

# 轮盘强度计算系数表

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一九七九年九月

## 目 录

前言.....	1	锥形盘轮 $t_1=0.710$ .....	109
锥形轮盘 $t_1=0.100$ .....	3	锥形轮盘 $t_1=0.720$ .....	112
锥形轮盘 $t_1=0.150$ .....	8	锥形轮盘 $t_1=0.730$ .....	115
锥形轮盘 $t_1=0.200$ .....	13	锥形轮盘 $t_1=0.740$ .....	118
锥形轮盘 $t_1=0.250$ .....	18	锥形轮盘 $t_1=0.750$ .....	121
锥形轮盘 $t_1=0.300$ .....	23	锥形轮盘 $t_1=0.760$ .....	124
锥形轮盘 $t_1=0.350$ .....	28	锥形轮盘 $t_1=0.770$ .....	127
锥形轮盘 $t_1=0.400$ .....	33	锥形轮盘 $t_1=0.780$ .....	129
锥形轮盘 $t_1=0.420$ .....	38	锥形轮盘 $t_1=0.790$ .....	131
锥形轮盘 $t_1=0.440$ .....	43	锥形轮盘 $t_1=0.800$ .....	133
锥形轮盘 $t_1=0.460$ .....	47	锥形轮盘 $t_1=0.810$ .....	135
锥形轮盘 $t_1=0.480$ .....	51	锥形轮盘 $t_1=0.820$ .....	137
锥形轮盘 $t_1=0.500$ .....	55	锥形轮盘 $t_1=0.830$ .....	139
锥形轮盘 $t_1=0.520$ .....	59	锥形轮盘 $t_1=0.840$ .....	141
锥形轮盘 $t_1=0.540$ .....	63	锥形轮盘 $t_1=0.850$ .....	142
锥形轮盘 $t_1=0.560$ .....	67	锥形轮盘 $t_1=0.860$ .....	144
锥形轮盘 $t_1=0.580$ .....	71	锥形轮盘 $t_1=0.870$ .....	145
锥形轮盘 $t_1=0.600$ .....	75	锥形轮盘 $t_1=0.880$ .....	147
锥形轮盘 $t_1=0.610$ .....	79	锥形轮盘 $t_1=0.890$ .....	148
锥形轮盘 $t_1=0.620$ .....	82	锥形轮盘 $t_1=0.900$ .....	149
锥形轮盘 $t_1=0.630$ .....	85	锥形轮盘 $t_1=0.910$ .....	150
锥形轮盘 $t_1=0.640$ .....	88	锥形轮盘 $t_1=0.920$ .....	150
锥形轮盘 $t_1=0.650$ .....	91	锥形轮盘 $t_1=0.930$ .....	151
锥形轮盘 $t_1=0.660$ .....	94	锥形轮盘 $t_1=0.940$ .....	152
锥形轮盘 $t_1=0.670$ .....	97	锥形轮盘 $t_1=0.950$ .....	152
锥形轮盘 $t_1=0.680$ .....	100	锥形轮盘 $t_1=0.960$ .....	152
锥形轮盘 $t_1=0.690$ .....	103	等厚度轮盘.....	153
锥形轮盘 $t_1=0.700$ .....	106		

关于涡轮机械轮盘（无侧向负荷和有侧向负荷的）计标，李斯（В.Ф.Рис）所著一书（1）中提出以简单线性应力方程为基础的递推标式。对于等厚度轮盘

$$\begin{cases} \sigma_r = \alpha_r \cdot \sigma_{r_1} + \alpha_t \cdot \sigma_{t_1} + \left( \alpha_c a + \alpha_s \cdot \frac{h}{D} \right) T; & a = 1 + \frac{D_2 S_2 - D_1 S_1}{D_2 - D_1} \\ \sigma_t = \beta_r \cdot \sigma_{r_1} + \beta_t \cdot \sigma_{t_1} + \left( \beta_c a + \beta_s \cdot \frac{h}{D} \right) T; & h = \frac{S_1 - S_2}{D_2 - D_1} D_2 D_1 \end{cases}$$

对于锥形轮盘

$$\begin{cases} \sigma_r = \alpha_r \cdot \sigma_{r_1} + \alpha_t \cdot \sigma_{t_1} + (\alpha_c' a + \alpha_s' h) T_d; \\ \sigma_t = \beta_r \cdot \sigma_{r_1} + \beta_t \cdot \sigma_{t_1} + (\beta_c' a + \beta_s' h) T_d; \end{cases}$$

式中：

$$T = \left( \frac{D}{100} \times \frac{n}{1000} \right)^2; \quad a = 1 + \frac{D_2 S_1 - D_1 S_2}{D_2 - D_1}$$

$$T_d = \left( \frac{d}{100} \times \frac{n}{1000} \right)^2; \quad h = \frac{S_2 - S_1}{D_2 - D_1} d$$

其中  $D=2r$ ,  $d=2R$  各表示计标直径及完全锥体的直径（厘米）。 $n$  是轮盘每分钟转数。无侧向轮盘时， $a=1$ ,  $h=0$ 。

以上标式告诉我们，如果已知在任意（起始的）半径  $r_1$  处应力  $\sigma_{r_1}$  和  $\sigma_{t_1}$  就能确定整个轮盘的应力分布情况。

对于标式中系数  $\alpha$  和  $\beta$ ，在（1）中给出了图表。但在使用中不太方便。我们通过 X-2 电子计标机计标，将这些系数列成表值，以供查用，考虑到表格篇幅，这里只列出等厚度和锥形轮盘两种系数表。篇末附有计标实例。

等厚度轮盘系数标式，可从（1）中查到。当引进符号  $W_k, W_k(t_1) = W_{k_1}$  后锥形轮盘系数计标公式可表达如下：

$$\begin{cases} \alpha_r = \Delta(P_A \cdot q_{B_1} - P_B \cdot q_{A_1}); \\ \alpha_t = \Delta(P_{A_1} \cdot P_B - P_A \cdot P_{B_1}); \\ \alpha_c' = \eta(P_c - \alpha_r P_{c_1} - \alpha_t q_{c_1}); \\ \alpha_s' = \eta(P_s - \alpha_r P_{s_1} - \alpha_t q_{s_1}); \\ \beta_r = \Delta(q_A \cdot q_{B_1} - q_{A_1} \cdot q_B); \\ \beta_t = \Delta(P_{A_1} \cdot q_B - P_{B_1} \cdot q_A); \\ \beta_c' = \eta(q_c - \beta_r \cdot P_{c_1} - \beta_t q_{c_1}); \\ \beta_s' = \eta(q_s - \beta_r \cdot P_{s_1} - \beta_t \cdot q_{s_1}); \end{cases}$$

式中：  $\Delta = \frac{1}{P_{A_1} \cdot q_{B_1} - P_{B_1} \cdot q_{A_1}}$ ； $\eta$  是与参数有关之常数。

如果引进  $t_1 = \frac{D_1}{d}$  和  $t = \frac{D}{d}$ ，则我们取的标式是：

$$P_A = \sum_{n=1}^{\infty} (n + \mu) a_n t^{n-1};$$

$$q_A = \sum_{n=1}^{\infty} (n\mu + 1) a_n t^{n-1};$$

式中系数

$$\begin{cases} a_1=1 \\ a_n = \left(1 - \frac{n-\mu}{n^2-1}\right) a_{n-1} \quad (n=2,3,\dots) \end{cases}$$

$$P_B = \sum_{n=0}^{\infty} \left( \frac{\mu(1-t)}{t} - n \right) b_n (1-t)^{n-1};$$

$$q_B = \sum_{n=0}^{\infty} \left( \frac{1-t}{t} - n\mu \right) b_n (1-t)^{n-1};$$

式中系数

$$\begin{cases} b_0=1 \\ b_1=\mu \\ b_n = \frac{1}{n^2} \{ (n-1)(2n-1) + \mu \} b_{n-1} - \{ (n-1)^2 - n + \mu \} b_{n-2}; \end{cases}$$

$$P_c = \frac{3(3+\mu)}{(11+\mu)(5+\mu)} + \frac{(2+\mu)(3+\mu)}{(11+\mu)(5+\mu)} t - \frac{3+\mu}{11+\mu} t^2;$$

$$q_c = \frac{3(3+\mu)}{(11+\mu)(5+\mu)} + \frac{(1+2\mu)(3+\mu)}{(11+\mu)(5+\mu)} t - \frac{1+3\mu}{11+\mu} t^2;$$

$$P_s = \frac{24(4+\mu)}{(19+\mu)(11+\mu)(5+\mu)} + \frac{8(4+\mu)(2+\mu)}{(19+\mu)(11+\mu)(5+\mu)} t \\ + \frac{(4+\mu)(3+\mu)}{(19+\mu)(11+\mu)} t^2 - \frac{4+\mu}{19+\mu} t^3;$$

$$q_s = \frac{24(4+\mu)}{(19+\mu)(11+\mu)(5+\mu)} + \frac{8(4+\mu)(1+\mu)}{(19+\mu)(11+\mu)(5+\mu)} t \\ + \frac{(4+\mu)(1+3\mu)}{(19+\mu)(11+\mu)} t^2 - \frac{1+4\mu}{19+\mu} t^3;$$

本表值是在泊桑系数  $\mu=0.3$ ，重力加速度  $g=9.81$  米/秒<sup>2</sup> 以及取轮盘材料比重  $r=7.85$  克/厘米<sup>3</sup> 下计标的，此时系数  $\eta=219.38$ 。至于当要计标别种材料制成的轮盘，则表中值应相应乘以因子  $\frac{r}{7.85}$ 。

由于我们水平有限，作此初次尝试，不足之处，请指正。

参考文献：

В.Ф.Рис, "Расчет дисков тубомашин" Ташгиз. 1959. (有中译本)。

锥形轮盘  $t_1=0.100$

$t$	$\alpha_c$	$\alpha_s$	$-\alpha_c'$	$-\alpha_s'$	$\beta_c$	$\beta_s$	$-\beta_c'$	$-\beta_s'$
0.100	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
0.110	0.9236	0.0873	0.2246	0.0236	0.0903	0.9134	0.0765	0.0080
0.120	0.8669	0.1546	0.4618	0.0510	0.1602	0.8479	0.1723	0.0189
0.130	0.8240	0.2079	0.7140	0.0828	0.2156	0.7973	0.2853	0.0327
0.140	0.7912	0.2511	0.9831	0.1195	0.2605	0.7575	0.4140	0.0495
0.150	0.7659	0.2868	1.2702	0.1617	0.2977	0.7259	0.5575	0.0694
0.160	0.7463	0.3169	1.5764	0.2099	0.3289	0.7005	0.7153	0.0926
0.170	0.7311	0.3427	1.9024	0.2646	0.3556	0.6798	0.8869	0.1193
0.180	0.7195	0.3651	2.2488	0.3262	0.3787	0.6630	1.0722	0.1497
0.190	0.7106	0.3849	2.6164	0.3952	0.3989	0.6492	1.2710	0.1840
0.200	0.7040	0.4026	3.0056	0.4723	0.4169	0.6379	1.4833	0.2225
0.210	0.6994	0.4186	3.4170	0.5577	0.4330	0.6286	1.7090	0.2653
0.220	0.6963	0.4333	3.8510	0.6522	0.4477	0.6209	1.9483	0.3127
0.230	0.6946	0.4469	4.3082	0.7561	0.4611	0.6147	2.2012	0.3649
0.240	0.6940	0.4595	4.7890	0.8701	0.4735	0.6098	2.4679	0.4223
0.250	0.6944	0.4715	5.2940	0.9946	0.4850	0.6058	2.7484	0.4850
0.260	0.6957	0.4829	5.8236	1.1302	0.4958	0.6027	3.0430	0.5534
0.270	0.6978	0.4938	6.3784	1.2776	0.5060	0.6005	3.3518	0.6276
0.280	0.7006	0.5044	6.9590	1.4371	0.5158	0.5989	3.6751	0.7081
0.290	0.7040	0.5146	7.5659	1.6096	0.5251	0.5979	4.0130	0.7950
0.300	0.7081	0.5246	8.1997	1.7955	0.5341	0.5975	4.3659	0.8887
0.310	0.7127	0.5345	8.8610	1.9955	0.5428	0.5975	4.7339	0.9894
0.320	0.7178	0.5442	9.5507	2.2103	0.5513	0.5980	5.1174	1.0975
0.330	0.7234	0.5539	10.269	2.4405	0.5595	0.5989	5.5166	1.2134
0.340	0.7294	0.5635	11.017	2.6868	0.5677	0.6002	5.9318	1.3372
0.350	0.7359	0.5731	11.795	2.9500	0.5757	0.6019	6.3635	1.4694
0.360	0.7429	0.5828	12.605	3.2307	0.5836	0.6039	6.8120	1.6104
0.370	0.7503	0.5925	13.447	3.5298	0.5915	0.6062	7.2776	1.7605
0.380	0.7581	0.6023	14.322	3.8480	0.5994	0.6088	7.7607	1.9200
0.390	0.7664	0.6123	15.232	4.1863	0.6072	0.6117	8.2619	2.0894
0.400	0.7751	0.6224	16.176	4.5454	0.6151	0.6148	8.7815	2.2691
0.405	0.7796	0.6275	16.662	4.7331	0.6190	0.6165	9.0484	2.3629
0.410	0.7842	0.6326	17.156	4.9263	0.6230	0.6183	9.3201	2.4594
0.415	0.7890	0.6379	17.661	5.1252	0.6269	0.6201	9.5966	2.5587
0.420	0.7938	0.6431	18.175	5.3300	0.6309	0.6220	9.8781	2.6609
0.425	0.7988	0.6484	18.698	5.5406	0.6349	0.6239	10.164	2.7660
0.430	0.8039	0.6538	19.231	5.7573	0.6390	0.6259	10.456	2.8740
0.435	0.8091	0.6593	19.775	5.9802	0.6430	0.6280	10.752	2.9850
0.440	0.8144	0.6648	20.328	6.2095	0.6471	0.6301	11.054	3.0992
0.445	0.8198	0.6704	20.892	6.4452	0.6512	0.6324	11.362	3.2164
0.450	0.8253	0.6760	21.467	6.6875	0.6553	0.6346	11.674	3.3369
0.455	0.8310	0.6817	22.052	6.9366	0.6594	0.6370	11.993	3.4607
0.460	0.8368	0.6875	22.649	7.1926	0.6636	0.6394	12.316	3.5878
0.465	0.8428	0.6934	23.256	7.4557	0.6679	0.6418	12.646	3.7183
0.470	0.8488	0.6994	23.875	7.7260	0.6721	0.6444	12.981	3.8523
0.475	0.8550	0.7054	24.506	8.0037	0.6764	0.6470	13.322	3.9898

锥形轮盘  $t_1=0.100$ 

$t$	$\alpha_r$	$\alpha_s$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_s$	$-\beta_c'$	$-\beta_s'$
0.480	0.8613	0.7116	25.149	8.2890	0.6809	0.6496	13.669	4.1310
0.485	0.8679	0.7178	25.804	8.5820	0.6852	0.6524	14.022	4.2759
0.490	0.8744	0.7242	26.471	8.8830	0.6896	0.6552	14.382	4.4247
0.495	0.8812	0.7306	27.151	9.1920	0.6941	0.6580	14.747	4.5772
0.500	0.8881	0.7372	27.844	9.5093	0.6986	0.6610	15.119	4.7338
0.505	0.8952	0.7438	28.550	9.8352	0.7032	0.6640	15.498	4.8944
0.510	0.9024	0.7506	29.270	10.160	0.7078	0.6671	15.883	5.0591
0.515	0.9098	0.7575	30.004	10.513	0.7125	0.6702	16.275	5.2281
0.520	0.9173	0.7646	30.752	10.865	0.7173	0.6734	16.674	5.4013
0.525	0.9250	0.7717	31.515	11.227	0.7221	0.6767	17.081	5.5790
0.530	0.9329	0.7790	32.293	11.599	0.7270	0.6801	17.494	5.7613
0.535	0.9410	0.7864	33.086	11.980	0.7320	0.6836	17.915	5.9481
0.540	0.9493	0.7940	33.895	12.372	0.7370	0.6871	18.343	6.1397
0.545	0.9577	0.8017	34.719	12.774	0.7421	0.6907	18.779	6.3362
0.550	0.9663	0.8096	35.561	13.186	0.7472	0.6944	19.223	6.5376
0.555	0.9752	0.8176	36.419	13.609	0.7525	0.6982	19.676	6.7441
0.560	0.9842	0.8258	37.295	14.044	0.7578	0.7021	20.136	6.9559
0.565	0.9935	0.8342	38.189	14.490	0.7633	0.7061	20.605	7.1729
0.570	1.0030	0.8427	39.102	14.948	0.7688	0.7101	21.082	7.3954
0.575	1.0127	0.8514	40.033	15.418	0.7744	0.7143	21.569	7.6236
0.580	1.0227	0.8604	40.984	15.901	0.7801	0.7185	22.065	7.8575
0.585	1.0329	0.8695	41.955	16.396	0.7859	0.7229	22.570	8.0973
0.590	1.0434	0.8788	42.947	16.905	0.7918	0.7273	23.084	8.3432
0.595	1.0541	0.8883	43.961	17.427	0.7978	0.7319	23.609	8.5952
0.600	1.0651	0.8981	44.996	17.964	0.8039	0.7365	24.144	8.8538
0.602	1.0696	0.9021	45.417	18.182	0.8063	0.7384	24.361	8.9590
0.604	1.0741	0.9061	45.841	18.403	0.8088	0.7403	24.579	9.0653
0.606	1.0787	0.9101	46.269	18.626	0.8114	0.7423	24.799	9.1726
0.608	1.0833	0.9142	46.701	18.852	0.8139	0.7442	25.021	9.2811
0.610	1.0879	0.9183	47.137	19.080	0.8164	0.7462	25.245	9.3906
0.612	1.0927	0.9225	47.576	19.311	0.8190	0.7482	25.471	9.5013
0.614	1.0974	0.9267	48.020	19.544	0.8216	0.7502	25.698	9.6131
0.616	1.1022	0.9310	48.467	19.779	0.8242	0.7522	25.927	9.7260
0.618	1.1071	0.9353	48.919	20.017	0.8269	0.7542	26.158	9.8401
0.620	1.1120	0.9396	49.374	20.258	0.8295	0.7563	26.391	9.9553
0.622	1.1170	0.9440	49.834	20.502	0.8322	0.7584	26.625	10.071
0.624	1.1220	0.9484	50.298	20.748	0.8349	0.7605	26.862	10.189
0.626	1.1271	0.9528	50.767	20.996	0.8376	0.7626	27.100	10.308
0.628	1.1322	0.9574	51.239	21.248	0.8404	0.7648	27.341	10.428
0.630	1.1374	0.9619	51.717	21.502	0.8431	0.7669	27.583	10.549
0.632	1.1426	0.9665	52.198	21.759	0.8459	0.7691	27.827	10.671
0.634	1.1479	0.9712	52.684	22.019	0.8487	0.7713	28.074	10.795
0.636	1.1533	0.9759	53.175	22.282	0.8516	0.7736	28.322	10.920
0.638	1.1587	0.9806	53.670	22.547	0.8544	0.7758	28.573	11.047
0.640	1.1642	0.9854	54.171	22.816	0.8573	0.7781	28.826	11.174

锥形轮盘  $t_1=0.100$

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.642	1.1697	0.9903	54.676	23.087	0.8602	0.7804	29.080	11.303
0.644	1.1753	0.9952	55.185	23.362	0.8632	0.7827	29.337	11.434
0.646	1.1810	1.0001	55.700	23.640	0.8661	0.7851	29.597	11.565
0.648	1.1867	1.0051	56.220	23.921	0.8691	0.7875	29.858	11.698
0.650	1.1925	1.0102	56.745	24.205	0.8721	0.7899	30.122	11.833
0.652	1.1984	1.0153	57.275	24.492	0.8752	0.7923	30.387	11.969
0.654	1.2043	1.0205	57.811	24.782	0.8783	0.7947	30.656	12.106
0.656	1.2103	1.0258	58.351	25.076	0.8814	0.7972	30.926	12.245
0.658	1.2164	1.0311	58.898	25.373	0.8845	0.7997	31.199	12.385
0.660	1.2225	1.0364	59.449	25.674	0.8876	0.8022	31.475	12.527
0.662	1.2287	1.0418	60.007	25.978	0.8908	0.8048	31.752	12.670
0.664	1.2350	1.0473	60.570	26.285	0.8940	0.8073	32.033	12.815
0.666	1.2414	1.0528	61.139	26.597	0.8973	0.8100	32.315	12.961
0.668	1.2478	1.0585	61.713	26.911	0.9006	0.8126	32.601	13.109
0.670	1.2543	1.0641	62.294	27.230	0.9039	0.8153	32.889	13.259
0.672	1.2609	1.0699	62.881	27.552	0.9072	0.8179	33.179	13.410
0.674	1.2676	1.0757	63.474	27.878	0.9106	0.8207	33.472	13.562
0.676	1.2744	1.0816	64.073	28.208	0.9140	0.8234	33.768	13.717
0.678	1.2812	1.0875	64.679	28.541	0.9175	0.8262	34.067	13.873
0.680	1.2881	1.0935	65.291	28.879	0.9209	0.8290	34.368	14.031
0.682	1.2952	1.0996	65.910	29.221	0.9244	0.8319	34.673	14.190
0.684	1.3023	1.1058	66.535	29.567	0.9280	0.8347	34.980	14.352
0.686	1.3095	1.1120	67.168	29.917	0.9316	0.8376	35.290	14.515
0.688	1.3167	1.1184	67.807	30.271	0.9352	0.8406	35.603	14.680
0.690	1.3241	1.1248	68.453	30.630	0.9389	0.8436	35.919	14.846
0.992	1.3316	1.1312	68.107	30.993	0.9426	0.8466	36.238	15.015
0.694	1.3392	1.1378	69.768	31.360	0.9463	0.8496	36.561	15.186
0.696	1.3468	1.1444	70.437	31.732	0.9501	0.8527	36.886	15.358
0.698	1.3546	1.1512	71.113	32.108	0.9539	0.8558	37.215	15.533
0.700	1.3625	1.1580	71.797	32.490	0.9578	0.8590	37.547	15.709
0.702	1.3705	1.1649	72.489	32.876	0.9617	0.8621	37.882	15.887
0.704	1.3785	1.1719	73.189	33.267	0.9656	0.8654	38.221	16.068
0.706	1.3867	1.1790	73.897	33.663	0.9696	0.8686	38.563	16.250
0.708	1.3950	1.1862	74.614	34.064	0.9736	0.8719	38.908	16.435
0.710	1.4035	1.1935	75.339	34.470	0.9777	0.8753	39.257	16.622
0.712	1.4120	1.2009	76.073	34.881	0.9818	0.8787	39.610	16.811
0.714	1.4207	1.2084	76.815	35.297	0.9860	0.8821	39.967	17.002
0.716	1.4294	1.2159	77.567	35.719	0.9902	0.8856	40.327	17.196
0.718	1.4383	1.2236	78.328	36.147	0.9945	0.8891	40.691	17.392
0.720	1.4474	1.2314	79.099	36.580	0.9988	0.8926	41.059	17.590
0.722	1.4565	1.2393	79.879	37.019	1.0032	0.8962	41.431	17.791
0.724	1.4658	1.2474	80.669	37.464	1.0076	0.8999	41.807	17.994
0.726	1.4752	1.2555	81.468	37.914	1.0121	0.9036	42.187	18.199
0.728	1.4848	1.2638	82.279	38.371	1.0166	0.9073	42.571	18.407
0.730	1.4945	1.2721	83.099	38.834	1.0212	0.9111	42.960	18.618

锥形轮盘  $t_1=0.100$

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.732	1.5044	1.2806	83.930	39.303	1.0259	0.9150	43.353	18.831
0.734	1.5143	1.2892	84.772	39.779	1.0306	0.9189	43.750	19.046
0.736	1.5245	1.2980	85.626	40.261	1.0352	0.9228	44.152	19.265
0.738	1.5348	1.3069	86.490	40.750	1.0402	0.9268	44.559	19.488
0.740	1.5452	1.3159	87.367	41.246	1.0451	0.9308	44.970	19.710
0.742	1.5559	1.3250	88.255	41.749	1.0500	0.9350	45.386	19.937
0.744	1.5666	1.3343	89.155	42.259	1.0550	0.9391	45.807	20.167
0.746	1.5776	1.3438	90.068	42.776	1.0601	0.9433	46.233	20.400
0.748	1.5887	1.3533	90.993	43.301	1.0652	0.9476	46.664	20.636
0.750	1.6000	1.3631	91.932	43.833	1.0705	0.9519	47.100	20.874
0.752	1.6115	1.3730	92.883	44.374	1.0758	0.9563	47.542	21.117
0.754	1.6231	1.3830	93.849	44.922	1.0811	0.9608	47.989	21.362
0.756	1.6350	1.3932	94.828	45.478	1.0865	0.9653	48.441	21.610
0.758	1.6471	1.4036	95.821	46.043	1.0921	0.9699	48.899	21.862
0.760	1.6593	1.4141	96.829	46.616	1.0976	0.9746	49.364	22.118
0.762	1.6718	1.4248	97.852	47.198	1.1033	0.9793	49.833	22.376
0.764	1.6844	1.4357	98.891	47.788	1.1091	0.9841	50.310	22.639
0.766	1.6973	1.4468	99.944	48.388	1.1149	0.9890	50.792	22.905
0.768	1.7104	1.4581	101.01	48.997	1.1208	0.9930	51.281	23.174
0.770	1.7237	1.4695	102.10	49.616	1.1268	0.9988	51.776	23.448
0.772	1.7373	1.4812	103.20	50.245	1.1329	1.0040	52.277	23.725
0.774	1.7511	1.4930	104.32	50.883	1.1391	1.0092	52.786	24.007
0.776	1.7651	1.5051	105.46	51.532	1.1454	1.0145	53.302	24.292
0.778	1.7794	1.5174	106.62	52.192	1.1517	1.0198	53.824	24.582
0.780	1.7939	1.5299	107.79	52.862	1.1582	1.0252	54.354	24.876
0.782	1.8087	1.5426	108.99	53.543	1.1648	1.0307	54.892	25.174
0.784	1.8238	1.5556	110.20	54.236	1.1715	1.0363	55.437	25.476
0.786	1.8392	1.5688	111.44	54.940	1.1782	1.0420	55.990	25.784
0.788	1.8549	1.5822	112.69	55.657	1.1851	1.0478	56.551	26.096
0.790	1.8708	1.5959	113.97	56.385	1.1921	1.0537	57.120	26.412
0.792	1.8870	1.6099	115.27	57.127	1.1993	1.0597	57.698	26.734
0.794	1.9036	1.6241	116.59	57.881	1.2065	1.0658	58.285	27.061
0.796	1.9205	1.6386	117.94	58.649	1.2139	1.0719	58.880	27.392
0.798	1.9377	1.6534	119.31	59.430	1.2213	1.0782	59.485	27.729
0.800	1.9553	1.6685	120.70	60.226	1.2290	1.0847	60.099	28.072
0.802	1.9732	1.6839	122.12	61.035	1.2367	1.0912	60.723	28.420
0.804	1.9915	1.6995	123.56	61.860	1.2446	1.0978	61.357	28.774
0.806	2.0101	1.7155	125.04	62.701	1.2526	1.1046	62.001	29.134
0.808	2.0292	1.7319	126.54	63.557	1.2608	1.1115	62.655	29.499
0.810	2.0486	1.7488	128.07	64.429	1.2691	1.1185	63.321	29.871
0.812	2.0685	1.7656	129.62	65.319	1.2776	1.1256	63.997	30.250
0.814	2.0887	1.7830	131.21	66.225	1.2862	1.1329	64.685	30.635
0.816	2.1094	1.8007	132.83	67.150	1.2950	1.1403	65.385	31.026
0.818	2.1306	1.8189	134.49	68.092	1.3040	1.1479	66.097	31.425
0.820	2.1522	1.8374	136.17	69.054	1.3131	1.1556	66.822	31.831



锥形轮盘  $t_1=0.100$ 

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.822	2.1743	1.8564	137.90	70.036	1.3224	1.1635	67.559	32.244
0.824	2.1969	1.8758	139.65	71.037	1.3319	1.1715	68.310	32.665
0.826	2.2201	1.8956	141.45	72.060	1.3416	1.1797	69.075	33.094
0.828	2.2437	1.9159	143.28	73.104	1.3515	1.1880	69.854	33.530
0.830	2.2679	1.9367	145.15	74.171	1.3616	1.1966	70.647	33.975
0.832	2.2927	1.9579	147.06	75.260	1.3718	1.2053	71.456	34.420
0.834	2.3181	1.9797	149.02	76.374	1.3824	1.2142	72.281	34.892
0.836	2.3441	2.0019	151.02	77.512	1.3931	1.2232	73.121	35.363
0.838	2.3707	2.0248	153.06	78.676	1.4041	1.2325	73.979	35.845
0.840	2.3980	2.0482	155.16	79.867	1.4153	1.2420	74.853	36.336
0.842	2.4260	2.0721	157.30	81.085	1.4267	1.2517	75.746	36.837
0.844	2.4547	2.0967	159.49	82.332	1.4384	1.2617	76.658	37.348
0.846	2.4842	2.1220	161.74	83.509	1.4504	1.2718	77.588	37.871
0.848	2.5144	2.1478	164.04	84.916	1.4627	1.2822	78.539	38.405
0.850	2.5454	2.1744	166.40	89.255	1.4752	1.2929	79.510	37.950
0.855	2.6266	2.2440	172.56	89.752	1.5080	1.3206	82.034	40.368
0.860	2.7136	2.3185	179.13	93.479	1.5427	1.3502	84.706	41.868
0.865	2.8071	2.3985	186.16	97.461	1.5798	1.3816	87.542	43.461
0.870	2.9076	2.4847	193.69	101.72	1.6194	1.4153	90.559	45.154
0.875	3.0162	2.5777	201.80	106.30	1.6618	1.4514	93.778	46.961
0.880	3.1338	2.6783	210.55	111.24	1.7074	1.4901	97.221	48.893
0.885	3.2616	2.7877	220.02	116.58	1.7565	1.5319	100.91	50.966
0.890	3.4009	2.9070	230.31	122.38	1.8096	1.5772	104.90	53.197
0.895	3.5535	3.0375	241.54	128.69	1.8673	1.6263	109.20	55.610
0.900	3.7212	3.1811	253.85	135.60	1.9303	1.6799	113.88	58.227
0.905	3.9066	3.3397	267.41	143.20	1.9992	1.7387	118.99	61.082
0.910	4.1125	3.5159	282.42	151.61	2.0751	1.8034	124.59	64.210
0.915	4.3425	3.7127	299.15	160.96	2.1591	1.8751	130.77	67.658
0.920	4.6012	3.9340	317.90	171.43	2.2527	1.9550	137.63	71.483
0.925	4.8942	4.1848	339.10	183.24	2.3578	2.0447	145.30	75.757
0.930	5.2291	4.4713	363.25	196.68	2.4768	2.1463	153.96	80.573
0.935	5.6153	4.8017	391.04	212.13	2.6127	2.2623	163.82	86.050
0.940	6.0658	5.1870	423.38	230.08	2.7697	2.3964	175.16	92.349
0.945	6.5980	5.6423	461.51	251.21	2.9532	2.5532	188.40	99.685
0.950	7.2365	6.1885	507.16	276.49	3.1712	2.7395	204.07	108.39
0.955	8.0167	6.8558	562.83	307.27	3.4347	2.9647	222.96	118.81
0.960	8.9917	7.6898	632.30	345.64	3.7604	3.2431	246.25	131.68
0.965	10.244	8.7617	721.46	394.83	4.1744	3.5970	275.80	147.99
0.970	11.915	10.190	840.15	460.25	4.7199	4.0634	314.66	169.41
0.975	14.253	12.190	1006.0	551.64	5.4745	4.7086	368.30	198.97

锥形轮盘  $t_1=0.150$ 

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.150	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
0.160	0.9507	0.0609	0.3348	0.0519	0.0643	0.9396	0.1098	0.0170
0.170	0.9110	0.1121	0.6826	0.1094	0.1184	0.8897	0.2404	0.0384
0.180	0.8789	0.1557	1.0457	0.1732	0.1647	0.8483	0.3901	0.0642
0.190	0.8527	0.1933	1.4255	0.2439	0.2047	0.8134	0.5575	0.0945
0.200	0.8314	0.2261	1.8236	0.3221	0.2396	0.7840	0.7419	0.1293
0.210	0.8140	0.2550	2.2408	0.4084	0.2704	0.7591	0.9424	0.1689
0.220	0.8080	0.2808	2.6783	0.5033	0.2978	0.7377	1.1588	0.2133
0.230	0.7887	0.3039	3.1369	0.6074	0.3224	0.7195	1.3907	0.2629
0.240	0.7799	0.3249	3.6174	0.7214	0.3446	0.7038	1.6376	0.3177
0.250	0.7729	0.3442	4.1204	0.8457	0.3649	0.6904	1.9001	0.3781
0.260	0.7677	0.3619	4.6467	0.9810	0.3835	0.6788	2.1774	0.4443
0.270	0.7640	0.3784	5.1970	1.1277	0.4007	0.6689	2.4699	0.5164
0.280	0.7617	0.3938	5.7719	1.2866	0.4168	0.6603	2.7776	0.5948
0.290	0.7605	0.4084	6.3722	1.4583	0.4318	0.6531	3.1005	0.6798
0.300	0.7604	0.4223	6.9984	1.6432	0.4459	0.6469	3.4388	0.7717
0.310	0.7612	0.4355	7.6513	1.8422	0.4593	0.6417	3.7927	0.8706
0.320	0.7629	0.4482	8.3317	2.0558	0.4720	0.6373	4.1625	0.9770
0.330	0.7655	0.4605	9.0401	2.2847	0.4842	0.6338	4.5481	1.0911
0.340	0.7687	0.4725	9.7774	2.5297	0.4960	0.6309	4.9501	1.2132
0.350	0.7727	0.4842	10.544	2.7914	0.5073	0.6287	5.3686	1.3438
0.360	0.7773	0.4957	11.342	3.0706	0.5183	0.6271	5.8040	1.4831
0.370	0.7826	0.5076	12.171	3.3681	0.5290	0.6261	6.2566	1.6315
0.380	0.7885	0.5182	13.032	3.6846	0.5395	0.6255	6.7268	1.7893
0.390	0.7949	0.5294	13.927	4.0210	0.5497	0.6254	7.2149	1.9571
0.400	0.8019	0.5405	14.856	4.3782	0.5599	0.6258	7.7215	2.1351
0.405	0.8057	0.5461	15.334	4.5649	0.5649	0.6261	7.9818	2.2280
0.410	0.8095	0.5517	15.821	4.7571	0.5699	0.6265	8.2469	2.3237
0.415	0.8135	0.5573	16.317	4.9549	0.5748	0.6271	8.5168	2.4222
0.420	0.8177	0.5629	16.822	5.1587	0.5798	0.6277	8.7917	2.5236
0.425	0.8220	0.5685	17.337	5.3682	0.5847	0.6285	9.0715	2.6278
0.430	0.8264	0.5742	17.862	5.5838	0.5897	0.6293	9.3564	2.7349
0.435	0.8310	0.5799	18.396	5.8056	0.5946	0.6302	9.6463	2.8451
0.440	0.8357	0.5856	18.940	6.0336	0.5995	0.6312	9.9415	2.9584
0.445	0.8405	0.5914	19.495	6.2682	0.6044	0.6323	10.242	3.0748
0.450	0.8455	0.5972	20.060	6.5093	0.6094	0.6335	10.547	3.1944
0.455	0.8507	0.6030	20.636	6.7572	0.6143	0.6347	10.859	3.3173
0.460	0.8559	0.6089	21.222	7.0119	0.6192	0.6361	11.175	3.4435
0.465	0.8614	0.6149	21.819	7.2737	0.6242	0.6375	11.498	3.5731
0.470	0.8669	0.6209	22.428	7.5427	0.6292	0.6391	11.826	3.7062
0.475	0.8727	0.6270	23.048	7.8191	0.6342	0.6407	12.159	3.8428
0.480	0.8785	0.6331	23.680	8.1030	0.6392	0.6424	12.499	3.9831
0.485	0.8846	0.6394	24.324	8.3945	0.6442	0.6441	12.845	4.1270

锥形轮盘  $t_1=0.150$

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.490	0.8908	0.6457	24.980	8.6941	0.6493	0.6460	13.197	4.2748
0.495	0.8971	0.6520	25.648	9.0017	0.6544	0.6479	13.555	4.4264
0.500	0.9036	0.6585	26.329	9.3175	0.6595	0.6499	13.919	4.5820
0.505	0.9103	0.6650	27.023	9.6419	0.6647	0.6520	14.290	4.7416
0.510	0.9171	0.6717	27.731	9.9747	0.6699	0.6542	14.668	4.9053
0.515	0.9242	0.6784	28.452	10.316	0.6752	0.6565	15.052	5.0733
0.520	0.9314	0.6852	29.187	10.667	0.6805	0.6588	15.443	5.2455
0.525	0.9388	0.6922	29.937	11.027	0.6858	0.6613	15.841	5.4222
0.530	0.9463	0.6992	30.701	11.397	0.6912	0.6638	16.246	5.6034
0.535	0.9541	0.7064	31.480	11.777	0.6967	0.6664	16.658	5.7892
0.540	0.9620	0.7137	32.275	12.167	0.7022	0.6691	17.078	5.9797
0.545	0.9702	0.7211	33.085	12.567	0.7079	0.6719	17.506	6.1751
0.550	0.9785	0.7286	33.912	12.977	0.7134	0.6748	17.941	6.3754
0.555	0.9871	0.7363	34.755	13.399	0.7191	0.6777	18.384	6.5808
0.560	0.9959	0.7441	35.616	13.831	0.7249	0.6808	18.836	6.7913
0.565	1.0049	0.7521	36.494	14.275	0.7307	0.6839	19.299	7.0072
0.570	1.0141	0.7602	37.390	14.731	0.7367	0.6872	19.764	7.2286
0.575	1.0236	0.7685	38.305	15.199	0.7427	0.6905	20.241	7.4555
0.580	1.0333	0.7769	39.238	15.680	0.7488	0.6940	20.727	7.6882
0.585	1.0433	0.7855	40.192	16.173	0.7550	0.6975	21.222	7.9268
0.590	1.0536	0.7943	41.166	16.679	0.7612	0.7011	21.727	8.1714
0.595	1.0641	0.8033	42.161	17.199	0.7676	0.7049	22.241	8.4222
0.600	1.0748	0.8125	43.178	17.733	0.7741	0.7088	22.765	8.6794
0.602	1.0792	0.8163	43.591	17.951	0.7767	0.7103	22.978	8.7841
0.604	1.0837	0.8200	44.007	18.171	0.7794	0.7119	23.192	8.8898
0.606	1.0882	0.8238	44.428	18.393	0.7820	0.7135	23.408	8.9966
0.608	1.0927	0.8277	44.852	18.618	0.7847	0.7152	23.626	9.1045
0.610	1.0973	0.8315	45.279	18.845	0.7874	0.7168	23.845	9.2135
0.612	1.1019	0.8354	45.711	19.074	0.7901	0.7185	24.066	9.3237
0.614	1.1066	0.8394	46.146	19.306	0.7929	0.7201	24.289	9.4349
0.616	1.1114	0.8434	46.585	19.541	0.7956	0.7219	24.514	9.5472
0.618	1.1161	0.8474	47.029	19.778	0.7984	0.7236	24.740	9.6607
0.620	1.1210	0.8514	47.476	20.018	0.8012	0.7253	24.969	9.7754
0.622	1.1259	0.8555	47.927	20.260	0.8040	0.7271	25.199	9.8912
0.624	1.1308	0.8597	48.383	20.505	0.8068	0.7289	25.431	10.008
0.626	1.1356	0.8638	48.842	20.753	0.8097	0.7307	25.664	10.126
0.628	1.1409	0.8680	49.306	21.003	0.8125	0.7325	25.900	10.245
0.630	1.1460	0.8723	49.775	21.256	0.8154	0.7343	26.138	10.366
0.632	1.1512	0.8766	50.247	21.512	0.8184	0.7362	26.378	10.488
0.634	1.1564	0.8809	50.724	21.771	0.8213	0.7381	26.619	10.611
0.636	1.1617	0.8853	51.206	22.032	0.8243	0.7400	26.863	10.736
0.638	1.1671	0.8898	51.692	22.297	0.8273	0.7419	27.109	10.861
0.640	1.1725	0.8942	52.183	22.564	0.8303	0.7439	27.356	10.988

锥形轮盘  $t_1=0.150$

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.642	1.1780	0.8988	52.678	22.834	0.8333	0.7458	27.606	11.117
0.644	1.1835	0.9033	53.178	23.108	0.8364	0.7478	27.858	11.246
0.646	1.1891	0.9079	53.684	23.384	0.8394	0.7498	28.112	11.378
0.648	1.1948	0.9126	54.194	23.664	0.8426	0.7519	28.369	11.510
0.650	1.2005	0.9173	54.709	23.947	0.8457	0.7539	28.627	11.644
0.652	1.2063	0.9221	55.229	24.233	0.8489	0.7560	28.888	11.779
0.654	1.2122	0.9269	55.754	24.522	0.8520	0.7581	29.151	11.916
0.656	1.2181	0.9318	56.285	24.815	0.8553	0.7603	29.416	12.054
0.658	1.2241	0.9367	56.821	25.110	0.8585	0.7624	29.684	12.193
0.660	1.2302	0.9417	57.362	25.410	0.8618	0.7646	29.954	12.334
0.662	1.2364	0.9467	57.908	25.712	0.8651	0.7668	30.226	12.477
0.664	1.2426	0.9518	58.461	26.018	0.8684	0.7691	30.501	12.621
0.666	1.2489	0.9569	59.019	26.328	0.8718	0.7713	30.778	12.767
0.668	1.2553	0.9621	59.582	26.642	0.8752	0.7736	31.058	12.914
0.670	1.2616	0.9674	60.152	26.959	0.8786	0.7759	31.340	13.063
0.672	1.2683	0.9727	60.727	27.279	0.8820	0.7783	31.625	13.213
0.674	1.2749	0.9781	61.309	27.604	0.8855	0.7807	31.912	13.365
0.676	1.2816	0.9835	61.897	27.932	0.8890	0.7831	32.202	13.519
0.678	1.2884	0.9890	62.491	28.264	0.8926	0.7855	32.495	13.674
0.680	1.2953	0.9946	63.091	28.601	0.8962	0.7879	32.791	13.831
0.682	1.3023	1.0003	63.698	28.941	0.8998	0.7904	33.089	13.990
0.684	1.3093	1.0060	64.311	29.285	0.9035	0.7929	33.390	14.151
0.686	1.3165	1.0118	64.931	29.634	0.9071	0.7955	33.694	14.313
0.688	1.3237	1.0176	65.558	29.986	0.9109	0.7981	34.001	14.477
0.690	1.3310	1.0235	66.192	30.343	0.9146	0.8007	34.311	14.643
0.692	1.3385	1.0295	66.833	30.705	0.9184	0.8033	34.624	14.811
0.694	1.3460	1.0356	67.481	31.070	0.9223	0.8060	34.940	14.981
0.696	1.3536	1.0417	68.137	31.441	0.9262	0.8087	35.259	15.152
0.698	1.3613	1.0480	68.800	31.816	0.9301	0.8115	35.581	15.326
0.700	1.3692	1.0543	69.470	32.195	0.9340	0.8142	35.906	15.501
0.702	1.3771	1.0606	70.148	32.580	0.9380	0.8170	36.235	15.679
0.704	1.3852	1.0671	70.834	32.969	0.9421	0.8199	36.567	15.859
0.706	1.3933	1.0737	71.529	33.363	0.9462	0.8228	36.902	16.040
0.708	1.4016	1.0803	72.231	33.762	0.9503	0.8257	37.241	16.224
0.710	1.4100	1.0870	72.942	34.166	0.9545	0.8287	37.583	16.410
0.712	1.4185	1.0936	73.661	34.575	0.9587	0.8316	37.929	16.598
0.714	1.4271	1.1007	74.389	34.990	0.9630	0.8347	38.278	16.789
0.716	1.4358	1.1077	75.126	35.410	0.9673	0.8378	38.631	16.981
0.718	1.4447	1.1148	75.872	35.836	0.9717	0.8409	38.988	17.176
0.720	1.4537	1.1220	76.627	36.267	0.9761	0.8440	39.349	17.373
0.722	1.4628	1.1293	77.391	36.704	0.9806	0.8472	39.713	17.573
0.724	1.4721	1.1367	78.165	37.147	0.9851	0.8505	40.082	17.775
0.726	1.4815	1.1442	78.949	37.595	0.9896	0.8537	40.454	17.980

锥形轮盘  $t_1=0.150$ 

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.728	1.4910	1.1518	79.743	38.050	0.9943	0.8571	40.831	18.187
0.730	1.5007	1.1595	80.547	38.511	0.9990	0.8604	41.211	18.396
0.732	1.5105	1.1674	81.361	38.978	1.0037	0.8639	41.596	18.608
0.734	1.5204	1.1753	82.186	39.451	1.0085	0.8673	41.986	18.823
0.736	1.5305	1.1834	83.022	39.932	1.0133	0.8708	42.379	19.041
0.738	1.5408	1.1915	83.869	40.418	1.0183	0.8744	42.778	19.261
0.740	1.5512	1.1998	84.727	40.912	1.0232	0.8780	43.181	19.484
0.742	1.5618	1.2082	85.597	41.413	1.0283	0.8817	43.588	19.710
0.744	1.5726	1.2168	86.479	41.920	1.0334	0.8854	44.000	19.938
0.746	1.5835	1.2255	87.373	42.435	1.0385	0.8892	44.418	20.170
0.748	1.5946	1.2343	88.280	42.958	1.0438	0.8930	44.840	20.405
0.750	1.6059	1.2432	89.199	43.487	1.0491	0.8969	45.267	20.643
0.752	1.6173	1.2533	90.131	44.025	1.0544	0.9008	45.700	20.883
0.754	1.6290	1.2616	91.076	44.571	1.0599	0.9046	46.138	21.128
0.756	1.6408	1.2710	92.035	45.124	1.0654	0.9089	46.581	21.375
0.758	1.6528	1.2805	93.008	45.686	1.0710	0.9130	47.030	21.626
0.760	1.6650	1.2902	93.995	46.257	1.0767	0.9172	47.485	21.880
0.762	1.6775	1.3000	94.997	46.836	1.0824	0.9214	47.945	22.137
0.764	1.6901	1.3101	96.013	47.424	1.0883	0.9257	48.411	22.398
0.766	1.7030	1.3202	97.045	48.021	1.0942	0.9301	48.884	22.663
0.768	1.7160	1.3306	98.093	48.627	1.1002	0.9345	49.362	22.932
0.770	1.7293	1.3411	99.157	49.243	1.1063	0.9390	49.847	23.204
0.772	1.7429	1.3518	100.23	49.869	1.1124	0.9436	50.338	23.480
0.774	1.7567	1.3627	101.33	50.505	1.1187	0.9482	50.836	23.760
0.776	1.7707	1.3738	102.44	51.150	1.1251	0.9530	51.341	24.044
0.778	1.7849	1.3851	103.58	51.807	1.1315	0.9578	51.853	24.332
0.780	1.7995	1.3966	104.73	52.474	1.1381	0.9627	52.372	24.625
0.782	1.8143	1.4082	105.90	53.152	1.1447	0.9676	52.898	24.921
0.784	1.8293	1.4201	107.09	53.841	1.1515	0.9727	53.432	25.223
0.786	1.8447	1.4323	108.29	54.543	1.1583	0.9778	53.973	25.528
0.788	1.8603	1.4446	109.52	55.255	1.1653	0.9830	54.523	25.839
0.790	1.8763	1.4572	110.77	55.981	1.1724	0.9883	55.080	26.154
0.792	1.8925	1.4700	112.05	56.718	1.1796	0.9937	55.646	26.474
0.794	1.9091	1.4830	113.34	57.469	1.1869	0.9992	56.220	26.799
0.796	1.9259	1.4964	114.66	58.233	1.1944	1.0048	56.803	27.129
0.798	1.9432	1.5099	116.00	59.011	1.2019	1.0105	57.395	27.465
0.800	1.9607	1.5238	117.36	59.803	1.2096	1.0163	57.996	27.806
0.802	1.9786	1.5379	118.75	60.609	1.2175	1.0221	58.606	28.152
0.804	1.9969	1.5523	120.16	61.430	1.2254	1.0282	59.227	28.504
0.806	2.0155	1.5669	121.60	62.266	1.2335	1.0343	59.857	28.862
0.808	2.0346	1.5819	123.07	63.118	1.2418	1.0405	60.498	29.226
0.810	2.0540	1.5972	124.57	63.986	1.2502	1.0468	61.149	29.597
0.812	2.0738	1.6128	126.09	64.871	1.2587	1.0533	61.811	29.973

锥形轮盘  $t_1=0.150$

$t$	$\alpha_r$	$\alpha_s$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_s$	$-\beta_c'$	$-\beta_s'$
0.814	2.0941	1.6288	127.65	65.773	1.2674	1.0599	62.484	30.356
0.816	2.1148	1.6451	129.23	66.693	1.2763	1.0666	63.169	30.746
0.818	2.1360	1.6617	130.85	67.631	1.2853	1.0734	63.866	31.143
0.820	2.1576	1.6787	132.50	68.589	1.2945	1.0804	64.575	31.547
0.822	2.1797	1.6961	134.18	69.565	1.3039	1.0876	65.297	31.958
0.824	2.2023	1.7139	135.90	70.562	1.3135	1.0948	66.031	32.376
0.826	2.2255	1.7320	137.65	71.580	1.3232	1.1023	66.780	32.803
0.828	2.2491	1.7506	139.45	72.619	1.3332	1.1098	67.542	33.238
0.830	2.2734	1.7697	141.28	73.680	1.3434	1.1176	68.318	33.681
0.832	2.2982	1.7891	143.15	74.764	1.3537	1.1255	69.109	34.132
0.834	2.3235	1.8091	145.06	75.872	1.3643	1.1335	69.916	34.592
0.836	2.3495	1.8295	147.01	77.005	1.3751	1.1418	70.738	35.062
0.838	2.3762	1.8504	149.01	78.164	1.3862	1.1502	71.577	35.540
0.840	2.4035	1.8719	151.06	79.348	1.3975	1.1588	72.432	36.029
0.842	2.4315	1.8938	153.15	80.561	1.4090	1.1677	73.306	36.528
0.844	2.4602	1.9164	155.30	81.801	1.4208	1.1767	74.197	37.037
0.846	2.4897	1.9395	157.49	83.071	1.4329	1.1859	75.107	37.557
0.848	2.5199	1.9632	159.74	84.372	1.4452	1.1953	76.037	38.088
0.850	2.5509	1.9875	162.05	85.705	1.4578	1.2050	76.986	38.631
0.855	2.6322	2.0513	168.07	89.184	1.4907	1.2303	79.455	40.041
0.860	2.7193	2.1195	174.49	92.892	1.5257	1.2571	82.068	41.534
0.865	2.8128	2.1928	181.36	96.853	1.5630	1.2858	84.840	43.119
0.870	2.9135	2.2717	188.73	101.09	1.6027	1.3164	87.789	44.804
0.875	3.0222	2.3568	196.65	105.65	1.6454	1.3493	90.935	46.601
0.880	3.1399	2.4490	205.19	110.56	1.6911	1.3846	94.301	48.523
0.885	3.2578	2.5491	214.45	115.98	1.7405	1.4227	97.915	50.585
0.890	3.4073	2.6583	224.50	121.64	1.7938	1.4639	101.80	52.806
0.895	3.5600	2.7779	235.47	127.92	1.8517	1.5088	106.01	55.205
0.900	3.7280	2.9093	247.49	134.80	1.9148	1.5577	110.58	57.810
0.905	3.9135	3.0545	260.74	142.36	1.9840	1.6113	115.57	60.649
0.910	4.1197	3.2157	275.40	150.72	2.0601	1.6704	121.04	63.671
0.915	4.3580	3.3958	291.73	160.02	2.1444	1.7358	127.07	67.191
0.920	4.6090	3.5984	310.04	170.43	2.2383	1.8086	133.78	70.995
0.925	4.9025	3.8278	330.74	182.18	2.3437	1.8907	141.27	75.247
0.930	5.2373	4.0900	354.31	195.55	2.4629	1.9835	149.72	80.037
0.935	6.6246	4.3923	381.45	210.91	2.5992	2.0896	159.35	85.485
0.940	6.0757	4.7450	413.02	228.77	2.7565	2.2121	170.43	91.749
0.945	6.6087	5.1616	450.23	249.79	2.9404	2.3555	183.35	99.046
0.950	7.2481	5.6613	494.79	274.92	3.1588	2.5257	198.64	107.67
0.955	8.0295	6.2719	549.14	305.54	3.4228	2.7316	217.09	118.06
0.960	9.0059	7.0349	616.94	343.69	3.7492	2.9862	239.83	130.87
0.965	10.261	8.0157	703.95	392.61	4.1639	3.3099	268.67	147.08
0.970	11.934	9.3230	819.79	457.67	4.7104	3.7365	306.59	168.39
0.975	14.276	11.152	981.74	548.55	5.4662	4.3267	358.95	197.78
0.980	17.788	13.896	1224.3	684.62	6.5858	5.2011	436.39	241.22

锥形轮盘  $t_1=0.200$ 

$t$	$\alpha_r$	$\alpha_s$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_s$	$-\beta_c'$	$-\beta_s'$
0.200	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
0.220	0.9369	0.0879	0.9045	0.1901	0.0949	0.9136	0.3080	0.0646
0.240	0.8927	0.1570	1.8729	0.4136	0.1699	0.8487	0.6983	0.1533
0.260	0.8620	0.2130	2.9167	0.6758	0.2319	0.7992	1.1633	0.2665
0.280	0.8413	0.2597	4.0451	0.9820	0.2820	0.7609	1.6988	0.4056
0.300	0.8282	0.2997	5.2658	1.3377	0.3257	0.7311	2.3026	0.5722
0.320	0.8212	0.3349	6.5858	1.7480	0.3639	0.7080	2.9739	0.7682
0.330	0.8196	0.3510	7.2852	1.9754	0.3812	0.6984	3.3349	0.8780
0.340	0.8191	0.3664	8.0120	2.2185	0.3977	0.6900	3.7129	0.9959
0.350	0.8196	0.3812	8.7671	2.4781	0.4135	0.6827	4.1082	1.1223
0.360	0.8210	0.3954	9.5515	2.7550	0.4285	0.6763	4.5209	1.2576
0.370	0.8234	0.4092	10.366	3.0499	0.4430	0.6707	4.9512	1.4020
0.380	0.8266	0.4226	11.211	3.3637	0.4569	0.6660	5.3994	1.5560
0.390	0.8306	0.4357	12.089	3.6972	0.4705	0.6620	5.8659	1.7199
0.400	0.8354	0.4485	13.000	4.0512	0.4836	0.6587	6.3510	1.8941
0.405	0.8380	0.4548	13.468	4.2361	0.4901	0.6572	6.6006	1.9852
0.410	0.8408	0.4611	13.945	4.4266	0.4964	0.6560	6.8550	2.0790
0.415	0.8439	0.4674	14.431	4.6227	0.5027	0.6548	7.1143	2.1756
0.420	0.8471	0.4736	14.926	4.8246	0.5090	0.6538	7.3785	2.2751
0.425	0.8504	0.4799	15.430	5.0323	0.5152	0.6530	7.6477	2.3774
0.430	0.8540	0.4861	15.944	5.2459	0.5213	0.6523	7.9219	2.4827
0.435	0.8577	0.4923	16.467	5.4657	0.5274	0.6517	8.2011	2.5910
0.440	0.8615	0.4984	16.999	5.6917	0.5335	0.6512	8.4856	2.7023
0.445	0.8656	0.5046	17.542	5.9242	0.5395	0.6509	8.7754	2.8169
0.450	0.8698	0.5108	18.095	6.1631	0.5455	0.6507	9.0704	2.9346
0.455	0.8742	0.5170	18.658	6.4088	0.5514	0.6508	9.3708	3.0555
0.460	0.8788	0.5232	19.231	6.6612	0.5574	0.6506	9.6767	3.1798
0.465	0.8835	0.5295	19.815	6.9207	0.5633	0.6507	9.9881	3.3075
0.470	0.8884	0.5357	20.411	7.1873	0.5692	0.6509	10.305	3.4387
0.475	0.8935	0.5420	21.017	7.4612	0.5751	0.6513	10.628	3.5733
0.480	0.8987	0.5484	21.634	7.7426	0.5810	0.6517	10.956	3.7116
0.485	0.9041	0.5547	22.263	8.0316	0.5869	0.6523	11.291	3.8536
0.490	0.9097	0.5012	22.904	8.3285	0.5928	0.6529	11.631	3.9994
0.495	0.9155	0.5676	23.558	8.6334	0.5987	0.6537	11.978	4.1490
0.500	0.9214	0.5741	24.223	8.9464	0.6047	0.6546	12.331	4.3026
0.505	0.9276	0.5807	24.901	9.2679	0.6106	0.6555	12.690	4.4601
0.510	0.9339	0.5874	25.592	9.5980	0.6166	0.6566	13.056	4.6218
0.515	0.9404	0.5941	26.297	9.9369	0.6225	0.6578	13.429	4.7877
0.520	0.9471	0.6008	27.014	10.284	0.6286	0.6591	13.808	4.9579
0.525	0.9540	0.6077	27.746	10.642	0.6346	0.6604	14.194	5.1324

锥形轮盘  $t_1=2.000$ 

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.530	0.9611	0.6146	28.492	11.008	0.6407	0.6619	14.587	5.3114
0.535	0.9684	0.6217	29.253	11.385	0.6468	0.6635	14.987	5.4951
0.540	0.9759	0.6288	30.029	11.771	0.6529	0.6651	15.394	5.6834
0.545	0.9837	0.6360	30.820	12.168	0.6591	0.6669	15.809	5.8765
0.550	0.9916	0.6433	31.626	12.575	0.6654	0.6687	16.232	6.0746
0.555	0.9998	0.6508	32.449	12.993	0.6717	0.6707	16.662	6.2777
0.560	1.0082	0.6583	33.289	13.421	0.6780	0.6728	17.100	6.4860
0.565	1.0168	0.6660	34.145	13.862	0.6844	0.6749	17.547	6.6995
0.570	1.0257	0.6736	35.020	14.314	0.6909	0.6772	18.001	6.9185
0.575	1.0348	0.6817	35.912	14.778	0.6975	0.6796	18.465	7.1430
0.580	1.0441	0.6898	36.823	15.254	0.7041	0.6821	18.937	7.3732
0.585	1.0538	0.6980	37.753	15.743	0.7108	0.6846	19.418	7.6093
0.590	1.0637	0.7064	38.703	16.245	0.7176	0.6873	19.908	7.8514
0.595	1.0739	0.7149	39.673	16.761	0.7244	0.6901	20.408	8.0996
0.600	1.0843	0.7236	40.664	17.290	0.7314	0.6930	20.916	8.3542
0.602	1.0886	0.7272	41.066	17.506	0.7342	0.6942	21.124	8.4578
0.604	1.0929	0.7307	41.472	17.724	0.7370	0.6955	21.332	8.5625
0.606	1.0973	0.7343	41.882	17.945	0.7390	0.6967	21.542	8.6682
0.608	1.1017	0.7379	42.295	18.167	0.7427	0.6979	21.754	8.7750
0.610	1.1062	0.7416	42.712	18.393	0.7456	0.6992	21.967	8.8830
0.612	1.1107	0.7453	43.133	18.620	0.7485	0.7005	22.182	8.9920
0.614	1.1152	0.7490	43.557	18.850	0.7514	0.7018	22.398	9.1021
0.616	1.1199	0.7527	43.985	19.083	0.7543	0.7031	22.617	9.2133
0.618	1.1245	0.7565	44.417	19.318	0.7573	0.7045	22.837	9.3257
0.620	1.1293	0.7603	44.853	19.556	0.7603	0.7059	23.059	9.4392
0.622	1.1340	0.7641	45.292	19.796	0.7632	0.7072	23.282	9.5540
0.624	1.1386	0.7680	45.736	20.039	0.7662	0.7086	23.508	9.6698
0.626	1.1438	0.7719	46.184	20.284	0.7693	0.7101	23.735	9.7869
0.628	1.1487	0.7759	46.636	20.533	0.7723	0.7115	23.964	9.9051
0.630	1.1537	0.7799	47.092	20.784	0.7754	0.7130	24.195	10.024
0.632	1.1588	0.7839	47.553	21.037	0.7784	0.7145	24.428	10.145
0.634	1.1639	0.7879	48.017	21.294	0.7816	0.7160	24.663	10.267
0.636	1.1691	0.7920	48.486	21.553	0.7847	0.7175	24.900	10.390
0.638	1.1743	0.7962	48.960	21.815	0.7878	0.7191	25.139	10.515
0.640	1.1796	0.8004	49.438	22.081	0.7910	0.7206	25.379	10.640
0.642	1.1850	0.8046	49.920	22.349	0.7942	0.7222	25.622	10.768
0.644	1.1904	0.8088	50.408	22.620	0.7974	0.7238	25.867	10.896
0.646	1.1959	0.8131	50.900	22.894	0.8006	0.7255	26.114	11.026
0.648	1.2015	0.8175	51.396	23.171	0.8039	0.7271	26.363	11.157
0.650	1.2071	0.8219	51.898	23.452	0.8072	0.7288	26.614	11.290



锥形轮盘  $t_1=0.200$

$t$	$\alpha_r$	$\alpha_i$	$-\alpha_c'$	$-\alpha_s'$	$\beta_r$	$\beta_i$	$-\beta_c'$	$-\beta_s'$
0.652	1.2120	0.8263	52.404	23.735	0.8105	0.7305	26.868	11.423
0.654	1.2186	0.8308	52.916	24.022	0.8138	0.7323	27.123	11.559
0.656	1.2245	0.8353	53.432	24.312	0.8172	0.7340	27.381	11.696
0.658	1.2304	0.8399	53.954	24.605	0.8206	0.7358	27.641	11.834
0.660	1.2364	0.8445	54.481	24.902	0.8240	0.7376	27.904	11.974
0.662	1.2424	0.8492	55.013	25.202	0.8275	0.7394	28.168	12.115
0.664	1.2486	0.8539	55.550	25.506	0.8309	0.7413	28.436	14.258
0.666	1.2548	0.8586	56.094	25.813	0.8344	0.7431	28.705	12.402
0.668	1.2611	0.8635	56.642	26.124	0.8380	0.7451	28.977	12.548
0.670	1.2674	0.8683	57.196	26.438	0.8415	0.7470	29.251	12.695
0.672	1.2739	0.8733	57.757	26.756	0.8451	0.7489	29.528	12.844
0.674	1.2804	0.8782	58.322	27.078	0.8487	0.7509	29.808	12.995
0.676	1.2870	0.8833	58.894	27.403	0.8524	0.7529	30.090	13.147
0.678	1.2937	0.8884	59.472	27.733	0.8561	0.7550	30.374	13.301
0.680	1.3005	0.8935	60.057	28.066	0.8598	0.7570	30.661	13.456
0.682	1.3074	0.8987	60.647	28.403	0.8635	0.7591	30.951	13.614
0.684	1.3144	0.9040	61.244	28.745	0.8673	0.7612	31.244	13.773
0.686	1.3214	0.9094	61.847	29.090	0.8712	0.7634	31.539	13.934
0.688	1.3286	0.9148	62.457	29.440	0.8750	0.7656	31.838	14.096
0.690	1.3358	0.9202	63.073	29.794	0.8789	0.7678	32.139	14.261
0.692	1.3432	0.9257	63.697	30.152	0.8828	0.7700	32.443	14.427
0.694	1.3506	0.9313	64.327	30.515	0.8868	0.7723	32.750	14.595
0.696	1.3581	0.9370	64.965	30.882	0.8908	0.7746	33.060	14.765
0.698	1.3658	0.9427	65.610	41.254	0.8948	0.7769	33.373	14.937
0.700	1.3735	0.9485	66.262	31.630	0.8989	0.7793	33.689	15.111
0.702	1.3814	0.9544	66.921	32.011	0.9030	0.7817	34.008	15.287
0.704	1.3894	0.9604	67.588	32.397	0.9072	0.7841	34.331	15.465
0.706	1.3974	0.9664	68.263	32.788	0.9114	0.7866	34.657	15.645
0.708	1.4056	0.9725	68.946	33.183	0.9157	0.7891	34.986	15.827
0.710	1.4139	0.9787	69.637	33.584	0.9200	0.7916	35.318	16.011
0.712	1.4223	0.9849	70.337	33.990	0.9243	0.7942	35.654	16.198
0.714	1.4309	0.9913	71.044	34.401	0.9287	0.7968	35.994	16.387
0.716	1.4395	0.9977	71.761	34.818	0.9331	0.7994	36.337	16.577
0.718	1.4483	1.0042	72.485	35.240	0.9376	0.8021	36.683	16.771
0.720	1.4572	1.0108	73.219	35.667	0.9421	0.8048	37.034	16.968
0.722	1.4663	1.0175	73.962	36.100	0.9467	0.8076	37.388	17.164
0.724	1.4754	1.0243	74.715	36.539	0.9513	0.8104	37.746	17.364
0.726	1.4848	1.0312	75.476	36.984	0.9560	0.8132	38.107	17.567
0.728	1.4942	1.0382	76.248	37.434	0.9608	0.8161	38.473	17.772
0.730	1.5038	1.0452	77.029	37.891	0.9655	0.8190	38.843	17.979