

風洞試驗數據處理用表



中國人民軍 第六研究院第七研究所第三研究室

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风洞试验数据处理用表



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中国人民解放军 第六研究院第七研究所第三研究室

毛主席语录

中国应当对于人类有较大的贡献。

中国人民有志气，有能力，一定要在不远的将来，赶上和超过世界先进水平。

我们将不但有一个强大的陆军，而且有一个强大的空军和一个强大的海军。

抓革命、促生产、促工作、促战备。

我们需要的是热烈而镇定的情绪，紧张而有秩序的工作。

世界上怕就怕“认真”二字，共产党就最讲“认真”。

前 言

伟大领袖毛主席教导我们：“人类总得不断地总结经验，有所发现，有所发明，有所创造，有所前进。”随着祖国航空工业的迅速发展，FL-1风洞试验内容和 M 数范围也逐渐增加和扩大，原有的《数据处理计算用表》已不能满足试验数据处理工作的需要。为此，我们编写了这册《风洞试验数据处理用表》。

本数据处理用表的编写，是在实际使用者直接参加下，在原有计算用表的基础上加以修改、补充，以适应 FL-1 风洞试验数据处理工作的需要，同时兼顾了类似风洞的使用要求，内容力求达到简练，可靠，使用方便。

但由于我们缺乏经验，水平有限，错误和不足之处在所难免，诚恳地希望使用者给予批评指正。

风洞试验数据处理用表编写小组

1971年1月

编 表 说 明

表 3 是按气体等熵流动关系式制成。

$$\frac{P}{P_0} = \left(1 + \frac{K-1}{2} M^2\right)^{-\frac{K}{K-1}} = (1 + 0.2M^2)^{-3.5} \quad (1)$$

$$\frac{F_{KP}}{F} = M \left[\frac{2}{K+1} \left(1 + \frac{K-1}{2} M^2\right) \right]^{\frac{K+1}{2(K-1)}} = M \left(\frac{1.2}{1 + 0.2M^2} \right)^3 \quad (2)$$

$$\frac{q}{P_0} = \frac{1}{2} KM^2 \left(1 + \frac{K-1}{2} M^2\right)^{-\frac{K}{K-1}} = 0.7M^2 (1 + 0.2M^2)^{-3.5} \quad (3)$$

$$\frac{P_0}{q} = \left(1 + \frac{K-1}{2} M^2\right)^{\frac{K}{K-1}} \bigg/ \frac{1}{2} KM^2 = (1 + 0.2M^2)^{3.5} \bigg/ 0.7M^2 \quad (4)$$

在试验中,通常是测出气流的总、静压力来计算M数。故表 4 按 (1) 式和由 (1)、(2) 式导出的 (5) 式制成的。表 5、表 6 则是按气流正冲波关系式、雷列公式制成。

$$\begin{aligned} \frac{F_{KP}}{F} &= \left[\frac{2}{K-1} \left(\frac{2}{K+1}\right)^{-\frac{K+1}{K-1}} \right]^{\frac{1}{2}} \left[\left(\frac{P}{P_0}\right)^{\frac{2}{K}} - \left(\frac{P}{P_0}\right)^{\frac{K+1}{K}} \right]^{\frac{1}{2}} \\ &= 3.864 \left[\left(\frac{P}{P_0}\right)^{\frac{1}{0.7}} - \left(\frac{P}{P_0}\right)^{\frac{1.2}{0.7}} \right]^{\frac{1}{2}} \end{aligned} \quad (5)$$

$$\begin{aligned} \frac{P_{20}}{P_{10}} &= \left[\frac{2KM_1^2 - (K-1)}{K+1} \right]^{\frac{1}{K-1}} \left[\frac{(K+1)M_1^2}{(K-1)M_1^2 + 2} \right]^{\frac{K}{K-1}} \\ &= \left(\frac{7M_1^2 - 1}{6} \right)^{-2.5} \left(\frac{6M_1^2}{M_1^2 + 5} \right)^{3.5} \end{aligned} \quad (6)$$

$$\begin{aligned} \frac{P_1}{P_{20}} &= \left[\frac{2KM_1^2 - (K-1)}{K+1} \right]^{\frac{1}{K-1}} \left[\frac{2}{(K+1)M_1^2} \right]^{\frac{K}{K-1}} \\ &= \left(\frac{7M_1^2 - 1}{6} \right)^{2.5} \left(\frac{5}{6M_1^2} \right)^{3.5} \end{aligned} \quad (7)$$

表 8 是按下列关系式制成的单位压力、单位长度的雷诺数表。

$$\frac{Re}{P_0 L} \times 10^{-6} = 0.4766716 \frac{\left[(1 + 0.2M^2)^{-1} + \frac{114}{T_0} \right] M}{(1 + 0.2M^2)^{1.5} T_0} \left[\frac{\text{米}^2}{\text{公斤} \cdot \text{米}} \right] \quad (8)$$

其中取:

$$\text{动力粘性系数 } \mu_0 = 0.1465 \times 10^{-6} \frac{T_0^{1.5}}{T_0 + 114} \left[\frac{\text{公斤} \cdot \text{秒}}{\text{米}^2} \right]$$

$$\text{重力加速度 } g = 9.81 \left[\frac{\text{米}}{\text{秒}^2} \right]$$

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表1. 水银比重表 (单位: 公斤/米³)

t °C	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	13.59500	13.59480	13.59460	13.59440	13.59420	13.59400	13.59380	13.59360	13.59340	13.59320
1	.59300	.59275	.59250	.59225	.59200	.59175	.59150	.59125	.59100	.59075
2	.59050	.59025	.59000	.58975	.58950	.58925	.58900	.58875	.58850	.58825
3	.58800	.58776	.58752	.58728	.58704	.58680	.58656	.58632	.58608	.58584
4	.58560	.58535	.58510	.58485	.58460	.58435	.58410	.58385	.58360	.58335
5	13.58310	13.58285	13.58260	13.58235	13.58210	13.58185	13.58160	13.58135	13.58110	13.58085
6	.58060	.58026	.57992	.57958	.57924	.57890	.57856	.57822	.57788	.57754
7	.57720	.57695	.57670	.57645	.57620	.57595	.57570	.57545	.57520	.57495
8	.57470	.57445	.57420	.57395	.57370	.57345	.57320	.57295	.57270	.57245
9	.57220	.57196	.57172	.57148	.57124	.57100	.57076	.57052	.57028	.57004
10	13.56980	13.56965	13.56950	13.56935	13.56920	13.56905	13.56890	13.56875	13.56860	13.56845
11	.56830	.56805	.56780	.56755	.56730	.56705	.56680	.56655	.56630	.56605
12	.56580	.56556	.56532	.56508	.56484	.56460	.56436	.56412	.56388	.56364
13	.56340	.56315	.56290	.56265	.56240	.56215	.56190	.56165	.56140	.56115
14	.56090	.56065	.56040	.56015	.55990	.55965	.55940	.55915	.55890	.55865
15	13.55840	13.55816	13.55792	13.55768	13.55744	13.55720	13.55696	13.55672	13.55648	13.55624
16	.55600	.55575	.55550	.55525	.55500	.55475	.55450	.55425	.55400	.55375
17	.55350	.55326	.55302	.55278	.55254	.55230	.55206	.55182	.55158	.55134
18	.55110	.55085	.55060	.55035	.55010	.54985	.54960	.54935	.54910	.54885
19	.54860	.54835	.54810	.54785	.54760	.54735	.54710	.54685	.54660	.54635
20	13.54610	13.54586	13.54562	13.54538	13.54514	13.54490	13.54466	13.54442	13.54418	13.54394
21	.54370	.54345	.54320	.54295	.54270	.54245	.54220	.54195	.54170	.54145
22	.54120	.54096	.54072	.54048	.54024	.54000	.53976	.53952	.53928	.53904
23	.53880	.53855	.53830	.53805	.53780	.53755	.53730	.53705	.53680	.53655
24	.53630	.53606	.53582	.53558	.53534	.53510	.53486	.53462	.53438	.53414
25	13.53390	13.53365	13.53340	13.53315	13.53290	13.53265	13.53240	13.53215	13.53190	13.53165
26	.53140	.53116	.53092	.53068	.53044	.53020	.52996	.52972	.52948	.52924
27	.52900	.52875	.52850	.52825	.52800	.52775	.52750	.52725	.52700	.52675
28	.52650	.52626	.52602	.52578	.52554	.52530	.52506	.52482	.52458	.52434
29	.52410	.52385	.52360	.52335	.52310	.52285	.52260	.52235	.52210	.52185
30	13.52160	13.52135	13.52110	13.52085	13.52060	13.52035	13.52010	13.51985	13.51960	13.51935
31	.51910	.51886	.51862	.51838	.51814	.51790	.51766	.51742	.51718	.51694
32	.51670	.51645	.51620	.51595	.51570	.51545	.51520	.51495	.51470	.51445
33	.51420	.51396	.51372	.51348	.51324	.51300	.51276	.51252	.51228	.51204
34	.51180	.51156	.51132	.51108	.51084	.51060	.51036	.51012	.50988	.50964
35	13.50940	13.50915	13.50890	13.50865	13.50840	13.50815	13.50790	13.50765	13.50740	13.50715
36	.50690	.50666	.50642	.50618	.50594	.50570	.50546	.50522	.50498	.50474
37	.50450	.50425	.50400	.50375	.50350	.50325	.50300	.50275	.50250	.50225
38	.50200	.50176	.50152	.50128	.50104	.50080	.50056	.50032	.50008	.49984
39	.49960	.49935	.49910	.49885	.49860	.49835	.49810	.49785	.49760	.49735
40	13.49710	13.49686	13.49662	13.49638	13.49614	13.49590	13.49566	13.49542	13.49518	13.49494
41	.49470	.49445	.49420	.49395	.49370	.49345	.49320	.49295	.49270	.49245
42	.49220	.49196	.49172	.49148	.49124	.49100	.49076	.49052	.49028	.49004
43	.48980	.48955	.48930	.48905	.48880	.48855	.48830	.48805	.48780	.48755
44	.48730	.48706	.48682	.48658	.48634	.48610	.48586	.48562	.48538	.48514
45	13.48490									

表2. 正 弦、余 弦 函 数 表

0°	sin	cos	0°	sin	cos	1°	sin	cos
0.00	0.00000	1.0000	0.50	0.00873	0.99996	1.00	0.01745	0.99985
.01	.00017	.0000	.51	.00890	.99996	.01	.01762	.99984
.02	.00035	.0000	.52	.00908	.99996	.02	.01780	.99984
.03	.00052	.0000	.53	.00925	.99996	.03	.01797	.99984
.04	.00070	.0000	.54	.00943	.99996	.04	.01815	.99984
0.05	0.00087	1.0000	0.55	0.00960	0.99995	1.05	0.01832	0.99983
.06	.00104	.0000	.56	.00977	.99995	.06	.01849	.99983
.07	.00122	.0000	.57	.00995	.99995	.07	.01867	.99983
.08	.00139	.0000	.58	.01012	.99995	.08	.01885	.99982
.09	.00157	.0000	.59	.01030	.99995	.09	.01903	.99982
0.10	0.00175	1.0000	0.60	0.01047	0.99995	1.10	0.01920	0.99982
.11	.00192	.0000	.61	.01064	.99994	.11	.01937	.99981
.12	.00210	.0000	.62	.01082	.99994	.12	.01955	.99981
.13	.00227	.0000	.63	.01099	.99994	.13	.01972	.99980
.14	.00245	.0000	.64	.01117	.99994	.14	.01990	.99980
0.15	0.00262	1.0000	0.65	0.01134	0.99994	1.15	0.02007	0.99980
.16	.00279	.99999	.66	.01152	.99993	.16	.02024	.99979
.17	.00297	.99999	.67	.01170	.99993	.17	.02042	.99979
.18	.00314	.99999	.68	.01187	.99993	.18	.02059	.99979
.19	.00332	.99999	.69	.01205	.99993	.19	.02077	.99979
0.20	0.00349	0.99999	0.70	0.01222	0.99993	1.20	0.02094	0.99978
.21	.00366	.99999	.71	.01239	.99992	.21	.02111	.99977
.22	.00384	.99999	.72	.01257	.99992	.22	.02129	.99977
.23	.00401	.99999	.73	.01274	.99992	.23	.02146	.99977
.24	.00419	.99999	.74	.01292	.99992	.24	.02164	.99977
0.25	0.00436	0.99999	0.75	0.01309	0.99991	1.25	0.02181	0.99976
.26	.00453	.99999	.76	.01326	.99991	.26	.02199	.99976
.27	.00471	.99999	.77	.01344	.99991	.27	.02217	.99976
.28	.00489	.99999	.78	.01361	.99991	.28	.02234	.99975
.29	.00507	.99999	.79	.01379	.99991	.29	.02252	.99975
0.30	0.00524	0.99999	0.80	0.01396	0.99990	1.30	0.02269	0.99974
.31	.00541	.99998	.81	.01413	.99990	.31	.02286	.99974
.32	.00559	.99998	.82	.01431	.99990	.32	.02304	.99974
.33	.00576	.99998	.83	.01448	.99989	.33	.02321	.99973
.34	.00594	.99998	.84	.01466	.99989	.34	.02339	.99973
0.35	0.00611	0.99998	0.85	0.01483	0.99989	1.35	0.02356	0.99972
.36	.00628	.99998	.86	.01501	.99989	.36	.02373	.99972
.37	.00646	.99998	.87	.01519	.99989	.37	.02391	.99972
.38	.00663	.99998	.88	.01536	.99988	.38	.02408	.99971
.39	.00681	.99998	.89	.01554	.99988	.39	.02426	.99971
0.40	0.00698	0.99998	0.90	0.01571	0.99988	1.40	0.02443	0.99970
.41	.00715	.99997	.91	.01588	.99987	.41	.02460	.99969
.42	.00733	.99997	.92	.01606	.99987	.42	.02478	.99969
.43	.00750	.99997	.93	.01623	.99987	.43	.02495	.99969
.44	.00768	.99997	.94	.01641	.99987	.44	.02513	.99969
0.45	0.00785	0.99997	0.95	0.01658	0.99986	1.45	0.02530	0.99968
.46	.00802	.99997	.96	.01675	.99986	.46	.02548	.99967
.47	.00820	.99997	.97	.01693	.99986	.47	.02566	.99967
.48	.00838	.99996	.98	.01710	.99985	.48	.02583	.99966
.49	.00856	.99996	.99	.01728	.99985	.49	.02601	.99966

表2. 正 弦、余 弦 函 数 表

1°	sin	cos	2°	sin	cos	2°	sin	cos
1.50	0.02618	0.99966	2.00	0.03490	0.99939	2.50	0.04362	0.99905
.51	.02635	.99965	.01	.03507	.99938	.51	.04379	.99904
.52	.02653	.99965	.02	.03525	.99938	.52	.04397	.99904
.53	.02670	.99964	.03	.03542	.99937	.53	.04414	.99902
.54	.02688	.99964	.04	.03560	.99937	.54	.04432	.99902
1.55	0.02705	0.99963	2.05	0.03577	0.99936	2.55	0.04449	0.99901
.56	.02722	.99963	.06	.03594	.99935	.56	.04466	.99900
.57	.02740	.99963	.07	.03612	.99935	.57	.04484	.99900
.58	.02757	.99962	.08	.03629	.99934	.58	.04501	.99898
.59	.02775	.99962	.09	.03647	.99934	.59	.04519	.99898
1.60	0.02792	0.99961	2.10	0.03664	0.99933	2.60	0.04536	0.99897
.61	.02809	.99960	.11	.03681	.99932	.61	.04553	.99896
.62	.02827	.99960	.12	.03699	.99932	.62	.04571	.99896
.63	.02844	.99959	.13	.03717	.99931	.63	.04588	.99894
.64	.02862	.99959	.14	.03735	.99931	.64	.04606	.99894
1.65	0.02879	0.99959	2.15	0.03752	0.99930	2.65	0.04623	0.99893
.66	.02896	.99958	.16	.03769	.99929	.66	.04641	.99892
.67	.02914	.99958	.17	.03787	.99929	.67	.04659	.99892
.68	.02932	.99957	.18	.03804	.99927	.68	.04676	.99890
.69	.02950	.99957	.19	.03822	.99927	.69	.04694	.99890
1.70	0.02967	0.99956	2.20	0.03839	0.99926	2.70	0.04711	0.99889
.71	.02984	.99955	.21	.03856	.99925	.71	.04728	.99888
.72	.03002	.99955	.22	.03874	.99925	.72	.04746	.99888
.73	.03019	.99954	.23	.03891	.99924	.73	.04763	.99886
.74	.03037	.99954	.24	.03909	.99924	.74	.04781	.99886
1.75	0.03054	0.99953	2.25	0.03926	0.99923	2.75	0.04798	0.99885
.76	.03071	.99952	.26	.03943	.99922	.76	.04815	.99884
.77	.03089	.99952	.27	.03961	.99922	.77	.04833	.99883
.78	.03106	.99952	.28	.03978	.99921	.78	.04850	.99882
.79	.03124	.99952	.29	.03996	.99920	.79	.04868	.99882
1.80	0.03141	0.99951	2.30	0.04013	0.99919	2.80	0.04885	0.99881
.81	.03158	.99950	.31	.04030	.99918	.81	.04902	.99880
.82	.03176	.99950	.32	.04048	.99918	.82	.04920	.99879
.83	.03193	.99949	.33	.04065	.99917	.83	.04937	.99878
.84	.03211	.99949	.34	.04083	.99917	.84	.04955	.99877
1.85	0.03228	0.99948	2.35	0.04100	0.99916	2.85	0.04972	0.99876
.86	.03245	.99947	.36	.04117	.99915	.86	.04989	.99875
.87	.03263	.99947	.37	.04135	.99915	.87	.05007	.99875
.88	.03280	.99946	.38	.04153	.99913	.88	.05024	.99873
.89	.03298	.99946	.39	.04171	.99913	.89	.05042	.99873
1.90	0.03316	0.99945	2.40	0.04188	0.99912	2.90	0.05059	0.99872
.91	.03333	.99944	.41	.04205	.99911	.91	.05076	.99871
.92	.03351	.99944	.42	.04223	.99911	.92	.05094	.99870
.93	.03368	.99943	.43	.04240	.99910	.93	.05111	.99869
.94	.03386	.99943	.44	.04258	.99910	.94	.05129	.99868
1.95	0.03403	0.99942	2.45	0.04275	0.99909	2.95	0.05146	0.99867
.96	.03420	.99941	.46	.04292	.99908	.96	.05163	.99866
.97	.03438	.99941	.47	.04310	.99907	.97	.05181	.99866
.98	.03455	.99940	.48	.04327	.99906	.98	.05199	.99864
.99	.03473	.99940	.49	.04345	.99906	.99	.05217	.99864

表2. 正 弦、余 弦 函 数 表

3°	sin	cos	3°	sin	cos	4°	sin	cos
3.00	0.05234	0.99863	3.50	0.06105	0.99813	4.00	0.06976	0.99756
.01	.05251	.99862	.51	.06122	.99812	.01	.06993	.99755
.02	.05269	.99861	.52	.06140	.99812	.02	.07011	.99754
.03	.05286	.99860	.53	.06157	.99810	.03	.07028	.99752
.04	.05304	.99859	.54	.06175	.99809	.04	.07046	.99751
3.05	0.05321	0.99858	3.55	0.06192	0.99808	4.05	0.07063	0.99750
.06	.05338	.99857	.56	.06209	.99807	.06	.07080	.99749
.07	.05356	.99857	.57	.06227	.99806	.07	.07098	.99748
.08	.05373	.99855	.58	.06244	.99804	.08	.07115	.99746
.09	.05391	.99855	.59	.06262	.99804	.09	.07133	.99745
3.10	0.05408	0.99854	3.60	0.06279	0.99803	4.10	0.07150	0.99744
.11	.05425	.99853	.61	.06296	.99802	.11	.07167	.99743
.12	.05443	.99852	.62	.06314	.99801	.12	.07185	.99742
.13	.05460	.99851	.63	.06331	.99799	.13	.07202	.99740
.14	.05478	.99850	.64	.06349	.99798	.14	.07220	.99739
3.15	0.05495	0.99849	3.65	0.06366	0.99797	4.15	0.07237	0.99738
.16	.05512	.99848	.66	.06383	.99796	.16	.07254	.99737
.17	.05530	.99847	.67	.06401	.99795	.17	.07272	.99736
.18	.05547	.99846	.68	.06418	.99793	.18	.07289	.99734
.19	.05565	.99845	.69	.06436	.99793	.19	.07307	.99733
3.20	0.05582	0.99844	3.70	0.06453	0.99792	4.20	0.07324	0.99731
.21	.05599	.99843	.71	.06470	.99791	.21	.07341	.99730
.22	.05617	.99842	.72	.06488	.99790	.22	.07359	.99729
.23	.05634	.99841	.73	.06505	.99788	.23	.07376	.99727
.24	.05652	.99840	.74	.06523	.99787	.24	.07394	.99726
3.25	0.05669	0.99839	3.75	0.06540	0.99786	4.25	0.07411	0.99725
.26	.05686	.99838	.76	.06557	.99785	.26	.07428	.99724
.27	.05704	.99838	.77	.06575	.99784	.27	.07446	.99723
.28	.05721	.99836	.78	.06592	.99782	.28	.07463	.99721
.29	.05739	.99835	.79	.06610	.99781	.29	.07481	.99720
3.30	0.05756	0.99834	3.80	0.06627	0.99780	4.30	0.07498	0.99719
.31	.05773	.99833	.81	.06644	.99779	.31	.07515	.99717
.32	.05791	.99833	.82	.06662	.99778	.32	.07533	.99716
.33	.05808	.99831	.83	.06679	.99776	.33	.07550	.99714
.34	.05826	.99830	.84	.06697	.99775	.34	.07568	.99713
3.35	0.05844	0.99829	3.85	0.06714	0.99774	4.35	0.07585	0.99712
.36	.05861	.99828	.86	.06731	.99773	.36	.07602	.99711
.37	.05879	.99827	.87	.06749	.99772	.37	.07620	.99710
.38	.05896	.99826	.88	.06767	.99770	.38	.07637	.99708
.39	.05914	.99825	.89	.06785	.99769	.39	.07655	.99707
3.40	0.05931	0.99824	3.90	0.06802	0.99768	4.40	0.07672	0.99705
.41	.05948	.99823	.91	.06819	.99767	.41	.07689	.99704
.42	.05966	.99822	.92	.06837	.99766	.42	.07707	.99703
.43	.05983	.99821	.93	.06854	.99764	.43	.07724	.99701
.44	.06001	.99820	.94	.06872	.99763	.44	.07742	.99700
3.45	0.06018	0.99819	3.95	0.06889	0.99762	4.45	0.07759	0.99699
.46	.06035	.99818	.96	.06906	.99761	.46	.07776	.99697
.47	.06053	.99817	.97	.06924	.99760	.47	.07794	.99696
.48	.06070	.99815	.98	.06941	.99758	.48	.07811	.99694
.49	.06088	.99814	.99	.06959	.99757	.49	.07829	.99693

表2. 正 弦、余 弦 函 数 表

4°	sin	cos	5°	sin	cos	5°	sin	cos
4.50	0.07846	0.99692	5.00	0.08716	0.99619	5.50	0.09585	0.99540
.51	.07863	.99690	.01	.08733	.99618	.51	.09602	.99538
.52	.07881	.99689	.02	.08751	.99616	.52	.09620	.99536
.53	.07898	.99687	.03	.08768	.99615	.53	.09636	.99535
.54	.07916	.99686	.04	.08786	.99613	.54	.09654	.99533
4.55	0.07933	0.99685	5.05	0.08803	0.99612	5.55	0.09671	0.99531
.56	.07950	.99684	.06	.08820	.99610	.56	.09688	.99529
.57	.07968	.99682	.07	.08837	.99609	.57	.09706	.99528
.58	.07985	.99681	.08	.08854	.99607	.58	.09723	.99526
.59	.08003	.99679	.09	.08872	.99606	.59	.09741	.99525
4.60	0.08020	0.99678	5.10	0.08889	0.99604	5.60	0.09758	0.99523
.61	.08037	.99677	.11	.08906	.99603	.61	.09775	.99521
.62	.08055	.99675	.12	.08924	.99601	.62	.09793	.99519
.63	.08072	.99674	.13	.08941	.99600	.63	.09810	.99518
.64	.08090	.99672	.14	.08959	.99598	.64	.09828	.99516
4.65	0.08107	0.99671	5.15	0.08976	0.99596	5.65	0.09845	0.99514
.66	.08124	.99669	.16	.08993	.99595	.66	.09862	.99512
.67	.08142	.99668	.17	.09011	.99593	.67	.09880	.99510
.68	.08159	.99666	.18	.09028	.99592	.68	.09897	.99509
.69	.08177	.99665	.19	.09046	.99590	.69	.09915	.99507
4.70	0.08194	0.99664	5.20	0.09063	0.99588	5.70	0.09932	0.99506
.71	.08211	.99662	.21	.09080	.99587	.71	.09949	.99504
.72	.08229	.99661	.22	.09098	.99585	.72	.09967	.99502
.73	.08246	.99659	.23	.09115	.99584	.73	.09984	.99501
.74	.08264	.99658	.24	.09133	.99582	.74	.10002	.99499
4.75	0.08281	0.99657	5.25	0.09150	0.99580	5.75	0.10019	0.99497
.76	.08298	.99655	.26	.09167	.99579	.76	.10036	.99495
.77	.08316	.99654	.27	.09185	.99577	.77	.10054	.99493
.78	.08333	.99652	.28	.09202	.99576	.78	.10071	.99492
.79	.08351	.99651	.29	.09220	.99574	.79	.10089	.99490
4.80	0.08368	0.99649	5.30	0.09237	0.99572	5.80	0.10106	0.99488
.81	.08385	.99648	.31	.09254	.99571	.81	.10123	.99486
.82	.08403	.99646	.32	.09272	.99569	.82	.10141	.99484
.83	.08420	.99645	.33	.09289	.99568	.83	.10158	.99483
.84	.08438	.99643	.34	.09307	.99566	.84	.10176	.99481
4.85	0.08455	0.99642	5.35	0.09324	0.99564	5.85	0.10192	0.99479
.86	.08472	.99640	.36	.09341	.99563	.86	.10209	.99477
.87	.08490	.99639	.37	.09359	.99561	.87	.10227	.99475
.88	.08507	.99637	.38	.09376	.99560	.88	.10244	.99474
.89	.08525	.99636	.39	.09394	.99558	.89	.10262	.99472
4.90	0.08542	0.99635	5.40	0.09411	0.99556	5.90	0.10279	0.99470
.91	.08559	.99633	.41	.09428	.99554	.91	.10296	.99468
.92	.08577	.99632	.42	.09446	.99553	.92	.10314	.99466
.93	.08594	.99630	.43	.09463	.99551	.93	.10331	.99465
.94	.08612	.99629	.44	.09481	.99550	.94	.10349	.99463
4.95	0.08629	0.99627	5.45	0.09498	0.99548	5.95	0.10366	0.99461
.96	.08646	.99626	.46	.09515	.99546	.96	.10383	.99459
.97	.08664	.99624	.47	.09533	.99544	.97	.10401	.99457
.98	.08681	.99623	.48	.09550	.99543	.98	.10418	.99456
.99	.08699	.99621	.49	.09568	.99541	.99	.10436	.99454

表2. 正 弦、余 弦 函 数 表

6°	sin	cos	6°	sin	cos	7°	sin	cos
6.00	0.10453	0.99452	6.50	0.11320	0.99357	7.00	0.12187	0.99255
.01	.10470	.99450	.51	.11337	.99355	.01	.12204	.99253
.02	.10488	.99448	.52	.11355	.99353	.02	.12222	.99250
.03	.10505	.99447	.53	.11372	.99352	.03	.12239	.99249
.04	.10523	.99445	.54	.11390	.99349	.04	.12257	.99246
6.05	0.10540	0.99443	6.55	0.11407	0.99347	7.05	0.12274	0.99244
.06	.10557	.99441	.56	.11424	.99345	.06	.12291	.99242
.07	.10575	.99439	.57	.11442	.99343	.07	.12308	.99239
.08	.10591	.99438	.58	.11459	.99342	.08	.12325	.99238
.09	.10609	.99436	.59	.11477	.99340	.09	.12343	.99235
6.10	0.10626	0.99434	6.60	0.11494	0.99337	7.10	0.12360	0.99233
.11	.10643	.99433	.61	.11511	.99335	.11	.12377	.99231
.12	.10661	.99430	.62	.11529	.99333	.12	.12395	.99229
.13	.10678	.99429	.63	.11546	.99332	.13	.12412	.99227
.14	.10696	.99426	.64	.11563	.99329	.14	.12430	.99224
6.15	0.10713	0.99424	6.65	0.11580	0.99327	7.15	0.12447	0.99222
.16	.10730	.99422	.66	.11597	.99325	.16	.12464	.99220
.17	.10748	.99420	.67	.11615	.99323	.17	.12482	.99218
.18	.10765	.99419	.68	.11632	.99321	.18	.12498	.99216
.19	.10783	.99417	.69	.11650	.99319	.19	.12516	.99213
6.20	0.10800	0.99415	6.70	0.11667	0.99317	7.20	0.12533	0.99211
.21	.10817	.99413	.71	.11684	.99315	.21	.12550	.99209
.22	.10835	.99411	.72	.11702	.99313	.22	.12568	.99207
.23	.10852	.99410	.73	.11719	.99311	.23	.12585	.99205
.24	.10870	.99408	.74	.11737	.99309	.24	.12603	.99202
6.25	0.10887	0.99406	6.75	0.11754	0.99307	7.25	0.12620	0.99200
.26	.10904	.99404	.76	.11771	.99305	.26	.12637	.99198
.27	.10922	.99401	.77	.11789	.99302	.27	.12655	.99196
.28	.10939	.99400	.78	.11806	.99301	.28	.12672	.99194
.29	.10956	.99398	.79	.11823	.99299	.29	.12689	.99191
6.30	0.10973	0.99396	6.80	0.11840	0.99297	7.30	0.12706	0.99189
.31	.10990	.99394	.81	.11857	.99295	.31	.12723	.99187
.32	.11008	.99392	.82	.11875	.99292	.32	.12741	.99185
.33	.11025	.99391	.83	.11892	.99291	.33	.12758	.99183
.34	.11043	.99388	.84	.11910	.99288	.34	.12776	.99180
6.35	0.11060	0.99386	6.85	0.11927	0.99286	7.35	0.12793	0.99178
.36	.11077	.99384	.86	.11944	.99284	.36	.12810	.99176
.37	.11095	.99382	.87	.11962	.99282	.37	.12828	.99174
.38	.11112	.99381	.88	.11979	.99280	.38	.12845	.99172
.39	.11130	.99379	.89	.11997	.99278	.39	.12863	.99169
6.40	0.11147	0.99377	6.90	0.12014	0.99276	7.40	0.12880	0.99167
.41	.11164	.99375	.91	.12031	.99274	.41	.12897	.99165
.42	.11182	.99373	.92	.12049	.99271	.42	.12914	.99162
.43	.11199	.99371	.93	.12065	.99270	.43	.12931	.99161
.44	.11217	.99369	.94	.12083	.99267	.44	.12949	.99158
6.45	0.11234	0.99367	6.95	0.12100	0.99265	7.45	0.12966	0.99156
.46	.11251	.99365	.96	.12117	.99263	.46	.12983	.99154
.47	.11269	.99363	.97	.12135	.99261	.47	.13001	.99151
.48	.11285	.99361	.98	.12152	.99259	.48	.13018	.99149
.49	.11303	.99359	.99	.12170	.99257	.49	.13036	.99146

表2. 正 弦、余 弦 函 数 表

7°	sin	cos	8°	sin	cos	8°	sin	cos
7.50	0.13053	0.99144	8.00	0.13917	0.99027	8.50	0.14781	0.98902
.51	.13070	.99142	.01	.13934	.99025	.51	.14798	.98899
.52	.13087	.99140	.02	.13952	.99022	.52	.14816	.98896
.53	.13104	.99138	.03	.13969	.99020	.53	.14832	.98894
.54	.13122	.99135	.04	.13987	.99017	.54	.14850	.98891
7.55	0.13139	0.99133	8.05	0.14004	0.99015	8.55	0.14867	0.98889
.56	.13156	.99131	.06	.14021	.99013	.56	.14884	.98886
.57	.13174	.99128	.07	.14039	.99010	.57	.14902	.98883
.58	.13191	.99126	.08	.14055	.99007	.58	.14919	.98881
.59	.13209	.99124	.09	.14073	.99004	.59	.14937	.98878
7.60	0.13226	0.99122	8.10	0.14090	0.99002	8.60	0.14954	0.98876
.61	.13243	.99120	.11	.14107	.99000	.61	.14971	.98873
.62	.13260	.99117	.12	.14125	.98997	.62	.14988	.98870
.63	.13277	.99115	.13	.14142	.98995	.63	.15005	.98868
.64	.13295	.99112	.14	.14160	.98992	.64	.15023	.98865
7.65	0.13312	0.99110	8.15	0.14177	0.98990	8.65	0.15040	0.98863
.66	.13329	.99108	.16	.14194	.98988	.66	.15057	.98860
.67	.13347	.99105	.17	.14211	.98985	.67	.15075	.98857
.68	.13364	.99103	.18	.14228	.98983	.68	.15091	.98855
.69	.13382	.99100	.19	.14246	.98980	.69	.15109	.98852
7.70	0.13399	0.99098	8.20	0.14263	0.98978	8.70	0.15126	0.98849
.71	.13416	.99096	.21	.14280	.98975	.71	.15143	.98847
.72	.13433	.99093	.22	.14298	.98972	.72	.15161	.98844
.73	.13450	.99092	.23	.14314	.98970	.73	.15178	.98842
.74	.13468	.99089	.24	.14332	.98967	.74	.15195	.98839
7.75	0.13485	0.99087	8.25	0.14349	0.98965	8.75	0.15212	0.98836
.76	.13502	.99085	.26	.14366	.98963	.76	.15229	.98834
.77	.13520	.99082	.27	.14384	.98960	.77	.15247	.98831
.78	.13537	.99080	.28	.14401	.98958	.78	.15264	.98828
.79	.13555	.99077	.29	.14419	.98955	.79	.15282	.98825
7.80	0.13572	0.99075	8.30	0.14436	0.98953	8.80	0.15299	0.98823
.81	.13589	.99073	.31	.14453	.98950	.81	.15316	.98820
.82	.13606	.99070	.32	.14470	.98947	.82	.15334	.98817
.83	.13623	.99068	.33	.14487	.98945	.83	.15350	.98815
.84	.13641	.99065	.34	.14505	.98942	.84	.15368	.98812
7.85	0.13658	0.99063	8.35	0.14522	0.98940	8.85	0.15385	0.98809
.86	.13675	.99061	.36	.14539	.98938	.86	.15402	.98807
.87	.13693	.99058	.37	.14557	.98935	.87	.15420	.98804
.88	.13710	.99056	.38	.14574	.98933	.88	.15436	.98801
.89	.13727	.99053	.39	.14591	.98929	.89	.15454	.98798
7.90	0.13744	0.99051	8.40	0.14608	0.98927	8.90	0.15471	0.98796
.91	.13761	.99049	.41	.14625	.98925	.91	.15488	.98793
.92	.13779	.99046	.42	.14643	.98922	.92	.15506	.98790
.93	.13796	.99044	.43	.14660	.98920	.93	.15523	.98788
.94	.13814	.99041	.44	.14678	.98917	.94	.15540	.98785
7.95	0.13831	0.99039	8.45	0.14695	0.98914	8.95	0.15557	0.98782
.96	.13848	.99037	.46	.14712	.98912	.96	.15574	.98780
.97	.13866	.99034	.47	.14729	.98909	.97	.15592	.98777
.98	.13883	.99032	.48	.14746	.98907	.98	.15609	.98774
.99	.13900	.99029	.49	.14764	.98904	.99	.15626	.98771

表2. 正 弦、余 弦 函 数 表

9°	sin	cos	9°	sin	cos	10°	sin	cos
9.00	0.15643	0.98769	9.50	0.16505	0.98629	10.00	0.17365	0.98481
.01	.15660	.98766	.51	.16522	.98626	.01	.17382	.98478
.02	.15678	.98763	.52	.16539	.98623	.02	.17399	.98475
.03	.15695	.98761	.53	.16556	.98620	.03	.17416	.98472
.04	.15713	.98758	.54	.16574	.98617	.04	.17434	.98469
9.05	0.15730	0.98755	9.55	0.16591	0.98614	10.05	0.17451	0.98466
.06	.15747	.98753	.56	.16608	.98611	.06	.17468	.98463
.07	.15764	.98750	.57	.16626	.98608	.07	.17485	.98460
.08	.15781	.98747	.58	.16642	.98605	.08	.17502	.98456
.09	.15799	.98744	.59	.16660	.98602	.09	.17520	.98453
9.10	0.15816	0.98741	9.60	0.16677	0.98600	10.10	0.17537	0.98450
.11	.15833	.98739	.61	.16694	.98597	.11	.17554	.98447
.12	.15851	.98736	.62	.16712	.98594	.12	.17571	.98444
.13	.15867	.98733	.63	.16728	.98591	.13	.17588	.98441
.14	.15885	.98730	.64	.16746	.98588	.14	.17606	.98438
9.15	0.15902	0.98728	9.65	0.16763	0.98585	10.15	0.17623	0.98435
.16	.15919	.98725	.66	.16780	.98582	.16	.17640	.98432
.17	.15937	.98722	.67	.16798	.98579	.17	.17657	.98429
.18	.15953	.98719	.68	.16814	.98576	.18	.17674	.98426
.19	.15971	.98716	.69	.16832	.98573	.19	.17691	.98423
9.20	0.15988	0.98714	9.70	0.16849	0.98570	10.20	0.17708	0.98420
.21	.16005	.98711	.71	.16866	.98567	.21	.17725	.98416
.22	.16023	.98708	.72	.16884	.98564	.22	.17743	.98413
.23	.16040	.98705	.73	.16900	.98562	.23	.17760	.98410
.24	.16057	.98702	.74	.16918	.98559	.24	.17777	.98407
9.25	0.16074	0.98700	9.75	0.16935	0.98556	10.25	0.17794	0.98404
.26	.16091	.98697	.76	.16952	.98553	.26	.17811	.98401
.27	.16109	.98694	.77	.16970	.98550	.27	.17829	.98398
.28	.16126	.98691	.78	.16986	.98547	.28	.17846	.98395
.29	.16143	.98688	.79	.17004	.98544	.29	.17863	.98392
9.30	0.16160	0.98686	9.80	0.17021	0.98541	10.30	0.17880	0.98389
.31	.16177	.98683	.81	.17038	.98538	.31	.17897	.98385
.32	.16195	.98680	.82	.17056	.98535	.32	.17915	.98382
.33	.16212	.98677	.83	.17072	.98532	.33	.17931	.98379
.34	.16229	.98674	.84	.17090	.98529	.34	.17949	.98376
9.35	0.16246	0.98671	9.85	0.17107	0.98526	10.35	0.17966	0.98373
.36	.16263	.98669	.86	.17124	.98523	.36	.17983	.98370
.37	.16281	.98666	.87	.17142	.98520	.37	.18001	.98367
.38	.16298	.98663	.88	.17158	.98517	.38	.18017	.98363
.39	.16316	.98660	.89	.17176	.98514	.39	.18035	.98360
9.40	0.16333	0.98657	9.90	0.17193	0.98511	10.40	0.18052	0.98357
.41	.16350	.98654	.91	.17210	.98508	.41	.18069	.98354
.42	.16367	.98651	.92	.17228	.98505	.42	.18087	.98351
.43	.16384	.98649	.93	.17244	.98502	.43	.18103	.98348
.44	.16402	.98646	.94	.17262	.98499	.44	.18121	.98345
9.45	0.16419	0.98643	9.95	0.17279	0.98496	10.45	0.18138	0.98341
.46	.16436	.98640	.96	.17296	.98493	.46	.18155	.98338
.47	.16453	.98637	.97	.17314	.98490	.47	.18172	.98335
.48	.16470	.98634	.98	.17330	.98487	.48	.18189	.98332
.49	.16488	.98631	.99	.17348	.98484	.49	.18206	.98329

表2. 正 弦、余 弦 函 数 表

10°	sin	cos	11°	sin	cos	11°	sin	cos
10.50	0.18223	0.98325	11.00	0.19081	0.98163	11.50	0.19937	0.97992
.51	.18240	.98322	.01	.19098	.98159	.51	.19954	.97989
.52	.18258	.98319	.02	.19115	.98156	.52	.19971	.97986
.53	.18275	.98316	.03	.19132	.98153	.53	.19988	.97982
.54	.18292	.98313	.04	.19150	.98150	.54	.20005	.97979
10.55	0.18309	0.98310	11.05	0.19167	0.98146	11.55	0.20022	0.97975
.56	.18326	.98306	.06	.19184	.98142	.56	.20039	.97971
.57	.18344	.98303	.07	.19201	.98139	.57	.20057	.97968
.58	.18361	.98300	.08	.19218	.98136	.58	.20073	.97964
.59	.18378	.98297	.09	.19235	.98133	.59	.20091	.97961
10.60	0.18395	0.98294	11.10	0.19252	0.98129	11.60	0.20108	0.97958
.61	.18412	.98290	.11	.19269	.98126	.61	.20125	.97954
.62	.18430	.98287	.12	.19287	.98123	.62	.20142	.97951
.63	.18446	.98284	.13	.19303	.98119	.63	.20159	.97947
.64	.18464	.98281	.14	.19321	.98116	.64	.20176	.97944
10.65	0.18481	0.98277	11.15	0.19338	0.98112	11.65	0.20193	0.97940
.66	.18498	.98274	.16	.19355	.98109	.66	.20210	.97936
.67	.18515	.98271	.17	.19372	.98106	.67	.20228	.97933
.68	.18532	.98268	.18	.19389	.98102	.68	.20244	.97929
.69	.18550	.98265	.19	.19406	.98099	.69	.20262	.97926
10.70	0.18567	0.98261	11.20	0.19423	0.98096	11.70	0.20279	0.97922
.71	.18584	.98258	.21	.19440	.98092	.71	.20296	.97918
.72	.18601	.98255	.22	.19458	.98089	.72	.20313	.97915
.73	.18618	.98251	.23	.19475	.98085	.73	.20330	.97911
.74	.18635	.98248	.24	.19492	.98082	.74	.20347	.97908
10.75	0.18652	0.98245	11.25	0.19509	0.98079	11.75	0.20364	0.97905
.76	.18669	.98242	.26	.19526	.98075	.76	.20381	.97901
.77	.18687	.98239	.27	.19544	.98072	.77	.20399	.97898
.78	.18704	.98235	.28	.19560	.98068	.78	.20415	.97894
.79	.18721	.98232	.29	.19578	.98065	.79	.20433	.97891
10.80	0.18738	0.98229	11.30	0.19595	0.98061	11.80	0.20450	0.97887
.81	.18755	.98225	.31	.19612	.98058	.81	.20467	.97883
.82	.18773	.98222	.32	.19629	.98055	.82	.20484	.97880
.83	.18789	.98219	.33	.19646	.98051	.83	.20500	.97876
.84	.18807	.98216	.34	.19663	.98048	.84	.20518	.97873
10.85	0.18824	0.98212	11.35	0.19680	0.98044	11.85	0.20535	0.97869
.86	.18841	.98209	.36	.19697	.98041	.86	.20552	.97865
.87	.18858	.98206	.37	.19715	.98038	.87	.20569	.97862
.88	.18875	.98202	.38	.19731	.98034	.88	.20586	.97858
.89	.18892	.98199	.39	.19749	.98031	.89	.20603	.97855
10.90	0.18909	0.98196	11.40	0.19766	0.98027	11.90	0.20620	0.97851
.91	.18926	.98192	.41	.19783	.98023	.91	.20637	.97847
.92	.18944	.98189	.42	.19800	.98020	.92	.20655	.97844
.93	.18961	.98186	.43	.19817	.98017	.93	.20671	.97840
.94	.18978	.98183	.44	.19834	.98014	.94	.20689	.97837
10.95	0.18995	0.98179	11.45	0.19851	0.98010	11.95	0.20706	0.97833
.96	.19012	.98176	.46	.19868	.98006	.96	.20723	.97829
.97	.19030	.98173	.47	.19886	.98003	.97	.20740	.97826
.98	.19046	.98169	.48	.19902	.97999	.98	.20757	.97822
.99	.19064	.98166	.49	.19920	.97996	.99	.20774	.97819

表2. 正弦、余弦函数表

12°	sin	cos	12°	sin	cos	13°	sin	cos
12.00	0.20791	0.97815	12.50	0.21644	0.97630	13.00	0.22495	0.97437
.01	.20808	.97811	.51	.21661	.97626	.01	.22512	.97433
.02	.20826	.97808	.52	.21678	.97622	.02	.22529	.97429
.03	.20842	.97804	.53	.21695	.97618	.03	.22546	.97425
.04	.20860	.97801	.54	.21712	.97615	.04	.22563	.97421
12.05	0.20877	0.97797	12.55	0.21729	0.97611	13.05	0.22580	0.97417
.06	.20894	.97793	.56	.21746	.97607	.06	.22597	.97413
.07	.20911	.97790	.57	.21764	.97603	.07	.22614	.97410
.08	.20927	.97785	.58	.21780	.97599	.08	.22631	.97405
.09	.20945	.97782	.59	.21797	.97596	.09	.22648	.97402
12.10	0.20962	0.97778	12.60	0.21814	0.97592	13.10	0.22665	0.97398
.11	.20979	.97774	.61	.21831	.97588	.11	.22682	.97394
.12	.20996	.97771	.62	.21849	.97584	.12	.22699	.97390
.13	.21013	.97767	.63	.21865	.97580	.13	.22716	.97385
.14	.21030	.97764	.64	.21882	.97577	.14	.22733	.97382
12.15	0.21047	0.97760	12.65	0.21899	0.97573	13.15	0.22750	0.97378
.16	.21064	.97756	.66	.21916	.97569	.16	.22767	.97374
.17	.21082	.97753	.67	.21934	.97565	.17	.22784	.97370
.18	.21098	.97749	.68	.21950	.97561	.18	.22801	.97366
.19	.21115	.97746	.69	.21968	.97557	.19	.22818	.97362
12.20	0.21132	0.97742	12.70	0.21985	0.97553	13.20	0.22835	0.97358
.21	.21149	.97738	.71	.22002	.97549	.21	.22852	.97354
.22	.21167	.97734	.72	.22019	.97546	.22	.22869	.97350
.23	.21183	.97730	.73	.22035	.97542	.23	.22886	.97346
.24	.21201	.97727	.74	.22053	.97538	.24	.22903	.97342
12.25	0.21218	0.97723	12.75	0.22070	0.97534	13.25	0.22920	0.97338
.26	.21235	.97719	.76	.22087	.97530	.26	.22937	.97334
.27	.21252	.97716	.77	.22104	.97527	.27	.22954	.97330
.28	.21269	.97712	.78	.22120	.97522	.28	.22971	.97326
.29	.21286	.97709	.79	.22138	.97519	.29	.22988	.97322
12.30	0.21303	0.97705	12.80	0.22155	0.97515	13.30	0.23005	0.97318
.31	.21320	.97701	.81	.22172	.97511	.31	.23022	.97314
.32	.21337	.97697	.82	.22189	.97507	.32	.23039	.97310
.33	.21354	.97693	.83	.22206	.97503	.33	.23056	.97305
.34	.21371	.97690	.84	.22223	.97500	.34	.23073	.97302
12.35	0.21388	0.97686	12.85	0.22240	0.97496	13.35	0.23090	0.97298
.36	.21405	.97682	.86	.22257	.97492	.36	.23107	.97294
.37	.21423	.97679	.87	.22274	.97488	.37	.23124	.97290
.38	.21439	.97674	.88	.22291	.97484	.38	.23140	.97285
.39	.21457	.97671	.89	.22308	.97479	.39	.23158	.97282
12.40	0.21474	0.97667	12.90	0.22325	0.97476	13.40	0.23175	0.97278
.41	.21491	.97663	.91	.22342	.97472	.41	.23192	.97274
.42	.21508	.97660	.92	.22359	.97469	.42	.23209	.97270
.43	.21524	.97656	.93	.22376	.97464	.43	.23226	.97265
.44	.21542	.97652	.94	.22393	.97461	.44	.23243	.97261
12.45	0.21559	0.97648	12.95	0.22410	0.97457	13.45	0.23260	0.97257
.46	.21576	.97644	.96	.22427	.97453	.46	.23277	.97253
.47	.21593	.97641	.97	.22444	.97449	.47	.23294	.97250
.48	.21610	.97637	.98	.22461	.97445	.48	.23310	.97245
.49	.21627	.97634	.99	.22478	.97441	.49	.23328	.97241

表2. 正 弦、余 弦 函 数 表

13°	sin	cos	14°	sin	cos	14°	sin	cos
13.50	0.23345	0.97237	14.00	0.24192	0.97030	14.50	0.25038	0.96815
.51	.23362	.97233	.01	.24209	.97026	.51	.25055	.96810
.52	.23379	.97229	.02	.24226	.97021	.52	.25072	.96806
.53	.23395	.97224	.03	.24243	.97017	.53	.25088	.96801
.54	.23412	.97221	.04	.24260	.97012	.54	.25105	.96797
13.55	0.23429	0.97217	14.05	0.24277	0.97008	14.55	0.25122	0.96793
.56	.23446	.97213	.06	.24294	.97004	.56	.25139	.96789
.57	.23464	.97209	.07	.24311	.97000	.57	.25157	.96785
.58	.23480	.97204	.08	.24327	.96995	.58	.25173	.96780
.59	.23497	.97200	.09	.24344	.96991	.59	.25190	.96775
13.60	0.23514	0.97196	14.10	0.24361	0.96987	14.60	0.25207	0.96771
.61	.23531	.97192	.11	.24378	.96983	.61	.25224	.96767
.62	.23548	.97188	.12	.24396	.96979	.62	.25241	.96763
.63	.23565	.97183	.13	.24412	.96974	.63	.25257	.96758
.64	.23582	.97180	.14	.24429	.96970	.64	.25274	.96753
13.65	0.23599	0.97176	14.15	0.24446	0.96966	14.65	0.25291	0.96749
.66	.23616	.97172	.16	.24463	.96962	.66	.25308	.96745
.67	.23633	.97168	.17	.24480	.96958	.67	.25326	.96740
.68	.23650	.97163	.18	.24497	.96953	.68	.25342	.96736
.69	.23667	.97159	.19	.24514	.96949	.69	.25359	.96731
13.70	0.23684	0.97155	14.20	0.24531	0.96945	14.70	0.25376	0.96727
.71	.23701	.97151	.21	.24548	.96940	.71	.25393	.96722
.72	.23718	.97147	.22	.24565	.96936	.72	.25410	.96718
.73	.23734	.97142	.23	.24581	.96931	.73	.25426	.96713
.74	.23752	.97138	.24	.24598	.96927	.74	.25443	.96709
13.75	0.23769	0.97134	14.25	0.24615	0.96923	14.75	0.25460	0.96705
.76	.23786	.97130	.26	.24632	.96919	.76	.25477	.96700
.77	.23803	.97126	.27	.24650	.96915	.77	.25494	.96696
.78	.23819	.97121	.28	.24666	.96910	.78	.25510	.96691
.79	.23836	.97117	.29	.24683	.96906	.79	.25528	.96687
13.80	0.23853	0.97113	14.30	0.24700	0.96902	14.80	0.25545	0.96682
.81	.23870	.97109	.31	.24717	.96897	.81	.25562	.96678
.82	.23888	.97105	.32	.24734	.96893	.82	.25579	.96673
.83	.23904	.97101	.33	.24750	.96888	.83	.25595	.96669
.84	.23921	.97097	.34	.24767	.96884	.84	.25612	.96664
13.85	0.23938	0.97093	14.35	0.24784	0.96880	14.85	0.25629	0.96660
.86	.23955	.97089	.36	.24801	.96876	.86	.25646	.96656
.87	.23972	.97085	.37	.24819	.96872	.87	.25663	.96651
.88	.23989	.97080	.38	.24835	.96867	.88	.25679	.96647
.89	.24006	.97076	.39	.24852	.96863	.89	.25696	.96642
13.90	0.24023	0.97072	14.40	0.24869	0.96858	14.90	0.25713	0.96638
.91	.24040	.97068	.41	.24886	.96854	.91	.25730	.96633
.92	.24057	.97064	.42	.24903	.96850	.92	.25747	.96629
.93	.24073	.97059	.43	.24919	.96845	.93	.25763	.96624
.94	.24091	.97055	.44	.24937	.96841	.94	.25781	.96620
13.95	0.24108	0.97051	14.45	0.24954	0.96837	14.95	0.25798	0.96615
.96	.24125	.97047	.46	.24971	.96832	.96	.25815	.96611
.97	.24142	.97043	.47	.24988	.96828	.97	.25832	.96607
.98	.24158	.97038	.48	.25004	.96823	.98	.25848	.96602
.99	.24175	.97034	.49	.25021	.96819	.99	.25865	.96597