01649	0.30949	5.84479	0.09639	55.90396	17.4216
3.35	0.01625	0.30821	5.90004	0.09590	56.07283	17.3680
3.36	0.01602	0.30694	5.95577	0.09542	56.24105	17.3147
3.37	0.01579	0.30568	6.01201	0.09494	56.40862	17.2617
3.38	0.01557	0.30443	6.06873	0.09447	56.57556	17.2090
3.39	0.01534	0.30318	6.12596	0.09399	56.74185	17.1567
3.40	0.01512	0.30193	6.18370	0.09353	56.90751	17.1046
3.41	0.01491	0.30070	6.24194	0.09306	57.07254	17.0529
3.42	0.01470	0.29947	6.30070	0.09260	57.23694	17.0016
3.43	0.01449	0.29824	6.35997	0.09214	57.40071	16.9505
3.44	0.01428	0.29702	6.41976	0.09168	57.56385	16.8997
3.45	0.01408	0.29581	6.48007	0.09123	57.72637	16.8493
3.46	0.01388	0.29461	6.54092	0.09078	57.88828	16.7991
3.47	0.01368	0.29341	6.60229	0.09034	58.04957	16.7493
3.48	0.01349	0.29222	6.66419	0.08989	58.21024	16.6997
3.49	0.01330	0.29103	6.72664	0.08945	58.37030	16.6505
3.50	0.01311	0.28986	6.78962	0.08902	58.52976	16.6015
3.51	0.01293	0.28868	6.85315	0.08858	58.68861	16.5529
3.52	0.01274	0.28751	6.91723	0.08815	58.84685	16.5045
3.53	0.01256	0.28635	6.98186	0.08773	59.00450	16.4564
3.54	0.01239	0.28520	7.04705	0.08730	59.16155	16.4086
3.55	0.01221	0.28405	7.11281	0.08688	59.31801	16.3611
3.56	0.01204	0.28291	7.17912	0.08646	59.47387	16.3139
3.57	0.01188	0.28177	7.24601	0.08605	59.62914	16.2669
3.58	0.01171	0.28064	7.31346	0.08563	59.78383	16.2202
3.59	0.01155	0.27952	7.38150	0.08522	59.93793	16.1738

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
3.60	0.01138	0.27840	7.45011	0.08482	60.01146	16.1276
3.61	0.01123	0.27728	7.51931	0.08441	60.24440	16.0817
3.62	0.01107	0.27618	7.58910	0.08401	60.39677	16.0361
3.63	0.01092	0.27507	7.65948	0.08361	60.54856	15.9907
3.64	0.01076	0.27398	7.73045	0.08322	60.69978	15.9456
3.65	0.01062	0.27289	7.80203	0.08282	60.85044	15.9008
3.66	0.01047	0.27180	7.87421	0.08243	61.00052	15.8562
3.67	0.01032	0.27073	7.94700	0.08205	61.15005	15.8119
3.68	0.01018	0.26965	8.02040	0.08166	61.29902	15.7678
3.69	0.01004	0.26858	8.09442	0.08128	61.44742	15.7239
3.70	0.00990	0.26752	8.16907	0.08090	61.59527	15.6803
3.71	0.00977	0.26647	8.24433	0.08052	61.74257	15.6370
3.72	0.00963	0.26542	8.32023	0.08014	61.88932	15.5939
3.73	0.00950	0.26437	8.39676	0.07977	62.03552	15.5510
3.74	0.00937	0.26333	8.47393	0.07940	62.18118	15.5084
3.75	0.00924	0.26230	8.55174	0.07904	62.32629	15.4660
3.76	0.00912	0.26127	8.63020	0.07867	62.47086	15.4239
3.77	0.00899	0.26024	8.70931	0.07831	62.61490	15.3819
3.78	0.00887	0.25922	8.78907	0.07795	62.75840	15.3402
3.79	0.00875	0.25821	8.86950	0.07759	62.90136	15.2988
3.80	0.00863	0.25720	8.95059	0.07723	63.04380	15.2575
3.81	0.00851	0.25620	9.03234	0.07688	63.18571	15.2165
3.82	0.00840	0.25520	9.11477	0.07653	63.32709	15.1757
3.83	0.00828	0.25421	9.19788	0.07618	63.46795	15.1351
3.84	0.00817	0.25322	9.28167	0.07584	63.60829	15.0948
3.85	0.00806	0.25224	9.36614	0.07549	63.74811	15.0547
3.86	0.00795	0.25126	9.45131	0.07515	63.88741	15.0147
3.87	0.00784	0.25029	9.53717	0.07481	64.02620	14.9750
3.88	0.00774	0.24932	9.62373	0.07447	64.16448	14.9355
3.89	0.00763	0.24836	9.71100	0.07414	64.30225	14.8962
3.90	0.00753	0.24740	9.79897	0.07381	64.43952	14.8572
3.91	0.00743	0.24645	9.88766	0.07348	64.57628	14.8183
3.92	0.00733	0.24550	9.97707	0.07315	64.71254	14.7796
3.93	0.00723	0.24456	10.06720	0.07282	64.84829	14.7412
3.94	0.00714	0.24362	10.15806	0.07250	64.98356	14.7029
3.95	0.00704	0.24269	10.24965	0.07217	65.11832	14.6649
3.96	0.00695	0.24176	10.34197	0.07185	65.25260	14.6270
3.97	0.00686	0.24084	10.43504	0.07154	65.38638	14.5893
3.98	0.00676	0.23992	10.52886	0.07122	65.51968	14.5519
3.99	0.00667	0.23900	10.62343	0.07091	65.65249	14.5146

M	p/p_t	T/T_t	A/A^*	pA/p_tA^*	ν	μ
4.00	0.00659	0.23810	10.71875	0.07059	65.78402	14.4779
4.10	0.00577	0.22929	11.71465	0.06758	67.08200	14.1170
4.20	0.00506	0.22085	12.79164	0.06475	68.33324	13.7741
4.30	0.00445	0.21286	13.95490	0.06209	69.54063	13.4477
4.40	0.00392	0.20525	15.20987	0.05959	70.70616	13.1366
4.50	0.00346	0.19802	16.56219	0.05723	71.83174	12.8396
4.60	0.00305	0.19113	18.01779	0.05500	72.91915	12.5559
4.70	0.00270	0.18457	19.58283	0.05290	73.97012	12.2845
4.80	0.00239	0.17832	21.26371	0.05091	74.98627	12.0247
4.90	0.00213	0.17235	23.06712	0.04903	75.96915	11.7757
5.00	0.00189	0.16667	25.00000	0.04725	76.92021	11.5370
5.10	0.00168	0.16124	27.06957	0.04556	77.84087	11.3077
5.20	0.00150	0.15605	29.28333	0.04396	78.73243	11.0875
5.30	0.00134	0.15110	31.64905	0.04244	79.59616	10.8757
5.40	0.00120	0.14637	34.17481	0.04100	80.43323	10.6719
5.50	0.00107	0.14184	36.86896	0.03963	81.24479	10.4757
5.60	0.000964	0.13751	39.74018	0.03832	82.03190	10.2866
5.70	0.000866	0.13337	42.79743	0.03708	82.79558	10.1042
5.80	0.000779	0.12940	46.05000	0.03589	83.53681	9.9282
5.90	0.000702	0.12560	49.50747	0.03476	84.25649	9.7583
6.00	0.000633	0.12195	53.17978	0.03368	84.95550	9.5941
6.10	0.000572	0.11846	57.07718	0.03265	85.63467	9.4353
6.20	0.000517	0.11510	61.21023	0.03167	86.29479	9.2818
6.30	0.000468	0.11188	65.58987	0.03073	86.93661	9.1332
6.40	0.000425	0.10879	70.22736	0.02982	87.56084	8.9893
6.50	0.000385	0.10582	75.13431	0.02896	88.16816	8.8499
6.60	0.000350	0.10297	80.32271	0.02814	88.75922	8.7147
6.70	0.000319	0.10022	85.80487	0.02734	89.33463	8.5837
6.80	0.000290	0.09758	91.59351	0.02658	89.89499	8.4565
6.90	0.000265	0.09504	97.70169	0.02586	90.44084	8.3331
7.00	0.000242	0.09259	104.14286	0.02516	90.97273	8.2132
7.50	0.000155	0.08163	141.84148	0.02205	93.43967	7.6623
8.00	0.000102	0.07246	190.10937	0.01947	95.62467	7.1808
8.50	0.0000690	0.06472	251.046167	0.01732	97.57220	6.7563
9.00	0.0000474	0.05814	327.189300	0.01550	99.31810	6.3794
9.50	0.0000331	0.05249	421.131373	0.01396	100.89148	6.0423
10.00	0.0000236	0.04762	535.937500	0.01263	102.31625	5.7392
∞	0.0	0.0	∞	0.0	130.4541	0.0

APPENDIX I

Fanno Flow Parameters ($\gamma = 1.4$)

M	T/T^*	p/p^*	p_0/p_0^*	V/V^*	$4fL_{max}/D$	S_{max}/R
0.0	1.20000	∞	∞	0.0	∞	∞
0.01	1.19998	109.54342	57.87384	0.01095	7134.40454	4.95887
0.02	1.19990	54.77006	28.94213	0.02191	1778.44988	3.36480
0.03	1.19978	36.51155	19.30054	0.03286	787.08139	2.96013
0.04	1.19962	27.38175	14.48149	0.04381	440.09721	2.67287
0.05	1.19940	21.90343	11.59144	0.05476	280.82031	2.45027
0.06	1.19914	18.25085	9.66591	0.06570	193.03108	2.26861
0.07	1.19883	15.64155	8.29153	0.07664	140.65501	2.11523
0.08	1.19847	13.68431	7.26161	0.08758	106.71822	1.98260
0.09	1.19806	12.16177	6.46134	0.09851	83.49612	1.86584
0.10	1.19760	10.94351	5.82183	0.10944	66.92156	1.76161
0.11	1.19710	9.94656	5.29923	0.12035	54.68790	1.66756
0.12	1.19655	9.11559	4.86432	0.13126	45.40796	1.58193
0.13	1.19596	8.41230	4.49686	0.14217	38.20700	1.50328
0.14	1.19531	7.80932	4.18240	0.15306	32.51131	1.43089
0.15	1.19462	7.28659	3.91034	0.16395	27.93197	1.36433
0.16	1.19389	6.82907	3.67274	0.17482	24.19783	1.30094
0.17	1.19310	6.42525	3.46351	0.18569	21.11518	1.24228
0.18	1.19227	6.06618	3.27793	0.19654	18.54265	1.18721
0.19	1.19140	5.74480	3.11226	0.20739	16.37516	1.13535
0.20	1.19048	5.45545	2.96352	0.21822	14.53327	1.08638
0.21	1.18951	5.19355	2.82929	0.22904	12.95602	1.04003
0.22	1.18850	4.95587	2.70760	0.23984	11.59605	0.99606
0.23	1.18744	4.73781	2.59681	0.25063	10.41609	0.95428
0.24	1.18633	4.53829	2.49556	0.26141	9.38648	0.91451
0.25	1.18519	4.35465	2.40271	0.27217	8.48341	0.87660
0.26	1.18399	4.18505	2.31729	0.28291	7.68757	0.84040
0.27	1.18276	4.02795	2.23847	0.29364	6.98317	0.80579
0.28	1.18147	3.88199	2.16555	0.30435	6.35721	0.77268
0.29	1.18015	3.74602	2.09793	0.31504	5.79891	0.74095
0.30	1.17878	3.61906	2.03507	0.32572	5.29925	0.71053
0.31	1.17737	3.50022	1.97651	0.33637	4.85066	0.68133
0.32	1.17592	3.38874	1.92185	0.34701	4.44674	0.65329
0.33	1.17442	3.28396	1.87074	0.35762	4.08205	0.62634
0.34	1.17288	3.18529	1.82288	0.36822	3.75195	0.60042
0.35	1.17130	3.09219	1.77797	0.37879	3.45245	0.57547
0.36	1.16968	3.00422	1.73578	0.38934	3.18012	0.55146
0.37	1.16802	2.92094	1.69609	0.39988	2.93198	0.52833
0.38	1.16632	2.84200	1.65870	0.41039	2.70545	0.50603
0.39	1.16457	2.76706	1.62343	0.42087	2.49828	0.48454

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
0.40	1.16279	2.69582	1.59014	0.43133	2.30849	0.46382
0.41	1.16097	2.62801	1.55867	0.44177	2.13436	0.44384
0.42	1.15911	2.56338	1.52890	0.45218	1.97437	0.42455
0.43	1.15721	2.50171	1.50072	0.46257	1.82715	0.40594
0.44	1.15527	2.44280	1.47401	0.47293	1.69152	0.38798
0.45	1.15329	2.38648	1.44867	0.48326	1.56643	0.37065
0.46	1.15128	2.33256	1.42463	0.49357	1.45091	0.35391
0.47	1.14923	2.28089	1.40180	0.50385	1.34413	0.33775
0.48	1.14714	2.23135	1.38010	0.51410	1.24534	0.32215
0.49	1.14502	2.18378	1.35947	0.52433	1.15385	0.30709
0.50	1.14286	2.13809	1.33984	0.53452	1.06906	0.29255
0.51	1.14066	2.09415	1.32117	0.54469	0.99041	0.27852
0.52	1.13843	2.05187	1.30339	0.55483	0.91742	0.26497
0.53	1.13617	2.01116	1.28645	0.56493	0.84962	0.25189
0.54	1.13387	1.97192	1.27032	0.57501	0.78663	0.23927
0.55	1.13154	1.93407	1.25495	0.58506	0.72805	0.22709
0.56	1.12918	1.89755	1.24029	0.59507	0.67357	0.21535
0.57	1.12678	1.86228	1.22633	0.60505	0.62287	0.20402
0.58	1.12435	1.82820	1.21301	0.61501	0.57568	0.19310
0.59	1.12189	1.79525	1.20031	0.62492	0.53174	0.18258
0.60	1.11940	1.76336	1.18820	0.63481	0.49082	0.17244
0.61	1.11688	1.73250	1.17665	0.64466	0.45271	0.16267
0.62	1.11433	1.70261	1.16565	0.65448	0.41720	0.15328
0.63	1.11175	1.67364	1.15515	0.66427	0.38412	0.14423
0.64	1.10914	1.64556	1.14515	0.67402	0.35330	0.13553
0.65	1.10650	1.61831	1.13562	0.68374	0.32459	0.12718
0.66	1.10383	1.59187	1.12654	0.69342	0.29785	0.11915
0.67	1.10114	1.56620	1.11789	0.70307	0.27295	0.11144
0.68	1.09842	1.54126	1.10965	0.71268	0.24978	0.10405
0.69	1.09567	1.51702	1.10182	0.72225	0.22820	0.09696
0.70	1.09290	1.49345	1.09437	0.73179	0.20814	0.09018
0.71	1.09010	1.47053	1.08729	0.74129	0.18948	0.08369
0.72	1.08727	1.44823	1.08057	0.75076	0.17215	0.07749
0.73	1.08442	1.42652	1.07419	0.76019	0.15605	0.07157
0.74	1.08155	1.40537	1.06814	0.76958	0.14112	0.06592
0.75	1.07865	1.38478	1.06242	0.77894	0.12728	0.06055
0.76	1.07573	1.36470	1.05700	0.78825	0.11447	0.05543
0.77	1.07279	1.34514	1.05188	0.79753	0.10262	0.05058
0.78	1.06982	1.32605	1.04705	0.80677	0.09167	0.04598
0.79	1.06684	1.30744	1.04251	0.81597	0.08158	0.04163

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
0.80	1.06383	1.28928	1.03823	0.82514	0.07229	0.03752
0.81	1.06080	1.27155	1.03422	0.83426	0.06376	0.03365
0.82	1.05775	1.25423	1.03046	0.84335	0.05593	0.03001
0.83	1.05469	1.23732	1.02696	0.85239	0.04878	0.02660
0.84	1.05160	1.22080	1.02370	0.86140	0.04226	0.02342
0.85	1.04849	1.20466	1.02067	0.87037	0.03633	0.02046
0.86	1.04537	1.18888	1.01787	0.87929	0.03097	0.01771
0.87	1.04223	1.17344	1.01530	0.88818	0.02613	0.01518
0.88	1.03907	1.15835	1.01294	0.89703	0.02179	0.01286
0.89	1.03589	1.14358	1.01080	0.90583	0.01793	0.01074
0.90	1.03270	1.12913	1.00886	0.91460	0.01451	0.00882
0.91	1.02950	1.11499	1.00713	0.92332	0.01151	0.00711
0.92	1.02627	1.10114	1.00560	0.93201	0.00891	0.00558
0.93	1.02304	1.08758	1.00426	0.94065	0.00669	0.00425
0.94	1.01978	1.07430	1.00311	0.94925	0.00482	0.00310
0.95	1.01652	1.06129	1.00215	0.95781	0.00328	0.00214
0.96	1.01324	1.04854	1.00136	0.96633	0.00206	0.00136
0.97	1.00995	1.03604	1.00076	0.97481	0.00113	0.00076
0.98	1.00664	1.02379	1.00034	0.98325	0.00049	0.00034
0.99	1.00333	1.01176	1.00008	0.99165	0.00012	0.00008
1.00	1.00000	1.00000	1.00000	1.00000	0.00000	0.00000
1.01	0.99666	0.98844	1.00008	1.00831	0.00012	0.00008
1.02	0.99331	0.97711	1.00033	1.01658	0.00046	0.00033
1.03	0.98995	0.96598	1.00074	1.02481	0.00101	0.00074
1.04	0.98658	0.95507	1.00131	1.03300	0.00177	0.00130
1.05	0.98320	0.94435	1.00203	1.04114	0.00271	0.00203
1.06	0.97982	0.93383	1.00291	1.04925	0.00384	0.00290
1.07	0.97642	0.92349	1.00394	1.05731	0.00513	0.00393
1.08	0.97302	0.91335	1.00512	1.06533	0.00658	0.00511
1.09	0.96960	0.90338	1.00645	1.07331	0.00819	0.00643
1.10	0.96618	0.89359	1.00793	1.08124	0.00994	0.00789
1.11	0.96276	0.88397	1.00955	1.08913	0.01182	0.00950
1.12	0.95932	0.87451	1.01131	1.09699	0.01382	0.01125
1.13	0.95589	0.86522	1.01322	1.10479	0.01595	0.01313
1.14	0.95244	0.85608	1.01527	1.11256	0.01819	0.01515
1.15	0.94899	0.84710	1.01745	1.12029	0.02053	0.01730
1.16	0.94554	0.83826	1.01978	1.12797	0.02298	0.01959
1.17	0.94208	0.82958	1.02224	1.13561	0.02552	0.02200
1.18	0.93861	0.82103	1.02484	1.14321	0.02814	0.02454
1.19	0.93515	0.81263	1.02757	1.15077	0.03085	0.02720

M	T/T^*	p/p^*	p_0/p_0^*	V/V^*	fL_{max}/D	S_{max}/R
1.20	0.93168	0.80436	1.03044	1.15828	0.03364	0.02999
1.21	0.92820	0.79628	1.03344	1.16575	0.03650	0.03289
1.22	0.92473	0.78822	1.03657	1.17319	0.03943	0.03592
1.23	0.92125	0.78034	1.03983	1.18057	0.04242	0.03906
1.24	0.91777	0.77258	1.04323	1.18792	0.04547	0.04232
1.25	0.91429	0.76495	1.04675	1.19523	0.04858	0.04569
1.26	0.91080	0.75743	1.05041	1.20249	0.05174	0.04918
1.27	0.90732	0.75003	1.05419	1.20972	0.05495	0.05277
1.28	0.90383	0.74274	1.05810	1.21690	0.05820	0.05647
1.29	0.90035	0.73556	1.06214	1.22404	0.06150	0.06028
1.30	0.89686	0.72848	1.06630	1.23114	0.06483	0.06420
1.31	0.89338	0.72152	1.07060	1.23819	0.06820	0.06822
1.32	0.88989	0.71465	1.07502	1.24521	0.07161	0.07234
1.33	0.88641	0.70789	1.07957	1.25218	0.07504	0.07656
1.34	0.88292	0.70122	1.08424	1.25912	0.07850	0.08088
1.35	0.87944	0.69466	1.08904	1.26601	0.08199	0.08529
1.36	0.87596	0.68818	1.09396	1.27286	0.08550	0.08981
1.37	0.87249	0.68180	1.09902	1.27968	0.08904	0.09441
1.38	0.86901	0.67551	1.10419	1.28645	0.09259	0.09911
1.39	0.86554	0.66931	1.10950	1.29318	0.09615	0.10391
1.40	0.86207	0.66320	1.11493	1.29987	0.09974	0.10879
1.41	0.85860	0.65717	1.12048	1.30652	0.10334	0.11376
1.42	0.85514	0.65122	1.12616	1.31313	0.10694	0.11882
1.43	0.85168	0.64536	1.13197	1.31970	0.11056	0.12396
1.44	0.84822	0.63958	1.13790	1.32623	0.11419	0.12919
1.45	0.84477	0.63387	1.14396	1.33272	0.11782	0.13450
1.46	0.84133	0.62825	1.15015	1.33917	0.12146	0.13989
1.47	0.83788	0.62269	1.15646	1.34558	0.12511	0.14537
1.48	0.83445	0.61722	1.16290	1.35195	0.12875	0.15092
1.49	0.83101	0.61181	1.16947	1.35828	0.13240	0.15655
1.50	0.82759	0.60648	1.17617	1.36458	0.13605	0.16226
1.51	0.82416	0.60122	1.18299	1.37083	0.13970	0.16805
1.52	0.82075	0.59602	1.18994	1.37705	0.14335	0.17391
1.53	0.81734	0.59089	1.19702	1.38322	0.14699	0.17984
1.54	0.81393	0.58583	1.20423	1.38936	0.15063	0.18584
1.55	0.81054	0.58084	1.21157	1.39546	0.15427	0.19192
1.56	0.80715	0.57591	1.21904	1.40152	0.15790	0.19807
1.57	0.80376	0.57104	1.22664	1.40755	0.16152	0.20428
1.58	0.80038	0.56623	1.23438	1.41353	0.16514	0.21057
1.59	0.79701	0.56148	1.24224	1.41948	0.16875	0.21692

M	T/T^*	p/p^*	p_0/p_0^*	V/V^*	fL_{max}/D	S_{max}/R
1.60	0.79365	0.55679	1.25023	1.42539	0.17236	0.22333
1.61	0.79030	0.55216	1.25836	1.43127	0.17595	0.22981
1.62	0.78695	0.54759	1.26663	1.43710	0.17954	0.23636
1.63	0.78361	0.54308	1.27502	1.44290	0.18311	0.24296
1.64	0.78027	0.53862	1.28355	1.44866	0.18667	0.24963
1.65	0.77695	0.53421	1.29222	1.45439	0.19023	0.25636
1.66	0.77363	0.52986	1.30102	1.46008	0.19377	0.26315
1.67	0.77033	0.52556	1.30996	1.46573	0.19729	0.27000
1.68	0.76703	0.52131	1.31904	1.47135	0.20081	0.27690
1.69	0.76374	0.51711	1.32825	1.47693	0.20431	0.28386
1.70	0.76046	0.51297	1.33761	1.48247	0.20780	0.29088
1.71	0.75718	0.50887	1.34710	1.48798	0.21128	0.29795
1.72	0.75392	0.50482	1.35674	1.49345	0.21474	0.30508
1.73	0.75067	0.50082	1.36651	1.49889	0.21819	0.31226
1.74	0.74742	0.49686	1.37643	1.50429	0.22162	0.31949
1.75	0.74419	0.49295	1.38649	1.50966	0.22504	0.32678
1.76	0.74096	0.48909	1.39670	1.51499	0.22844	0.33411
1.77	0.73774	0.48527	1.40705	1.52029	0.23182	0.34149
1.78	0.73454	0.48149	1.41755	1.52555	0.23519	0.34893
1.79	0.73134	0.47776	1.42819	1.53078	0.23855	0.35641
1.80	0.72816	0.47407	1.43898	1.53598	0.24189	0.36394
1.81	0.72498	0.47042	1.44992	1.54114	0.24521	0.37151
1.82	0.72181	0.46681	1.46101	1.54626	0.24851	0.37913
1.83	0.71866	0.46324	1.47225	1.55136	0.25180	0.38680
1.84	0.71551	0.45972	1.48365	1.55642	0.25507	0.39450
1.85	0.71238	0.45623	1.49519	1.56145	0.25832	0.40226
1.86	0.70926	0.45278	1.50689	1.56644	0.26156	0.41005
1.87	0.70614	0.44937	1.51875	1.57140	0.26478	0.41789
1.88	0.70304	0.44600	1.53076	1.57633	0.26798	0.42576
1.89	0.69995	0.44266	1.54293	1.58123	0.27116	0.43368
1.90	0.69686	0.43936	1.55526	1.58609	0.27433	0.44164
1.91	0.69379	0.43610	1.56774	1.59092	0.27748	0.44964
1.92	0.69073	0.43287	1.58039	1.59572	0.28061	0.45767
1.93	0.68769	0.42967	1.59320	1.60049	0.28372	0.46574
1.94	0.68465	0.42651	1.60617	1.60523	0.28681	0.47385
1.95	0.68162	0.42339	1.61931	1.60993	0.28989	0.48200
1.96	0.67861	0.42029	1.63261	1.61460	0.29295	0.49018
1.97	0.67561	0.41724	1.64608	1.61925	0.29599	0.49840
1.98	0.67262	0.41421	1.65972	1.62386	0.29901	0.50665
1.99	0.66964	0.41121	1.67352	1.62844	0.30201	0.51493

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
2.00	0.66667	0.40825	1.68750	1.63299	0.30500	0.52325
2.01	0.66371	0.40532	1.70165	1.63751	0.30796	0.53160
2.02	0.66076	0.40241	1.71597	1.64201	0.31091	0.53998
2.03	0.65783	0.39954	1.73047	1.64647	0.31384	0.54839
2.04	0.65491	0.39670	1.74514	1.65090	0.31676	0.55683
2.05	0.65200	0.39388	1.75999	1.65530	0.31965	0.56531
2.06	0.64910	0.39110	1.77502	1.65967	0.32253	0.57381
2.07	0.64621	0.38834	1.79022	1.66402	0.32538	0.58234
2.08	0.64334	0.38562	1.80561	1.66833	0.32822	0.59090
2.09	0.64047	0.38292	1.82119	1.67262	0.33105	0.59949
2.10	0.63762	0.38024	1.83694	1.67687	0.33385	0.60810
2.11	0.63478	0.37760	1.85289	1.68110	0.33664	0.61674
2.12	0.63195	0.37498	1.86902	1.68530	0.33940	0.62541
2.13	0.62914	0.37239	1.88533	1.68947	0.34215	0.63411
2.14	0.62633	0.36982	1.90184	1.69362	0.34489	0.64282
2.15	0.62354	0.36728	1.91854	1.69774	0.34760	0.65157
2.16	0.62076	0.36476	1.93544	1.70183	0.35030	0.66033
2.17	0.61799	0.36227	1.95252	1.70589	0.35298	0.66912
2.18	0.61523	0.35980	1.96981	1.70992	0.35564	0.67794
2.19	0.61249	0.35736	1.98729	1.71393	0.35828	0.68677
2.20	0.60976	0.35494	2.00497	1.71791	0.36091	0.69563
2.21	0.60704	0.35255	2.02286	1.72187	0.36352	0.70451
2.22	0.60433	0.35017	2.04094	1.72579	0.36611	0.71341
2.23	0.60163	0.34782	2.05923	1.72970	0.36869	0.72233
2.24	0.59895	0.34550	2.07773	1.73357	0.37124	0.73128
2.25	0.59627	0.34319	2.09644	1.73742	0.37378	0.74024
2.26	0.59361	0.34091	2.11535	1.74125	0.37631	0.74922
2.27	0.59096	0.33865	2.13447	1.74504	0.37881	0.75822
2.28	0.58833	0.33641	2.15381	1.74882	0.38130	0.76724
2.29	0.58570	0.33420	2.17336	1.75257	0.38377	0.77628
2.30	0.58309	0.33200	2.19313	1.75629	0.38623	0.78533
2.31	0.58049	0.32983	2.21312	1.75999	0.38867	0.79440
2.32	0.57790	0.32767	2.23332	1.76366	0.39109	0.80349
2.33	0.57532	0.32554	2.25375	1.76731	0.39350	0.81260
2.34	0.57276	0.32342	2.27440	1.77093	0.39589	0.82172
2.35	0.57021	0.32133	2.29528	1.77453	0.39826	0.83085
2.36	0.56767	0.31925	2.31638	1.77811	0.40062	0.84001
2.37	0.56514	0.31720	2.33771	1.78166	0.40296	0.84917
2.38	0.56262	0.31516	2.35928	1.78519	0.40529	0.85835
2.39	0.56011	0.31314	2.38107	1.78869	0.40760	0.86755

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
2.40	0.55762	0.31114	2.40310	1.79218	0.40989	0.87676
2.41	0.55514	0.30916	2.42537	1.79563	0.41217	0.88598
2.42	0.55267	0.30720	2.44787	1.79907	0.41443	0.89522
2.43	0.55021	0.30525	2.47061	1.80248	0.41668	0.90447
2.44	0.54777	0.30332	2.49360	1.80587	0.41891	0.91373
2.45	0.54533	0.30141	2.51683	1.80924	0.42112	0.92300
2.46	0.54291	0.29952	2.54031	1.81258	0.42332	0.93229
2.47	0.54050	0.29765	2.56403	1.81591	0.42551	0.94158
2.48	0.53810	0.29579	2.58801	1.81921	0.42768	0.95089
2.49	0.53571	0.29394	2.61224	1.82249	0.42984	0.96021
2.50	0.53333	0.29212	2.63672	1.82574	0.43198	0.96954
2.51	0.53097	0.29031	2.66146	1.82898	0.43410	0.97887
2.52	0.52862	0.28852	2.68645	1.83219	0.43621	0.98822
2.53	0.52627	0.28674	2.71171	1.83538	0.43831	0.99758
2.54	0.52394	0.28498	2.73723	1.83855	0.44039	1.00695
2.55	0.52163	0.28323	2.76301	1.84170	0.44246	1.01632
2.56	0.51932	0.28150	2.78906	1.84483	0.44451	1.02571
2.57	0.51702	0.27978	2.81538	1.84794	0.44655	1.03510
2.58	0.51474	0.27808	2.84197	1.85103	0.44858	1.04450
2.59	0.51247	0.27640	2.86884	1.85410	0.45059	1.05391
2.60	0.51020	0.27473	2.89598	1.85714	0.45259	1.06332
2.61	0.50795	0.27307	2.92339	1.86017	0.45457	1.07274
2.62	0.50571	0.27143	2.95109	1.86318	0.45654	1.08217
2.63	0.50349	0.26980	2.97907	1.86616	0.45850	1.09161
2.64	0.50127	0.26818	3.00733	1.86913	0.46044	1.10105
2.65	0.49906	0.26658	3.03588	1.87208	0.46237	1.11050
2.66	0.49687	0.26500	3.06472	1.87501	0.46429	1.11996
2.67	0.49469	0.26342	3.09385	1.87792	0.46619	1.12942
2.68	0.49251	0.26186	3.12327	1.88081	0.46808	1.13888
2.69	0.49035	0.26032	3.15299	1.88368	0.46996	1.14835
2.70	0.48820	0.25878	3.18301	1.88653	0.47182	1.15783
2.71	0.48606	0.25726	3.21333	1.88936	0.47367	1.16731
2.72	0.48393	0.25575	3.24395	1.89218	0.47551	1.17679
2.73	0.48182	0.25426	3.27488	1.89497	0.47733	1.18628
2.74	0.47971	0.25278	3.30611	1.89775	0.47915	1.19577
2.75	0.47761	0.25131	3.33766	1.90051	0.48095	1.20527
2.76	0.47553	0.24985	3.36952	1.90325	0.48273	1.21477
2.77	0.47345	0.24840	3.40169	1.90598	0.48451	1.22427
2.78	0.47139	0.24697	3.43418	1.90868	0.48627	1.23378
2.79	0.46933	0.24555	3.46699	1.91137	0.48803	1.24329

M	T/T^*	p/p^*	p_0/p_0^*	V/V^*	fL_{max}/D	S_{max}/R
2.80	0.46729	0.24414	3.50012	1.91404	0.48976	1.25280
2.81	0.46526	0.24274	3.53358	1.91669	0.49149	1.26231
2.82	0.46323	0.24135	3.56737	1.91933	0.49321	1.27183
2.83	0.46122	0.23998	3.60148	1.92195	0.49491	1.28135
2.84	0.45922	0.23861	3.63593	1.92455	0.49660	1.29087
2.85	0.45723	0.23726	3.67072	1.92714	0.49828	1.30039
2.86	0.45525	0.23592	3.70584	1.92970	0.49995	1.30991
2.87	0.45328	0.23459	3.74131	1.93225	0.50161	1.31943
2.88	0.45132	0.23326	3.77711	1.93479	0.50326	1.32896
2.89	0.44937	0.23195	3.81327	1.93731	0.50489	1.33849
2.90	0.44743	0.23066	3.84977	1.93981	0.50652	1.34801
2.91	0.44550	0.22937	3.88662	1.94230	0.50813	1.35754
2.92	0.44358	0.22809	3.92383	1.94477	0.50973	1.36707
2.93	0.44167	0.22682	3.96139	1.94722	0.51132	1.37660
2.94	0.43977	0.22556	3.99932	1.94966	0.51290	1.38612
2.95	0.43788	0.22431	4.03760	1.95208	0.51447	1.39565
2.96	0.43600	0.22307	4.07625	1.95449	0.51603	1.40518
2.97	0.43413	0.22185	4.11527	1.95688	0.51758	1.41471
2.98	0.43226	0.22063	4.15466	1.95925	0.51912	1.42423
2.99	0.43041	0.21942	4.19443	1.96162	0.52064	1.43376
3.00	0.42857	0.21822	4.23457	1.96396	0.52216	1.44328
3.01	0.42674	0.21703	4.27509	1.96629	0.52367	1.45280
3.02	0.42492	0.21585	4.31599	1.96861	0.52516	1.46233
3.03	0.42310	0.21467	4.35728	1.97091	0.52665	1.47185
3.04	0.42130	0.21351	4.39895	1.97319	0.52813	1.48137
3.05	0.41951	0.21236	4.44102	1.97547	0.52959	1.49088
3.06	0.41772	0.21121	4.48347	1.97772	0.53105	1.50040
3.07	0.41595	0.21008	4.52633	1.97997	0.53249	1.50991
3.08	0.41418	0.20895	4.56959	1.98219	0.53393	1.51942
3.09	0.41242	0.20783	4.61325	1.98441	0.53536	1.52893
3.10	0.41068	0.20672	4.65731	1.98661	0.53678	1.53844
3.11	0.40894	0.20562	4.70178	1.98879	0.53818	1.54794
3.12	0.40721	0.20453	4.74667	1.99097	0.53958	1.55744
3.13	0.40549	0.20344	4.79197	1.99313	0.54097	1.56694
3.14	0.40378	0.20237	4.83769	1.99527	0.54235	1.57644
3.15	0.40208	0.20130	4.88383	1.99740	0.54372	1.58593
3.16	0.40038	0.20024	4.93039	1.99952	0.54509	1.59542
3.17	0.39870	0.19919	4.97739	2.00162	0.54644	1.60490
3.18	0.39702	0.19814	5.02481	2.00372	0.54778	1.61439
3.19	0.39536	0.19711	5.07266	2.00579	0.54912	1.62387

M	T/T^*	p/p^*	p_0/p_0^*	V/V^*	fL_{max}/D	S_{max}/R
3.20	0.39370	0.19608	5.12096	2.00786	0.55044	1.63334
3.21	0.39205	0.19506	5.16969	2.00991	0.55176	1.64281
3.22	0.39041	0.19405	5.21887	2.01195	0.55307	1.65228
3.23	0.38878	0.19304	5.26849	2.01398	0.55437	1.66174
3.24	0.38716	0.19204	5.31857	2.01599	0.55566	1.67120
3.25	0.38554	0.19105	5.36909	2.01799	0.55694	1.68066
3.26	0.38394	0.19007	5.42008	2.01998	0.55822	1.69011
3.27	0.38234	0.18909	5.47152	2.02196	0.55948	1.69956
3.28	0.38075	0.18812	5.52343	2.02392	0.56074	1.70900
3.29	0.37917	0.18716	5.57580	2.02587	0.56199	1.71844
3.30	0.37760	0.18621	5.62865	2.02781	0.56323	1.72787
3.31	0.37603	0.18526	5.68196	2.02974	0.56446	1.73730
3.32	0.37448	0.18432	5.73576	2.03165	0.56569	1.74672
3.33	0.37293	0.18339	5.79003	2.03356	0.56691	1.75614
3.34	0.37139	0.18246	5.84479	2.03545	0.56812	1.76555
3.35	0.36986	0.18154	5.90004	2.03733	0.56932	1.77496
3.36	0.36833	0.18063	5.95577	2.03920	0.57051	1.78436
3.37	0.36682	0.17972	6.01201	2.04105	0.57170	1.79376
3.38	0.36531	0.17882	6.06873	2.04290	0.57287	1.80315
3.39	0.36381	0.17793	6.12596	2.04474	0.57404	1.81254
3.40	0.36232	0.17704	6.18370	2.04656	0.57521	1.82192
3.41	0.36083	0.17616	6.24194	2.04837	0.57636	1.83129
3.42	0.35936	0.17528	6.30070	2.05017	0.57751	1.84066
3.43	0.35789	0.17441	6.35997	2.05196	0.57865	1.85002
3.44	0.35643	0.17355	6.41976	2.05374	0.57978	1.85938
3.45	0.35498	0.17270	6.48007	2.05551	0.58091	1.86873
3.46	0.35353	0.17185	6.54092	2.05727	0.58203	1.87808
3.47	0.35209	0.17100	6.60229	2.05901	0.58314	1.88742
3.48	0.35066	0.17016	6.66419	2.06075	0.58424	1.89675
3.49	0.34924	0.16933	6.72664	2.06247	0.58534	1.90608
3.50	0.34783	0.16851	6.78962	2.06419	0.58643	1.91540
3.51	0.34642	0.16768	6.85315	2.06589	0.58751	1.92471
3.52	0.34502	0.16687	6.91723	2.06759	0.58859	1.93402
3.53	0.34362	0.16606	6.98186	2.06927	0.58966	1.94332
3.54	0.34224	0.16526	7.04705	2.07094	0.59072	1.95261
3.55	0.34086	0.16446	7.11281	2.07261	0.59178	1.96190
3.56	0.33949	0.16367	7.17912	2.07426	0.59282	1.97118
3.57	0.33813	0.16288	7.24601	2.07590	0.59387	1.98045
3.58	0.33677	0.16210	7.31346	2.07754	0.59490	1.98972
3.59	0.33542	0.16132	7.38150	2.07916	0.59593	1.99898

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
3.60	0.33408	0.16059	7.45011	2.08077	0.59695	2.00823
3.61	0.33274	0.15979	7.51931	2.08238	0.59797	2.01747
3.62	0.33141	0.15903	7.58910	2.08397	0.59898	2.02671
3.63	0.33009	0.15827	7.65948	2.08556	0.59998	2.03594
3.64	0.32877	0.15752	7.73045	2.08713	0.60098	2.04517
3.65	0.32747	0.15678	7.80203	2.08870	0.60197	2.05438
3.66	0.32616	0.15604	7.87421	2.09026	0.60296	2.06359
3.67	0.32487	0.15531	7.94700	2.09180	0.60394	2.07279
3.68	0.32358	0.15458	8.02040	2.09334	0.60491	2.08199
3.69	0.32230	0.15385	8.09442	2.09487	0.60588	2.09118
3.70	0.32103	0.15313	8.16907	2.09639	0.60684	2.10035
3.71	0.31976	0.15242	8.24433	2.09790	0.60779	2.10953
3.72	0.31850	0.15171	8.32023	2.09941	0.60874	2.11869
3.73	0.31724	0.15100	8.39676	2.10090	0.60968	2.12785
3.74	0.31600	0.15030	8.47393	2.10238	0.61062	2.13699
3.75	0.31475	0.14961	8.55174	2.10386	0.61155	2.14613
3.76	0.31352	0.14892	8.63020	2.10533	0.61247	2.15527
3.77	0.31229	0.14823	8.70931	2.10679	0.61339	2.16439
3.78	0.31107	0.14755	8.78907	2.10824	0.61431	2.17351
3.79	0.30985	0.14687	8.86950	2.10968	0.61522	2.18262
3.80	0.30864	0.14620	8.95059	2.11111	0.61612	2.19172
3.81	0.30744	0.14553	9.03234	2.11254	0.61702	2.20081
3.82	0.30624	0.14487	9.11477	2.11397	0.61791	2.20990
3.83	0.30505	0.14421	9.19788	2.11538	0.61879	2.21897
3.84	0.30387	0.14355	9.28167	2.11676	0.61968	2.22804
3.85	0.30269	0.14290	9.36614	2.11815	0.62055	2.23710
3.86	0.30151	0.14225	9.45131	2.11954	0.62142	2.24615
3.87	0.30035	0.14161	9.53717	2.12091	0.62229	2.25520
3.88	0.29919	0.14097	9.62373	2.12228	0.62315	2.26423
3.89	0.29803	0.14034	9.71100	2.12364	0.62400	2.27326
3.90	0.29688	0.13971	9.79897	2.12499	0.62485	2.28228
3.91	0.29574	0.13908	9.88766	2.12634	0.62569	2.29129
3.92	0.29460	0.13846	9.97707	2.12767	0.62653	2.30029
3.93	0.29347	0.13784	10.06720	2.12900	0.62737	2.30928
3.94	0.29235	0.13723	10.15806	2.13032	0.62819	2.31827
3.95	0.29123	0.13662	10.24965	2.13163	0.62902	2.32724
3.96	0.29011	0.13602	10.34197	2.13294	0.62984	2.33621
3.97	0.28900	0.13541	10.43504	2.13424	0.63065	2.34517
3.98	0.28790	0.13482	10.52886	2.13553	0.63146	2.35412
3.99	0.28681	0.13422	10.62343	2.13681	0.63227	2.36306

M	T/T^*	p/p^*	p_t/p_t^*	V/V^*	fL_{max}/D	S_{max}/R
4.00	0.28571	0.13363	10.71875	2.13809	0.63336	2.37199
4.10	0.27510	0.12793	11.71465	2.15046	0.64080	2.46084
4.20	0.26502	0.12257	12.79164	2.16215	0.64810	2.54879
4.30	0.25543	0.11753	13.95490	2.17321	0.65499	2.63583
4.40	0.24631	0.11279	15.20987	2.18368	0.66149	2.72196
4.50	0.23762	0.10833	16.56219	2.19360	0.66763	2.80712
4.60	0.22936	0.10411	18.01779	2.20300	0.67345	2.89136
4.70	0.22148	0.10013	19.58283	2.21192	0.67895	2.97465
4.80	0.21398	0.09637	21.26371	2.22038	0.68417	3.05700
4.90	0.20683	0.09281	23.06712	2.22842	0.68911	3.13841
5.00	0.20000	0.08944	25.00000	2.23607	0.69380	3.21888
5.10	0.19349	0.08625	27.06957	2.24334	0.69826	3.29841
5.20	0.18727	0.08322	29.28333	2.25026	0.70249	3.37702
5.30	0.18132	0.08034	31.64905	2.25685	0.70652	3.45471
5.40	0.17564	0.07761	34.17481	2.26313	0.71035	3.53149
5.50	0.17021	0.07501	36.86896	2.26913	0.71400	3.60737
5.60	0.16502	0.07254	39.74018	2.27484	0.71748	3.68236
5.70	0.16004	0.07018	42.79743	2.28030	0.72080	3.75648
5.80	0.15528	0.06794	46.05000	2.28552	0.72397	3.82973
5.90	0.15072	0.06580	49.50747	2.29051	0.72699	3.90212
6.00	0.14634	0.06376	53.17978	2.29528	0.72988	3.97368
6.10	0.14215	0.06181	57.07718	2.29984	0.73264	4.04440
6.20	0.13812	0.05994	61.21023	2.30421	0.73528	4.11431
6.30	0.13426	0.05816	65.58987	2.30840	0.73780	4.18342
6.40	0.13055	0.05646	70.22736	2.31241	0.74022	4.25174
6.50	0.12698	0.05482	75.13431	2.31626	0.74254	4.31928
6.60	0.12356	0.05326	80.32271	2.31996	0.74477	4.38605
6.70	0.12026	0.05176	85.80487	2.32351	0.74690	4.45208
6.80	0.11710	0.05032	91.59351	2.32691	0.74895	4.51736
6.90	0.11405	0.04894	97.70169	2.33019	0.75091	4.58192
7.00	0.11111	0.04762	104.14286	2.33333	0.75280	4.64576
7.50	0.09796	0.04173	141.84148	2.34738	0.76121	4.95471
8.00	0.08696	0.03686	190.10937	2.35907	0.76819	5.24760
8.50	0.07767	0.03279	251.08617	2.36889	0.77406	5.52580
9.00	0.06977	0.02935	327.18930	2.37722	0.77899	5.79054
9.50	0.06299	0.02642	421.13137	2.38433	0.78320	6.04294
10.00	0.05714	0.02390	535.93750	2.39046	0.78683	6.28402
∞	0.0	0.0	∞	2.4495	0.82153	∞