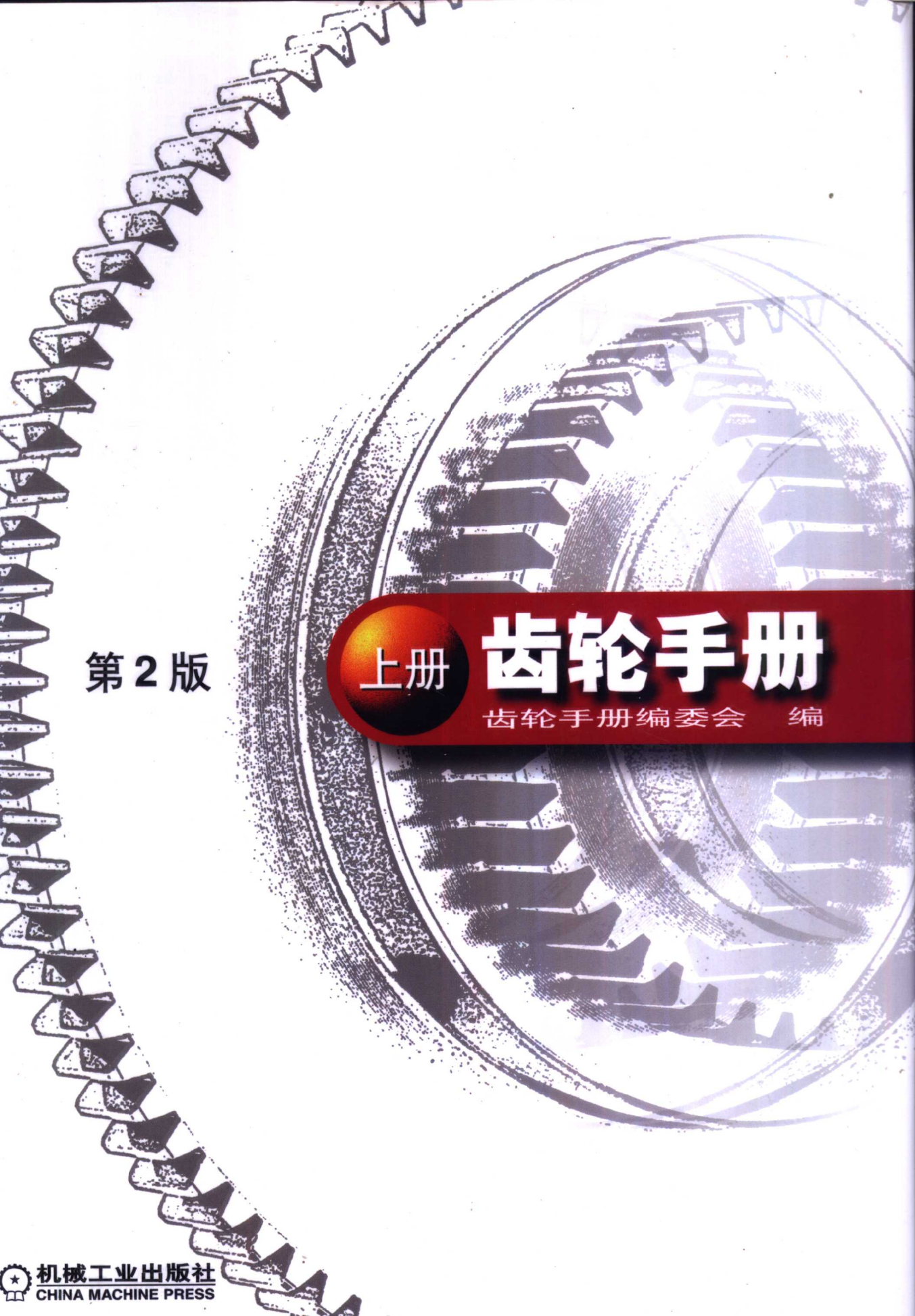




第2版

上册

齿轮手册

齿轮手册编委会 编



机械工业出版社
CHINA MACHINE PRESS

第 10 篇 小模数齿轮及小模数蜗杆传动



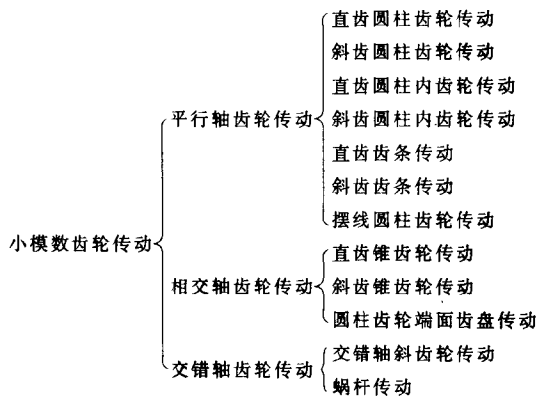
	主 编	孙麟治 (上海大学)	
	编写人		审稿人
第 1 章	赵明晶 (长春光机所)	刘镇湖 (北京手表厂)	
	孙麟治		
第 2 章	沈潜德 (长春光机所)	刘镇湖	
	孙麟治		
	刘镇湖		
第 3 章	刘镇湖		
第 4 章	沈潜德	刘镇湖	
	孙麟治		
第 5 章	沈潜德	刘镇湖	
	孙麟治		
第 6 章	孙麟治	刘镇湖	

第 1 章 小模数齿轮传动的分类及特点

(续)

1 小模数齿轮传动的分类

小模数齿轮是指法向模数 m_n 小于 1mm 的齿轮。
小模数齿轮传动形式有平行轴、相交轴、交错轴三种。



2 小模数齿轮传动的特点和适用范围
(表 10.1-1)

表 10.1-1 小模数齿轮传动的特点和适用范围

名称	特 点	适 用 范 围
直齿圆柱齿轮传动	可高速传动，线速度可达 150m/s，传动效率高，一对齿轮可达 98%~99%，对中心距变化敏感性小，制造装配简便，可借变位切削和修形、修缘来改善啮合性能，提高传动质量，获得高精度	广泛用于精密仪器和伺服机械的传动系统中，例如：照相机、显微镜、天文望远镜、计量仪器、光学仪器、航海仪器、雷达和火炮的解算装置、自动驾驶仪表和导弹的控制系统以及机器人的执行机构等
斜齿圆柱齿轮传动	重合度大，传动平稳，承载能力大，轴向力随螺旋角增大而增大	
直齿与斜齿圆柱内齿轮传动	传动平稳，承载能力大，结构紧凑。能实现大传动比，内齿轮易产生顶切，内啮合时易产生过渡曲线干涉，加工方法受限制，不易获得高精度	主要用于大传动比的行星齿轮传动和谐波齿轮传动

名称	特 点	适 用 范 围
直齿和斜齿齿条传动	直齿齿条和斜齿齿条可与直齿轮、斜齿轮和蜗杆啮合、齿条与齿轮啮合时，两者可任意为主或从动。齿条与蜗杆啮合时，齿条只能从动	可变旋转运动为直线移动，也可把直线移动变为旋转运动，主要用于各种往复运动机构
摆线圆柱齿轮传动	模数较小，最小模数为 $m=0.05\text{mm}$ ；齿数可以很少，小齿轮齿数可为 6~12；通常转速低，力矩小，传动比大，最高可达 $i=16$ ；侧隙较大，齿厚磨损均匀，对中心距变化敏感，中心距改变时，传动比不能保持恒定，齿根强度较弱	主要用于钟表和计时仪器的传动系统中，也用于压力表、水电计量装置等精密仪表的传动装置中
直齿与斜齿锥齿轮传动	传动比小， $i=1\sim 8$ ，不宜实现高速传动，承载能力小，比曲线锥齿轮容易制造，有轴向力	用于仪表机床、测量仪器和各种机械传动装置的分度头传动
圆柱齿轮端面齿盘传动	可用直齿或斜齿圆柱齿轮实现相交轴传动。端面齿盘为点接触承载能力小，齿长受切齿干涉限制，加工困难	用于一般精度的轻载相交轴或交错轴传动。只做运动传动
交错轴斜齿齿轮传动	能实现任意方位的交错轴传动，传动平稳，有轴向力	用于交错轴为任意方位的传动装置。可代替锥齿轮和蜗杆副实现交错轴传动
蜗杆传动	工作平稳，无噪声，可实现大传动比和高精度传动，承载能力大，能自锁，适用于低速传动，传动效率较低	用于精密仪器的大传动比高精度的传动机构，各种机床和测量仪器的分度机构以及高精度的分度头和刻划机等

第 2 章
小模数渐开线圆柱齿轮传动

1
基准齿形和模数系列

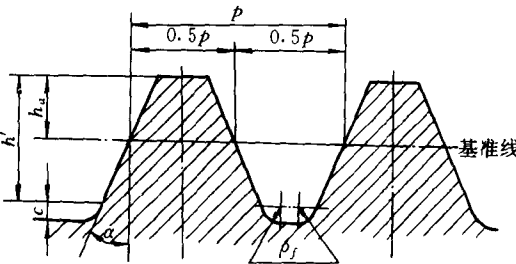
1.2
小模数渐开线齿轮模数系列

1.1
小模数渐开线圆柱齿轮基准齿形

模数 $m < 1\text{mm}$ 的基准齿形见表 10.2-1。

按国标 GB2363—90 规定，小模数渐开线齿轮的模数范围为 $m_n < 1.0\text{mm}$ 。

表 10.2-1
小模数渐开线圆柱齿轮基准齿形 (GB 2362—90)



参数名称	代号	数值	说 明	参数名称	代号	数值	说 明
齿形角	α	20°	中线上的齿厚和齿槽宽度相等	齿距	p	πm_n	中线上的齿厚和齿槽宽度相等
齿顶高	h_a	m_n		径向间隙	c	$0.35m_n$	
工作齿高	h'	$2m_n$		齿根圆角半径	ρ_f	$\leq 0.2m_n$	

2
小模数圆柱齿轮传动的几何尺寸计算

距见表 10.2-4, $m = 1\text{mm}$ 、 $\alpha = 20^\circ$ 、 $h_a^* = 1$ 齿轮的固定弦齿厚和固定弦齿高见表 10.2-5。

2.1
直齿圆柱齿轮传动的几何尺寸计算

标准圆柱齿轮传动的几何尺寸计算见表 10.2-2, 圆柱齿轮公法线长度见表 10.2-3, 圆柱齿轮圆柱测量

现代精密机械仪器设计制造中，广泛采用变位齿轮。采用变位齿轮，具有如下特点：

1) 用范成法切制标准齿轮时，齿轮的齿数必须大于或等于最小齿数 $z_{\min}$ ，否则产生根切现象。采用变位能够切制出小于最少齿数又无根切现象的齿轮。

表 10.2-2
标准圆柱齿轮传动的几何尺寸计算

序号	名 称	代号	公 式	算 例
1	模数	m	$m = \frac{p}{\pi} = \frac{d}{z}$ (按标准)	$m = 0.5\text{mm}$
2	齿数	z	$z = \frac{d}{m}$	$z_1 = 18, z_2 = 135$ (外齿轮副)
3	齿形角	α	$\alpha = 20^\circ$	$\alpha = 20^\circ$
4	齿顶高系数	h_a^*	$h_a^* = 1$	$h_a^* = 1$
5	顶隙系数	c^*	$c^* = 0.35$	$c^* = 0.35$
6	顶隙	c	$c = c^* m$	$c = 0.175\text{mm}$
7	分度圆直径	d	$d = mz$	$d_1 = 9\text{mm}, d_2 = 67.5\text{mm}$
8	基圆直径	d_b	$d_b = d \cos \alpha$	$d_{b1} = 8.457\text{mm}, d_{b2} = 63.429\text{mm}$
9	齿距	p	$p = \pi m$	$p = 1.571\text{mm}$
10	基圆齿距	p_b	$p_b = p \cos \alpha$	$p_b = 1.476\text{mm}$

(续)

序号	名 称	代号	公 式	算 例
11	齿顶高	h_a	$h_a = h_a^* m$	$h_a = 0.5\text{mm}$
12	齿根高	h_f	$h_f = (h_a^* + c^*) m$	$h_f = 0.675\text{mm}$
13	齿高	h	$h = (2h_a^* + c^*) m$	$h = 1.175\text{mm}$
14	齿宽	b	$b = (3 \sim 10)m$	$b = 4\text{mm}$
15	齿顶圆直径	d_a	$d_a = d \pm 2h_a^* m$	$d_{a1} = 10\text{mm}, d_{a2} = 68.5\text{mm}$
16	齿根圆直径	d_f	$d_f = d \mp 2(h_a^* + c^*) m$	$d_{f1} = 7.65\text{mm}, d_{f2} = 66.15\text{mm}$
17	标准中心距	a	$a = \frac{\pm d_1 + d_2}{2} = m \left(\frac{\pm z_1 + z_2}{2} \right)$	$a = 38.25\text{mm}$
18	齿数比	u	$u = \frac{z_2}{z_1}$	$u = 7.5$

测 量 尺 寸 (仅选一种)

19	公 法 线	跨越齿数, 跨越槽数 (用 于内齿轮)	k	$k = \frac{a}{180^\circ} z + 0.5$ $\alpha = 20^\circ$ 时, k 值按 z 查表 10.2-3		$k_1 = 3$ $k_2 = 16$
		长度	W	$W = m \cos \alpha [\pi (k - 0.5) + z \operatorname{inv} \alpha]$ $\alpha = 20^\circ$ 时, W 值按 z 查表 10.2-3		$W_1 = 3.816\text{mm}$ $W_2 = 23.824\text{mm}$
20	量 柱 测 量 距	量柱直径	d_p	$d_p = (1.68 \sim 1.9)m$ (外齿轮) $d_p = (1.4 \sim 1.7)m$ (内齿轮) 按表 10.2-4 选取		$d_p = 0.866\text{mm}$
		量柱中心所 在圆压力角	α_M	$\operatorname{inv} \alpha_M = \operatorname{inv} \alpha \pm \frac{d_p}{d \cos \alpha} \mp \frac{\pi}{2z}$		$\alpha_{M1} = 25^\circ 0' 56''$ $\alpha_{M2} = 20^\circ 50' 03''$
		量柱测量距	M	齿数为 偶数	$M = \frac{d \cos \alpha}{\cos \alpha_M} \pm d_p$ $\alpha = 20^\circ$ 时, M 值按 z 查表 10.2-4	外齿轮 应满足 $M > d_a$
				齿数为 奇数	$M = \frac{d \cos \alpha}{\cos \alpha_M} \cos \frac{90^\circ}{z} \pm a_p$ $\alpha = 20^\circ$ 时, M 值按 z 查表 10.2-4	内齿轮 应满足 $M < d_a$
21	固 定 弦	固定弦齿高	$\bar{h}_c$	$\bar{h}_c = \left(h_a^* - \frac{\pi}{8} \sin 2\alpha \right) m$ $h_c^* = 1, \alpha = 20^\circ$ 时, $\bar{h}_c = 0.7476m$ 或查表 10.2-5		$\bar{h}_c = 0.374\text{mm}$
		固定弦齿厚	$\bar{s}_c$	$\bar{s}_c = \frac{\pi m}{2} \cos^2 \alpha$ $\alpha = 20^\circ$ 时, $\bar{s}_c = 1.3870m$ 或查表 10.2-5		$\bar{s}_c = 0.694\text{mm}$

注: 所列各表中, 凡有土和干符号的, 上面符号用于外齿轮副, 下面符号用于内齿轮副。

表 10.2-3 圆柱齿轮公法线长度

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
9	2	2.277	2.733	3.643	4.554
10	2	2.284	2.741	3.655	4.568
11	2	2.291	2.749	3.666	4.582

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
12	2	2.298	2.758	3.677	4.596
13	2	2.305	2.766	3.688	4.610
14	2	2.312	2.775	3.699	4.624

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
15	2	2.319	2.783	3.711	4.638
16	2	2.326	2.791	3.722	4.652
17	2	2.333	2.800	3.733	4.666
18	3	3.816	4.579	6.106	7.632
19	3	3.823	4.588	6.117	7.646
20	3	3.830	4.596	6.128	7.660
21	3	3.837	4.605	6.140	7.674
22	3	3.844	4.613	6.151	7.688
23	3	3.851	4.621	6.162	7.702
24	3	3.858	4.630	6.173	7.716
25	3	3.865	4.633	6.184	7.730
26	3	3.872	4.647	6.196	7.744
27	4	5.355	6.426	8.568	10.711
28	4	5.362	6.435	8.580	10.725
29	4	5.369	6.443	8.591	10.739
30	4	5.376	6.452	8.602	10.753
31	4	5.383	6.460	8.613	10.767
32	4	5.390	6.468	8.625	10.781
33	4	5.397	6.477	8.636	10.795
34	4	5.404	6.485	8.647	10.809
35	4	5.411	6.494	8.658	10.823
36	5	6.894	8.273	11.031	13.789
37	5	6.901	8.282	11.042	13.803
38	5	6.908	8.290	11.053	13.817
39	5	6.915	8.298	11.065	13.831
40	5	6.922	8.307	11.076	13.845
41	5	6.929	8.315	11.087	13.859
42	5	6.936	8.324	11.098	13.873
43	5	9.943	8.332	11.109	13.887
44	5	6.950	8.341	11.121	13.901
45	6	8.433	10.120	13.494	16.867
46	6	8.440	10.129	13.505	16.881
47	6	8.447	10.137	13.516	16.895
48	6	8.454	10.145	13.527	16.909
49	6	8.461	10.154	13.538	16.923
50	6	8.468	10.162	13.550	16.937
51	6	8.476	10.171	13.561	16.951
52	6	8.483	10.179	13.572	16.965
53	6	8.490	10.187	13.583	16.979
54	7	9.973	11.967	15.956	19.945
55	7	9.980	11.975	15.967	19.959
56	7	9.987	11.984	15.979	19.973
57	7	9.994	11.992	15.990	19.987
58	7	10.001	12.001	16.001	20.001
59	7	10.008	12.009	16.012	20.015
60	7	10.015	12.018	16.023	20.029
61	7	10.022	12.026	16.035	20.043

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
62	7	10.029	12.034	16.046	20.057
63	8	11.512	13.814	18.419	23.023
64	8	11.519	13.822	18.430	23.037
65	8	11.526	13.831	18.441	23.051
66	8	11.533	13.839	18.452	23.065
67	8	11.540	13.848	18.463	23.079
68	8	11.547	13.856	18.475	23.093
69	8	11.554	13.864	18.486	23.107
70	8	11.561	13.873	18.497	23.121
71	8	11.568	13.881	18.508	23.135
72	9	13.051	15.661	20.881	26.102
73	9	13.058	15.669	20.892	26.116
74	9	13.065	15.678	20.904	26.130
75	9	13.072	15.686	20.915	26.144
76	9	13.079	15.695	20.926	26.158
77	9	13.086	15.703	20.937	26.172
78	9	13.093	15.711	20.948	26.186
79	9	13.100	15.720	20.960	26.200
80	9	13.107	15.728	20.971	26.214
81	10	14.590	17.508	23.344	29.180
82	10	14.597	17.516	23.355	29.194
83	10	14.604	17.525	23.366	29.208
84	10	14.611	17.533	23.377	29.222
85	10	14.618	17.541	23.389	29.236
86	10	14.625	17.550	23.400	29.250
87	10	14.632	17.558	23.411	29.264
88	10	14.639	17.567	23.422	29.278
89	10	14.646	17.575	23.433	29.292
90	11	16.129	19.355	25.806	32.258
91	11	16.136	19.363	25.818	32.272
92	11	16.143	19.372	25.829	32.286
93	11	16.150	19.380	25.840	32.300
94	11	16.157	19.388	25.851	32.314
95	11	16.164	19.397	25.862	32.328
96	11	16.171	19.405	25.874	32.342
97	11	16.178	19.414	25.885	32.356
98	11	16.185	19.422	25.896	32.370
99	12	17.668	21.202	28.269	35.336
100	12	17.675	21.210	28.280	35.350
101	12	17.682	21.218	28.291	35.364
102	12	17.689	21.227	28.302	35.378
103	12	17.696	21.235	28.314	35.392
104	12	17.703	21.244	28.325	35.406
105	12	17.710	21.252	28.336	35.420
106	12	17.717	21.260	28.347	35.434
107	12	17.724	21.269	28.358	35.448
108	13	19.207	23.049	30.731	38.414

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
109	13	19.214	23.057	30.743	38.428
110	13	19.221	23.065	30.754	38.442
111	13	19.228	23.074	30.765	38.456
112	13	19.235	23.082	30.776	38.470
113	13	19.242	23.091	30.787	38.484
114	13	19.249	23.099	30.799	38.498
115	13	19.256	23.107	30.810	38.512
116	13	19.263	23.116	30.821	38.526
117	14	20.746	24.895	33.194	41.492
118	14	20.753	24.904	33.205	41.506
119	14	20.760	24.912	33.216	41.520
120	14	20.767	24.921	33.228	41.534
121	14	20.774	24.929	33.239	41.548
122	14	20.781	24.937	33.250	41.562
123	14	20.788	24.946	33.261	41.576
124	14	20.795	24.954	33.272	41.590
125	14	20.802	24.963	33.284	41.604
126	15	22.285	26.742	35.656	44.571
127	15	22.292	26.751	35.668	44.585
128	15	22.299	26.759	35.679	44.599
129	15	22.306	26.768	35.690	44.613
130	15	22.313	26.776	35.701	44.627
131	15	22.320	26.784	35.713	44.641
132	15	22.327	26.793	35.724	44.655
133	15	22.334	26.801	35.735	44.669
134	15	22.341	26.810	35.746	44.683
135	16	23.824	28.589	38.119	47.649
136	16	23.831	28.598	38.130	47.663
137	16	23.838	28.606	38.141	47.677
138	16	23.845	28.614	38.153	47.691
139	16	23.852	28.623	38.164	47.705
140	16	23.859	28.631	38.175	47.719
141	16	23.866	28.640	38.186	47.733
142	16	23.873	28.648	38.197	47.747
143	16	23.880	28.656	38.209	47.761
144	17	25.363	30.436	40.582	50.727
145	17	25.370	30.445	40.593	50.741
146	17	25.377	30.453	40.604	50.755
147	17	25.384	30.461	40.615	50.769
148	17	25.391	30.470	40.626	50.783
149	17	25.398	30.478	40.638	50.797
150	17	25.405	30.487	40.649	50.811
151	17	25.413	30.495	40.660	50.825
152	17	25.420	30.503	40.671	50.839
153	18	26.903	32.283	43.044	53.805
154	18	26.910	32.291	43.055	53.819
155	18	26.917	32.300	43.067	53.833

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
156	18	26.924	32.308	43.078	53.847
157	18	26.931	32.317	43.089	53.861
158	18	26.938	32.325	43.100	53.875
159	18	26.945	32.334	43.111	53.889
160	18	26.952	32.342	43.123	53.903
161	18	26.959	32.350	43.134	53.917
162	19	28.442	34.130	45.507	56.883
163	19	28.449	34.138	45.518	56.897
164	19	28.456	34.147	45.529	56.911
165	19	28.463	34.155	45.540	56.925
166	19	28.470	34.164	45.551	56.939
167	19	28.477	34.172	45.563	56.953
168	19	28.484	34.180	45.574	56.967
169	19	28.491	34.189	45.585	56.981
170	19	28.498	34.197	45.596	56.995
171	20	29.981	35.977	47.969	59.962
172	20	29.988	35.985	47.980	59.976
173	20	29.995	35.994	47.992	59.990
174	20	30.002	36.002	48.003	60.004
175	20	30.009	36.011	48.014	60.018
176	20	30.016	36.019	48.025	60.032
177	20	30.023	36.027	48.036	60.046
178	20	30.030	36.036	48.048	60.060
179	20	30.037	36.044	48.059	60.074
180	21	31.520	37.824	50.432	63.040
181	21	31.527	37.832	50.443	63.054
182	21	31.534	37.841	50.454	63.068
183	21	31.541	37.849	50.465	63.082
184	21	31.548	37.857	50.477	63.096
185	21	31.555	37.866	50.488	63.110
186	21	31.562	37.874	50.499	63.124
187	21	31.569	37.883	50.510	63.138
188	21	31.576	37.891	50.521	63.152
189	22	33.059	39.671	52.894	66.118
190	22	33.066	39.679	52.906	66.132
191	22	33.073	39.688	52.917	66.146
192	22	33.080	39.696	52.928	66.160
193	22	33.087	39.704	52.939	66.174
194	22	33.094	39.713	52.950	66.188
195	22	33.101	39.721	52.962	66.202
196	22	33.108	39.730	52.973	66.216
197	22	33.115	39.738	52.984	66.230
198	23	34.598	41.518	55.357	69.196
199	23	34.605	41.526	55.368	69.210
200	23	34.612	41.534	55.379	69.224
201	23	34.619	41.543	55.390	69.238
202	23	34.626	41.551	55.402	69.252

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
203	23	34.633	41.560	55.413	69.266
204	23	34.640	41.568	55.424	69.280
205	23	34.647	41.576	55.435	69.294
206	23	34.654	41.585	55.440	69.308
207	24	36.137	43.365	57.819	72.274
208	24	36.144	43.373	57.831	72.288
209	24	36.151	43.381	57.842	72.302
210	24	36.158	43.390	57.853	72.316
211	24	36.165	43.398	57.864	72.330
212	24	36.172	43.407	57.875	72.344
213	24	36.179	43.415	57.887	72.358
214	24	36.186	43.423	57.898	72.372
215	24	36.193	43.432	57.909	72.386
216	25	37.676	45.211	60.282	75.352
217	25	37.683	45.220	60.293	75.366
218	25	37.690	45.228	60.304	75.380
219	25	37.697	45.237	60.316	75.394
220	25	37.704	45.245	60.327	75.408
221	25	37.711	45.253	60.338	75.422
222	25	37.718	45.262	60.349	75.436
223	25	37.725	45.270	60.360	75.450
224	25	37.732	45.279	60.372	75.464
225	26	39.215	47.058	62.744	78.431
226	26	39.222	47.067	62.756	78.445
227	26	39.229	47.075	62.767	78.459
228	26	39.236	47.084	62.778	78.473
229	26	39.243	47.092	62.789	78.487
230	26	39.250	47.100	62.800	78.501
231	26	39.257	47.109	62.812	78.515
232	26	39.264	47.117	62.823	78.529
233	26	39.271	47.126	62.834	78.543
234	27	40.754	48.905	65.207	81.509
235	27	40.761	48.914	65.218	81.523
236	27	40.768	48.922	65.229	81.537
237	27	40.775	48.930	65.241	81.551
238	27	40.782	48.939	65.252	81.565
239	27	40.789	48.947	65.263	81.579
240	27	40.796	48.956	65.274	81.593
241	27	40.803	48.964	65.285	81.607
242	27	40.810	48.972	65.297	81.621
243	28	42.293	50.752	67.670	84.587
244	28	42.300	50.761	67.681	84.601
245	28	42.307	50.769	67.692	84.615
246	28	42.314	50.777	67.703	84.629
247	28	42.321	50.786	67.714	84.643
248	28	42.328	50.794	67.726	84.657
249	28	42.335	50.803	67.737	84.671
250	28	42.342	50.811	67.748	84.685
251	28	42.350	50.819	67.759	84.699

(续)

z	k	m/mm			
		0.50	0.60	0.80	1.00
		W/mm			
252	29	43.833	52.599	70.132	87.665
253	29	43.840	52.607	70.143	87.679
254	29	43.847	52.616	70.155	87.693
255	29	43.854	52.624	70.166	87.707
256	29	43.861	52.633	70.177	87.721
257	29	43.868	52.641	70.188	87.735
258	29	43.875	52.650	70.199	87.749
259	29	43.882	52.658	70.211	87.763
260	29	43.889	52.666	70.222	87.777
261	30	45.372	54.446	72.595	90.743
262	30	45.379	54.454	72.606	90.757
263	30	45.386	54.463	72.617	90.771
264	30	45.393	54.471	72.628	90.785
265	30	45.400	54.480	72.639	90.799
266	30	45.407	54.488	72.651	90.813
267	30	45.414	54.496	72.662	90.827
268	30	45.421	54.505	72.673	90.841
269	30	45.428	54.513	72.684	90.855
270	31	46.911	58.293	75.057	93.822
271	31	46.918	58.301	75.068	93.836
272	31	46.925	58.310	75.080	93.850
273	31	46.932	58.318	75.091	93.864
274	31	46.939	58.327	75.102	93.878
275	31	46.946	58.335	75.113	93.892
276	31	46.953	58.343	75.124	93.906
277	31	46.960	58.352	75.136	93.920
278	31	46.967	58.360	75.147	93.934
279	32	48.450	58.140	77.520	96.900
280	32	48.457	58.148	77.531	96.914
281	32	48.464	58.157	77.542	96.928
282	32	48.471	58.165	77.553	96.942
283	32	48.478	58.173	77.565	96.956
284	32	48.485	58.182	77.576	96.970
285	32	48.492	58.190	77.587	96.984
286	32	48.499	58.199	77.598	96.998
287	32	48.506	58.207	77.609	97.012
288	33	49.989	59.987	79.982	99.978
289	33	49.996	59.995	79.993	99.992
290	33	50.003	60.004	80.005	100.006
291	33	50.010	60.012	80.016	100.020
292	33	50.017	60.020	80.027	100.034
293	33	50.024	60.029	80.038	100.048
294	33	50.031	60.037	80.050	100.062
295	33	50.038	60.046	80.061	100.076
296	33	50.045	60.054	80.072	100.090
297	34	51.528	61.834	82.445	103.056
298	34	51.535	61.842	82.456	103.070
299	34	51.542	61.850	82.467	103.084
300	34	51.549	61.859	82.478	103.098

表 10.2-4 圆柱齿轮圆柱测量距

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
6	2.079	2.643	3.416	4.158	4.896	6.812	8.315
7	2.284	2.890	3.745	4.569	5.389	7.471	9.138
8	2.585	3.256	4.229	5.170	6.107	8.438	10.339
9	2.801	3.516	4.575	5.601	6.625	9.129	11.203
10	3.089	3.866	5.039	6.179	7.315	10.057	12.357
11	3.311	4.133	5.395	6.623	7.848	10.769	13.246
12	3.593	4.474	5.847	7.185	8.521	11.672	14.371
13	3.819	4.746	6.210	7.638	9.064	12.398	15.277
14	4.095	5.080	6.653	8.191	9.725	13.284	16.381
15	4.325	5.357	7.021	8.650	10.276	14.020	17.300
16	4.598	5.686	7.458	9.195	10.929	14.894	18.390
17	4.830	5.965	7.830	9.659	11.486	15.637	19.319
18	5.099	6.290	8.262	10.199	12.132	16.502	20.397
19	5.333	6.572	8.637	10.667	12.694	17.251	21.333
20	5.601	6.894	9.066	11.202	13.335	18.109	22.404
21	5.836	7.177	9.443	11.673	13.900	18.863	23.346
22	6.102	7.497	9.869	12.204	14.537	19.715	24.409
23	6.339	7.782	10.248	12.678	15.105	20.473	25.356
24	6.603	8.100	10.672	13.207	15.739	21.320	26.414
25	6.841	8.386	11.053	13.682	16.310	22.082	27.365
26	7.101	8.703	11.474	14.209	16.911	22.925	28.418
27	7.343	8.990	11.857	14.686	17.514	23.689	29.373
28	7.605	9.305	12.277	15.211	18.142	24.529	30.421
29	7.845	9.593	12.660	15.690	18.717	25.296	31.379
30	8.106	9.908	13.079	16.212	19.344	26.133	32.424
31	8.346	10.196	13.463	16.693	19.920	26.902	33.385
32	8.607	10.510	13.880	17.214	20.515	27.736	34.427
33	8.848	10.799	14.266	17.695	21.122	28.507	35.390
34	9.107	11.111	14.682	18.215	21.746	29.339	36.430
35	9.349	11.401	15.068	18.697	22.325	30.112	37.395
36	9.608	11.713	15.483	19.216	22.947	30.942	38.432
37	9.850	12.003	15.870	19.700	23.527	31.716	39.399
38	10.109	12.314	16.285	20.217	24.148	32.545	40.431
39	10.351	12.605	16.672	20.701	24.729	33.320	41.403
40	10.609	12.916	17.086	21.218	25.348	34.147	42.436
41	10.852	13.207	17.474	21.703	25.930	34.923	43.406
42	11.109	13.517	17.887	22.219	26.549	35.749	44.438
43	11.352	13.809	18.276	22.705	27.132	36.527	45.410
44	11.610	14.118	18.688	23.220	27.750	37.351	46.440
45	11.853	14.410	19.077	23.706	28.333	38.130	47.412
46	12.110	14.719	19.489	24.221	28.950	38.953	48.441
47	12.354	15.012	19.879	24.708	29.535	39.732	49.415
48	12.611	15.320	20.290	25.221	30.151	40.554	50.442
49	12.854	15.613	20.680	25.709	30.736	41.335	51.418
50	13.111	15.921	21.091	26.222	31.351	42.156	52.444
51	13.355	16.214	21.481	26.710	31.937	42.937	53.420
52	13.611	16.522	21.891	27.223	32.552	43.758	54.445

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
53	13.856	16.815	22.282	27.711	33.138	44.539	55.422
54	14.112	17.123	22.692	28.223	33.752	45.359	56.446
55	14.356	17.416	23.083	28.712	34.339	46.141	57.424
56	14.612	17.724	23.493	29.224	34.953	46.960	58.447
57	14.856	18.017	23.884	29.713	35.540	47.743	59.426
58	15.112	18.324	24.293	30.224	36.153	48.561	60.448
59	15.357	18.618	24.685	30.714	36.741	49.345	61.428
60	15.612	18.925	25.094	31.225	37.354	50.163	62.449
61	15.857	19.219	25.486	31.715	37.942	50.947	63.429
62	16.113	19.526	25.895	32.225	38.554	51.764	64.450
63	16.358	19.820	26.287	32.715	39.142	52.548	65.431
64	16.613	20.126	26.695	33.225	39.754	53.365	66.451
65	16.858	20.421	27.088	33.716	40.343	54.150	67.432
66	17.113	20.727	27.496	34.226	40.955	54.966	68.452
67	17.358	21.022	27.888	34.717	41.544	55.751	69.433
68	17.613	21.328	28.296	35.226	42.155	56.567	70.452
69	17.859	21.622	28.689	35.717	42.744	57.353	71.435
70	18.113	21.928	29.097	36.227	43.355	58.167	72.453
71	18.359	22.223	29.490	36.718	43.945	58.954	73.436
72	18.613	22.529	29.897	37.227	44.555	59.768	74.454
73	18.859	22.824	30.290	37.719	45.145	60.555	75.437
74	19.114	23.129	30.697	38.227	45.756	61.369	76.454
75	19.360	23.424	31.091	38.719	46.346	62.156	77.438
76	19.614	23.730	31.498	39.228	46.956	62.970	78.455
77	19.860	24.025	31.892	39.720	47.546	63.757	79.439
78	20.114	24.330	32.298	40.228	48.156	64.571	80.456
79	20.360	24.625	32.692	40.720	48.747	65.358	81.440
80	20.614	24.930	33.099	41.228	49.356	66.171	82.456
81	20.860	25.226	33.493	41.721	49.947	66.959	83.441
82	21.114	25.531	33.899	42.228	50.557	67.772	84.457
83	21.361	25.827	34.293	42.721	51.148	68.560	85.442
84	21.614	26.131	34.699	43.229	51.757	69.373	86.457
85	21.861	26.427	35.094	43.721	52.348	70.161	87.443
86	22.114	26.732	35.500	44.229	52.957	70.973	88.458
87	22.361	27.027	35.894	44.722	53.549	71.762	89.444
88	22.615	27.332	36.300	45.229	54.157	72.574	90.458
89	22.861	27.628	36.694	45.722	54.749	73.363	91.444
90	23.115	27.932	37.100	46.229	55.357	74.174	92.459
91	23.361	28.228	37.495	46.723	55.949	74.964	93.445
92	23.615	28.533	37.900	47.230	56.558	75.775	94.459
93	23.861	28.829	38.295	47.723	57.150	76.564	95.446
94	24.115	29.133	38.701	48.230	57.758	77.375	96.460
95	24.362	29.429	39.096	48.723	58.350	78.165	97.447
96	24.615	29.733	39.501	49.230	58.958	78.976	98.460
97	24.862	30.030	39.896	49.724	59.550	79.766	99.447
98	25.115	30.334	40.301	50.230	60.158	80.576	100.460
99	25.362	30.630	40.696	50.724	60.751	81.366	101.448

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
100	25.615	30.934	41.101	51.230	61.358	82.177	102.461
101	25.862	31.230	41.497	51.724	61.951	82.967	103.449
102	26.115	31.534	41.902	52.231	62.558	83.777	104.461
103	26.362	31.831	42.297	52.725	63.151	84.568	105.449
104	26.615	32.134	42.702	53.231	63.758	85.378	106.461
105	26.862	32.431	43.097	53.725	64.351	86.168	107.450
106	27.115	32.735	43.502	54.231	64.959	86.978	108.462
107	27.363	33.031	43.898	54.725	65.552	87.769	109.450
108	27.616	33.335	44.302	55.231	66.159	88.578	110.462
109	27.863	33.632	44.698	55.725	66.752	89.369	111.451
110	28.116	33.935	45.103	56.231	67.359	90.179	112.462
111	28.363	34.232	45.498	56.726	67.952	90.970	113.451
112	28.616	34.535	45.903	57.231	68.559	91.779	114.463
113	28.863	34.832	46.298	57.726	69.152	92.571	115.452
114	29.116	35.136	46.703	58.231	69.759	93.380	116.463
115	29.363	35.432	47.099	58.726	70.353	94.171	117.452
116	29.616	35.736	47.503	59.232	70.959	94.980	118.463
117	29.863	36.033	47.899	59.726	71.553	95.772	119.453
118	30.116	36.336	48.303	60.232	72.159	96.580	120.463
119	30.363	36.633	48.699	60.727	72.753	97.372	121.453
120	30.616	36.936	49.103	61.232	73.359	98.181	122.464
121	30.863	37.233	49.499	61.727	73.953	98.972	123.454
122	31.116	37.536	49.904	62.232	74.559	99.781	124.464
123	31.364	37.833	50.300	62.727	75.153	100.573	125.454
124	31.616	38.137	50.704	63.232	75.760	101.381	126.464
125	31.864	38.434	51.100	63.727	76.354	102.173	127.454
126	32.116	38.737	51.504	64.232	76.960	102.981	128.464
127	32.364	39.034	51.900	64.727	77.554	103.774	129.455
128	32.616	39.337	52.304	65.232	78.160	104.582	130.465
129	32.864	39.634	52.700	65.728	78.754	105.374	131.455
130	33.116	39.937	53.104	66.232	79.360	106.182	132.465
131	33.364	40.234	53.501	66.728	79.954	106.975	133.456
132	33.616	40.537	53.904	67.233	80.560	107.782	134.465
133	33.864	40.835	54.301	67.728	81.154	108.575	135.456
134	34.116	41.137	54.705	68.233	81.760	109.383	136.465
135	34.364	41.435	55.101	68.728	82.355	110.175	137.456
136	34.616	41.738	55.505	69.233	82.960	110.983	138.466
137	34.864	42.035	55.901	69.728	83.555	111.776	139.457
138	35.116	42.338	56.305	70.233	84.160	112.583	140.466
139	35.364	42.635	56.701	70.728	84.755	113.376	141.457
140	35.616	42.938	57.105	71.233	85.360	114.183	142.466
141	35.864	43.235	57.501	71.729	85.955	114.976	143.457
142	36.117	43.538	57.905	72.223	86.560	115.784	144.466
143	36.364	43.836	58.302	72.729	87.155	116.577	145.458
144	36.617	44.138	58.705	73.233	87.760	117.384	146.466
145	36.864	44.436	59.102	73.729	88.355	118.177	147.458
146	37.117	44.738	59.505	74.233	88.960	118.984	148.466

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
147	37.365	45.036	59.902	74.729	89.555	119.777	149.458
148	37.617	45.339	60.305	75.233	90.160	120.584	150.467
149	37.885	45.636	60.702	75.729	90.756	121.378	151.458
150	38.117	45.939	61.106	76.233	91.361	122.184	152.467
151	38.365	46.236	61.502	76.729	91.956	122.978	153.459
152	38.617	46.539	61.906	77.233	92.561	123.785	154.467
153	38.865	46.836	62.302	77.729	93.156	124.578	155.459
154	39.117	47.139	62.706	78.234	93.761	125.385	156.467
155	39.365	47.437	63.103	78.730	94.356	126.179	157.459
156	39.617	47.739	63.506	79.234	94.961	126.985	158.467
157	39.865	48.037	63.903	79.730	95.556	127.779	159.459
158	40.117	48.339	64.306	80.234	96.161	128.585	160.467
159	40.365	48.637	64.703	80.730	96.756	129.379	161.460
160	40.617	48.939	65.106	81.234	97.361	130.185	162.468
161	40.885	49.237	65.503	81.730	97.956	130.979	163.460
162	41.117	49.539	65.906	82.234	98.561	131.786	164.468
163	41.365	49.837	66.303	82.730	99.156	132.580	165.460
164	41.617	50.140	66.706	83.234	99.761	133.386	166.468
165	41.865	50.437	67.103	83.730	100.356	134.180	167.460
166	42.117	50.740	67.506	84.234	100.961	134.986	168.468
167	42.365	51.037	67.903	84.730	101.557	135.780	169.461
168	42.617	51.340	68.306	85.234	102.161	136.586	170.468
169	42.865	51.638	68.704	85.730	102.757	137.380	171.461
170	43.117	51.940	69.107	86.234	103.361	138.186	172.468
171	43.365	52.238	69.504	86.731	103.957	138.981	173.461
172	43.617	52.540	69.907	87.234	104.561	139.786	174.468
173	43.865	52.838	70.304	87.731	105.157	140.581	175.461
174	44.117	53.140	70.707	88.234	105.761	141.387	176.469
175	44.365	53.438	71.104	88.731	106.357	142.181	177.462
176	44.617	53.740	71.507	89.234	106.961	142.987	178.469
177	44.865	54.038	71.904	89.731	107.557	143.781	179.462
178	45.117	54.340	72.307	90.234	108.161	144.587	180.469
179	45.365	54.638	72.704	90.731	108.757	145.381	181.462
180	45.617	54.940	73.107	91.234	109.361	146.187	182.469
181	45.866	55.238	73.504	91.731	109.957	146.982	183.462
182	46.117	55.540	73.907	92.235	110.561	147.787	184.469
183	46.366	55.838	74.304	92.731	111.157	148.582	185.462
184	46.617	56.141	74.707	93.235	111.761	149.387	186.469
185	46.866	56.439	75.104	93.731	112.357	150.182	187.463
186	47.117	56.741	75.507	94.235	112.961	150.988	188.469
187	47.366	57.039	75.905	94.731	113.558	151.782	189.463
188	47.617	57.341	76.307	95.235	114.162	152.588	190.469
189	47.866	57.639	76.705	95.731	114.758	153.382	191.463
190	48.117	57.941	77.107	96.235	115.362	154.188	192.469
191	48.366	58.239	77.505	96.732	115.958	154.983	193.463
192	48.617	58.541	77.907	97.235	116.562	155.788	194.470
193	48.866	58.839	78.305	97.732	117.158	156.583	195.463

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
194	49.117	59.141	78.707	98.235	117.762	157.388	196.470
195	49.366	59.439	79.105	98.732	118.358	158.183	197.463
196	49.617	59.741	79.508	99.235	118.962	158.988	198.470
197	49.866	60.039	79.905	99.732	119.558	159.783	199.464
198	50.117	60.341	80.308	100.235	120.162	160.588	200.470
199	50.366	60.639	80.705	100.732	120.758	161.383	201.464
200	50.618	60.941	81.108	101.235	121.362	162.188	202.470
201	50.866	61.239	81.505	101.732	121.958	162.984	203.464
202	51.118	61.541	81.908	102.235	122.562	163.789	204.470
203	51.366	61.840	82.305	102.732	123.158	164.584	205.464
204	51.618	62.141	82.708	103.235	123.762	165.389	206.470
205	51.866	62.440	83.105	103.732	124.358	166.184	207.464
206	52.118	62.741	83.508	104.235	124.962	166.989	208.470
207	52.366	63.040	83.905	104.732	125.558	167.784	209.464
208	52.618	63.342	84.308	105.235	126.162	168.589	210.470
209	52.866	63.640	84.706	105.732	126.758	169.384	211.464
210	53.118	63.942	85.108	106.235	127.362	170.189	212.470
211	53.366	64.240	85.506	106.732	127.958	170.984	213.465
212	53.618	64.542	85.908	107.235	128.562	171.789	214.471
213	53.866	64.840	86.306	107.732	129.159	172.585	215.465
214	54.118	65.142	86.708	108.235	129.762	173.389	216.471
215	54.366	65.440	87.106	108.732	130.359	174.185	217.465
216	54.618	65.742	87.508	109.235	130.962	174.989	218.471
217	54.866	66.040	87.906	109.733	131.559	175.785	219.465
218	55.118	66.342	88.308	110.235	132.162	176.589	220.471
219	55.366	66.640	88.706	110.733	132.759	177.385	221.465
220	55.618	66.942	89.108	111.235	133.362	178.190	222.471
221	55.866	67.240	89.506	111.733	133.959	178.985	223.465
222	56.118	67.542	89.908	112.235	134.562	179.790	224.471
223	56.366	67.840	90.306	112.733	135.159	180.585	225.465
224	56.618	68.142	90.708	113.236	135.762	181.390	226.471
225	56.866	68.440	91.106	113.733	136.359	182.185	227.466
226	57.118	68.742	91.508	114.236	136.952	182.990	228.471
227	57.366	69.041	91.906	114.733	137.559	183.786	229.466
228	57.618	69.342	92.308	115.236	138.162	184.590	230.471
229	57.866	69.641	92.706	115.733	138.759	185.386	231.466
230	58.118	69.942	93.108	116.236	139.362	186.190	232.471
231	58.366	70.241	93.506	116.733	139.959	186.986	233.466
232	58.618	70.542	93.909	117.236	140.562	187.790	234.471
233	58.867	70.841	94.306	117.733	141.159	188.586	235.466
234	59.118	71.142	94.709	118.236	141.762	189.390	236.471
235	59.367	71.441	95.107	118.733	142.359	190.186	237.466
236	59.618	71.742	95.509	119.236	142.962	190.990	238.471
237	59.867	72.041	95.907	119.733	143.559	191.786	239.466
238	60.118	72.342	96.309	120.236	144.162	192.590	240.472
239	60.367	72.641	96.707	120.733	144.759	193.386	241.466
240	60.618	72.943	97.109	121.236	145.362	194.190	242.472

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
241	60.867	73.241	97.507	121.733	145.959	194.986	243.467
242	61.118	73.543	97.909	122.236	146.562	195.791	244.472
243	61.367	73.841	98.307	122.733	147.159	196.587	245.467
244	61.618	74.143	98.709	123.236	147.762	197.391	246.472
245	61.867	74.441	99.107	123.733	148.359	198.187	247.467
246	62.118	74.743	99.509	124.236	148.962	198.991	248.472
247	62.367	75.041	99.907	124.733	149.559	199.787	249.467
248	62.618	75.343	100.309	125.236	150.162	200.591	250.472
249	62.867	75.641	100.707	125.733	150.760	201.387	251.467
250	63.118	75.943	101.109	126.236	151.363	202.191	252.472
251	63.367	76.241	101.507	126.734	151.960	202.987	253.467
252	63.618	76.543	101.909	127.236	152.563	203.791	254.472
253	63.867	76.841	102.307	127.734	153.160	204.587	255.467
254	64.118	77.143	102.709	128.236	153.763	205.391	256.472
255	64.367	77.441	103.107	128.734	154.360	206.187	257.467
256	64.618	77.743	103.509	129.236	154.963	206.991	258.472
257	64.867	78.042	103.907	129.734	155.560	207.787	259.467
258	65.118	78.343	104.309	130.236	156.163	208.591	260.472
259	65.367	78.642	104.707	130.734	156.760	209.387	261.467
260	65.618	78.943	105.109	131.236	157.363	210.191	262.472
261	65.867	79.242	105.507	131.734	157.960	210.987	263.468
262	66.118	79.543	105.909	132.236	158.563	211.791	264.472
263	66.367	79.842	106.307	132.734	159.160	212.588	265.468
264	66.618	80.143	106.709	133.236	159.763	213.391	266.472
265	66.867	80.442	107.107	133.734	160.360	214.188	267.468
266	67.118	80.743	107.509	134.236	160.963	214.991	268.472
267	67.367	81.042	107.907	134.734	161.560	215.788	269.468
268	67.618	81.343	108.309	135.236	162.163	216.592	270.472
269	67.867	81.642	108.707	135.734	162.760	217.388	271.468
270	68.118	81.943	109.109	136.236	163.363	218.192	272.473
271	68.367	82.242	109.508	136.734	163.960	218.988	273.468
272	68.618	82.543	109.909	137.236	164.563	219.792	274.473
273	68.867	82.842	110.308	137.734	165.160	220.588	275.468
274	69.118	83.143	110.709	138.236	165.763	221.392	276.473
275	69.367	83.442	111.108	138.734	166.360	222.188	277.468
276	69.618	83.743	111.509	139.236	166.963	222.992	278.473
277	69.867	84.042	111.908	139.734	167.560	223.788	279.468
278	70.118	84.343	112.309	140.236	168.163	224.592	280.473
279	70.367	84.642	112.708	140.734	168.760	225.388	281.468
280	70.618	84.943	113.110	141.236	169.363	226.192	282.473
281	70.867	85.242	113.508	141.734	169.960	226.988	283.468
282	71.118	85.544	113.910	142.236	170.563	227.792	284.473
283	71.367	85.842	114.308	142.734	171.160	228.589	285.468
284	71.618	86.144	114.710	143.236	171.763	229.392	286.473
285	71.867	86.442	115.108	143.734	172.360	230.189	287.469
286	72.118	86.744	115.510	144.236	172.963	230.992	288.473
287	72.367	87.042	115.908	144.734	173.560	231.789	289.469

(续)

m/mm	0.25	0.3	0.4	0.5	0.6	0.8	1.0
d_p/mm	0.433	0.572	0.724	0.866	1.008	1.441	1.732
z	M/mm						
288	72.618	87.344	116.310	145.236	174.163	232.592	290.473
289	72.867	87.642	116.708	145.734	174.760	233.389	291.469
290	73.118	87.944	117.110	146.236	175.363	234.192	292.473
291	73.367	88.242	117.508	146.734	175.960	234.989	293.469
292	73.618	88.544	117.910	147.237	176.563	235.792	294.473
293	73.867	88.842	118.308	147.734	177.160	236.589	295.469
294	74.118	89.144	118.710	148.237	177.763	237.392	296.473
295	74.367	89.443	119.108	148.734	178.360	238.189	297.469
296	74.618	89.744	119.510	149.237	178.963	238.992	298.473
297	74.867	90.043	119.908	149.734	179.560	239.789	299.469
298	75.118	90.344	120.310	150.237	180.163	240.592	300.473
299	75.367	90.643	120.708	150.735	180.761	241.389	301.469
300	75.618	90.944	121.110	151.237	181.363	242.193	302.473

表 10.2-5 $m=1\text{mm}, \alpha=20^\circ, h_a^*=1$ 齿轮的

(续)

固定弦齿厚和固定弦齿高

x_n	$\bar{s}_c$	$\bar{h}_c$
	mm	
-0.50	1.0657	0.3061
-0.49	1.0721	0.3149
-0.48	1.0785	0.3237
-0.47	1.0850	0.3325
-0.46	1.0914	0.3414
-0.45	1.0978	0.3502
-0.44	1.1042	0.3591
-0.43	1.1107	0.3679
-0.42	1.1171	0.3767
-0.41	1.1235	0.3855
-0.40	1.1299	0.3944
-0.39	1.1364	0.4032
-0.38	1.1428	0.4120
-0.37	1.1492	0.4208
-0.36	1.1557	0.4297
-0.35	1.1621	0.4385
-0.34	1.1685	0.4474
-0.33	1.1749	0.4563
-0.32	1.1814	0.4650
-0.31	1.1878	0.4738
-0.30	1.1942	0.4827
-0.29	1.2006	0.4915
-0.28	1.2071	0.5003
-0.27	1.2135	0.5091
-0.26	1.2199	0.5180
-0.25	1.2264	0.5268
-0.24	1.2328	0.5357
-0.23	1.2329	0.5445

x_n	$\bar{s}_c$	$\bar{h}_c$
	mm	
-0.22	1.2456	0.5533
-0.21	1.2521	0.5621
-0.20	1.2585	0.5710
-0.19	1.2649	0.5798
-0.18	1.2714	0.5886
-0.17	1.2778	0.5974
-0.16	1.2842	0.6063
-0.15	1.2906	0.6151
-0.14	1.2971	0.6240
-0.13	1.3035	0.6328
-0.12	1.3099	0.6416
-0.11	1.3164	0.6504
-0.10	1.3228	0.6593
-0.09	1.3292	0.6681
-0.08	1.3356	0.6769
-0.07	1.3421	0.6857
-0.06	1.3485	0.6946
-0.05	1.3549	0.7034
-0.04	1.3613	0.7123
-0.03	1.3678	0.7210
-0.02	1.3742	0.7299
-0.01	1.3806	0.7387
0.00	1.3871	0.7476
0.01	1.3935	0.7564
0.02	1.3999	0.7652
0.03	1.4063	0.7741
0.04	1.4128	0.7829
0.05	1.4192	0.7917
0.06	1.4256	0.8006

(续)		
x_n	$\bar{s}_c$	$\bar{h}_c$
	mm	
0.07	1.4300	0.8094
0.08	1.4385	0.8162
0.09	1.4449	0.8270
0.10	1.4513	0.8359
0.11	1.4577	0.8447
0.12	1.4642	0.8535
0.13	1.4706	0.8624
0.14	1.4771	0.8712
0.15	1.4835	0.8800
0.16	1.4899	0.8889
0.17	0.4963	0.8977
0.18	1.5028	0.9065
0.19	1.5092	0.9153
0.20	1.5156	0.9242
0.21	1.5220	0.9330
0.22	1.5285	0.9418
0.23	1.5349	0.9507
0.24	1.5413	0.9595
0.25	1.5477	0.9683
0.26	1.5542	0.9772
0.27	1.5606	0.9860
0.28	1.5670	0.9948
0.29	1.5735	1.0036
0.30	1.5799	1.0125
0.31	1.5863	1.0213
0.32	1.5928	1.0301
0.33	1.5992	1.0390
0.34	1.6056	1.0478
0.35	1.6120	1.0566
0.36	1.6185	1.0655
0.37	1.6249	1.0743
0.38	1.6313	1.0831
0.39	1.6377	1.0919
0.40	1.6442	1.1008
0.41	1.6506	1.1096
0.42	1.6570	1.1184
0.43	1.6635	1.1273
0.44	1.6699	1.1361
0.45	1.6763	1.1449
0.46	1.6827	1.1537
0.47	1.6892	1.1626
0.48	1.6956	1.1714
0.49	1.7020	1.1802

(续)		
x_n	$\bar{s}_c$	$\bar{h}_c$
	mm	
0.50	1.7085	1.1891
0.51	1.7149	1.1979
0.52	1.7213	1.2067
0.53	1.7277	1.2156
0.54	1.7342	1.2244
0.55	1.7406	1.2332
0.56	1.7470	1.2421
0.57	1.7534	1.2509
0.58	1.7599	1.2597
0.59	1.7663	1.2685
0.60	1.7727	1.2774
0.61	1.7792	1.2862
0.62	1.7856	1.2950
0.63	1.7920	1.3039
0.64	1.7984	1.3127
0.65	1.8049	1.3215
0.66	1.8113	1.3304
0.67	1.8177	1.3392
0.68	1.8242	1.3480
0.69	1.8306	1.3568
0.70	1.8370	1.3658

2) 能配凑中心距。

3) 可改善齿轮的啮合性能(提高齿面的接触强度, 提高齿根的弯曲强度, 提高齿面的抗胶合和耐磨损能力)。

齿轮的变位以改善齿轮刀具中线相对齿轮坯分度圆的位置来达到。切制标准齿轮时,切齿刀具的中线与齿轮坯的分度圆相切,变位系数 x 为零;切齿刀具由齿轮坯中心移远时称为正变位, x 为正值;刀具移近齿轮坯中心时,称为负变位, x 为负值。

根据两齿轮变位系数之和,一对齿轮的传动可分为下列三种类型:

- 1) 标准齿轮传动 $x_1+x_2=0$, 且 $x_1=0, x_2=0$;
- 2) 高变位齿轮传动 $x_1+x_2=0$, 且 $x_1=-x_2$;
- 3) 角变位齿轮传动 $x_1+x_2\neq 0$ 。

高变位圆柱齿轮传动的几何尺寸计算公式见表 10.2-6。

角变位圆柱齿轮传动的几何尺寸计算公式见表 10.2-7。

变位的概念,不仅用于直齿圆柱齿轮,还可用于斜齿圆柱齿轮、锥齿轮和蜗杆传动。