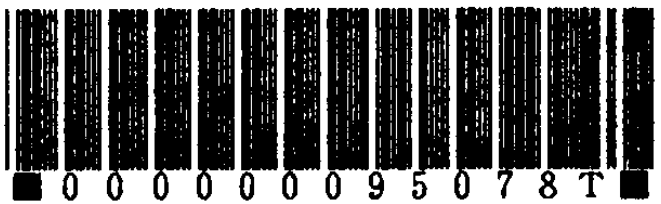
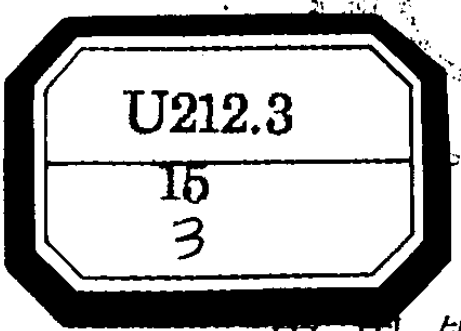
铁路曲线测设用表

（第三册）

铁道部第四勘测设计院修订





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(3)

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责任编辑　安鸿逵　封面设计　王毓平

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修 订 说 明

一、本表是在原铁道部第四工程局设计处主编的，由原人民铁道出版社1975年出版的《铁路曲线测设用表》的基础上，广泛征集设计、施工等有关部门的意见，对原表进行修订的。

本表此次系由铁道部第四勘测设计院线路处主持修订，修订人员为王憙安、刘宗瑛、王汝南，由金成岐、钱广机审校。为扩大本表的应用范围，本册注＊者系烟台公路段杨殿生、李荣富、毕应林增加的一些有关数据，使本表可在各级公路测设中应用。

本表在修订过程中，承各设计、施工等有关部门的同志提供了许多宝贵意见，并经铁道部专业设计院审查，谨此一并致谢。

二、本表所列曲线半径、缓和曲线长度均系根据计标(1986)08号文批准，自1986年7月1日施行的国家标准《铁路线路设计规范》GBJ90—85及计标〔1987〕2415号文批准的《工业企业标准轨距铁路设计规范》GBJ12-87所规定的标准编制的。公路部分则依据《公路工程技术标准》JTJ1-81（交通部部标准）及《公路路线设计规范》JTJ011-84（交通部部标准）有关规定编制。

三、为避免重复，对Ⅰ、Ⅱ、Ⅲ级铁路线路和工业企业标准轨距铁路的曲线要素采用综合编制方式。全表共分三册。

第一、二两册包括各级铁路曲线（含缓和曲线）采用一个偏角时的曲线综合要素表。

第三册内容包括缓和曲线函数、缓和曲线偏角、曲线坐标、竖曲线要素、不同置镜点测设曲线的计算公式、常用数学公式及任意点置镜测设曲线时使用的PC-1211、PC-1500电算程序等。

四、本表表列数据主要由MC68K计算机计算。

五、在使用本表过程中，希望用者随时提出意见和建议，以便再版时修正。

铁道部第四勘测设计院线路处

一九八六年十二月

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第二表　缓和曲线函数表

缓和曲线（见图2）各项函数按下列公式计算：

$$
\left.\begin{aligned}
&\beta=\frac{90l}{\pi R}\qquad \delta=\frac{\beta}{3}\\
&m=\frac{l}{2}-\frac{l^3}{240R^2}\\
&p=\frac{l^2}{24R}-\frac{l^4}{2688R^3}\\
&x_0=l-\frac{l^3}{40R^2}+\frac{l^5}{3456R^4}\\
&y_0=\frac{l^2}{6R}-\frac{l^4}{336R^3}\\
&t_1=\frac{2l}{3}+\frac{l^3}{114.5R^2}+\frac{l^5}{4786.2R^4}\\
&t_2=\frac{56R^3l-l^3}{7(24R^2-l^2)}\\
&C_e=l-\frac{l^3}{90R^2}+\frac{l^5}{3888R^4}
\end{aligned}\right\}\qquad (4)
$$

公式（4）及图2中的符号，其代表意义如下：

ZH——直缓点；　　l——缓和曲线长度；

HY——缓圆点；　　m——切垂距；

QZ——曲线中点；　　p——圆曲线移动量；

YH——圆缓点；　　β——缓和曲线角度；

HZ——缓直点；　　δ——缓和曲线偏角；

R——圆曲线半径；　　C_e——缓和曲线弦长；

T——切线长度；x_0、y_0、t_1、t_2如图所示。

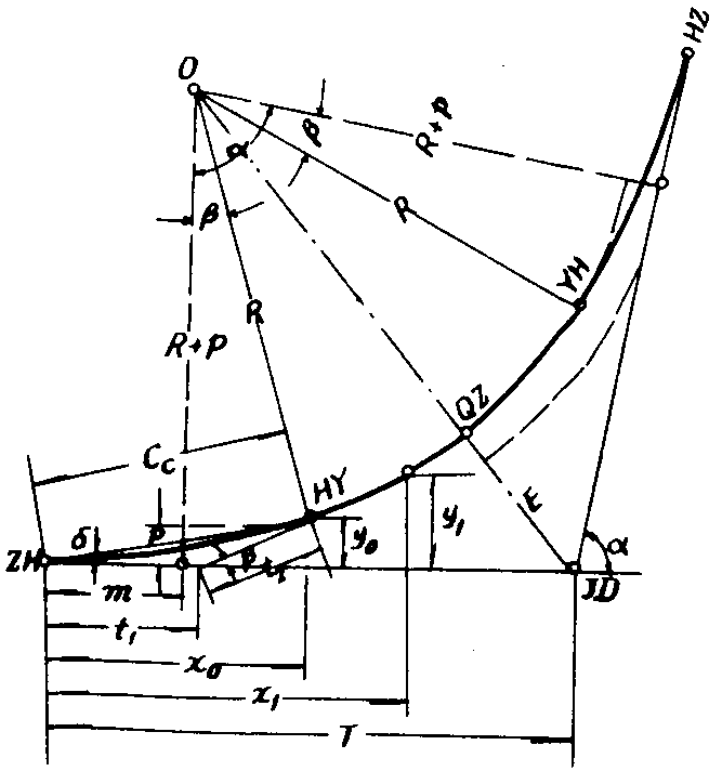

图 2　缓和曲线各主要点示意图

注：1．本册公式中凡以长度表示的符号均以米计。

2．本册公式中凡以角度表示的符号均以度为单位。

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
4000	*100	0°42′58″	0°14′19″	50.000	0.104	99.998	0.417	99.999	66.667	33.334
	*90	0°38′40″	0°12′53″	45.000	0.084	89.999	0.337	89.999	60.000	30.000
	80	0°34′23″	0°11′28″	40.000	0.067	79.999	0.267	80.000	53.334	26.667
	70	0°30′05″	0°10′02″	35.000	0.051	69.999	0.204	70.000	46.667	23.334
	60	0°25′47″	0°08′36″	30.000	0.037	60.000	0.150	60.000	40.000	20.000
	50	0°21′29″	0°07′10″	25.000	0.026	50.000	0.104	50.000	33.333	16.667
	40	0°17′11″	0°05′44″	20.000	0.017	40.000	0.067	40.000	26.667	13.333
	30	0°12′53″	0°04′18″	15.000	0.009	30.000	0.037	30.000	20.000	10.000
	20	0°08′36″	0°02′52″	10.000	0.004	20.000	0.017	20.000	13.333	6.667
3000	*100	0°57′18″	0°19′06″	50.000	0.139	99.997	0.556	99.999	66.668	33.334
	90	0°51′34″	0°17′11″	45.000	0.112	89.998	0.450	89.999	60.001	30.001
	80	0°45′50″	0°15′17″	40.000	0.089	79.999	0.356	79.999	53.334	26.667
	70	0°40′06″	0°13′22″	35.000	0.068	69.999	0.272	70.000	46.667	23.334
	60	0°34′23″	0°11′28″	30.000	0.050	59.999	0.200	60.000	40.000	20.000
	50	0°28′39″	0°09′33″	25.000	0.035	50.000	0.139	50.000	33.333	16.667
	40	0°22′55″	0°07′38″	20.000	0.022	40.000	0.089	40.000	26.667	13.333
	30	0°17′11″	0°05′14″	15.000	0.012	30.000	0.050	30.000	20.000	10.000
	20	0°11′28″	0°03′49″	10.000	0.006	20.000	0.022	20.000	13.333	6.667
2500	*100	1°08′45″	0°22′55″	49.999	0.167	99.996	0.667	99.998	66.668	33.335
	90	1°01′53″	0°20′38″	45.000	0.135	89.997	0.540	89.999	60.001	30.001
	80	0°55′00″	0°18′20″	40.000	0.107	79.998	0.427	79.999	53.334	26.667
	70	0°48′08″	0°16′03″	35.000	0.082	69.999	0.327	69.999	46.667	23.334
	60	0°41′15″	0°13′45″	30.000	0.060	59.999	0.240	60.000	40.000	20.000
	50	0°34′23″	0°11′28″	25.000	0.042	50.000	0.167	50.000	33.334	16.667
	40	0°27′30″	0°09′10″	20.000	0.027	40.000	0.107	40.000	26.667	13.333
	30	0°20′38″	0°06′53″	15.000	0.015	30.000	0.060	30.000	20.000	10.000
	20	0°13′45″	0°04′35″	10.000	0.007	20.000	0.027	20.000	13.333	6.667

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
2000	100	1°25′57″	0°28′39″	49.999	0.208	99.994	0.833	99.997	66.669	33.335
	90	1°17′21″	0°25′47″	44.999	0.169	89.995	0.675	89.998	60.002	30.001
	80	1°08′45″	0°22′55″	39.999	0.133	79.997	0.533	79.999	53.334	26.668
	70	1°00′10″	0°20′03″	35.000	0.102	69.998	0.408	69.999	46.667	23.334
	60	0°51′34″	0°17′11″	30.000	0.075	59.999	0.300	59.999	40.000	20.000
	50	0°42′58″	0°14′19″	25.000	0.052	49.999	0.208	50.000	33.334	16.667
	40	0°34′23″	0°11′28″	20.000	0.033	40.000	0.133	40.000	26.667	13.333
	30	0°25′47″	0°08′36″	15.000	0.019	30.000	0.075	30.000	20.000	10.000
	20	0°17′11″	0°05′44″	10.000	0.008	20.000	0.033	20.000	13.333	6.667
1500	110	2°06′03″	0°42′01″	54.998	0.336	109.985	1.344	109.993	73.339	36.671
	100	1°54′35″	0°38′12″	49.998	0.278	99.989	1.111	99.995	66.671	33.337
	90	1°43′08″	0°34′23″	44.999	0.225	89.992	0.900	89.996	60.003	30.003
	80	1°31′40″	0°30′33″	39.999	0.178	79.994	0.711	79.997	53.335	26.668
	70	1°20′13″	0°26′44″	34.999	0.136	69.996	0.544	69.998	46.668	23.335
	60	1°08′45″	0°22′55″	30.000	0.100	59.998	0.400	59.999	40.001	20.001
	50	0°57′18″	0°19′06″	25.000	0.069	49.999	0.278	49.999	33.334	16.667
	40	0°45′50″	0°15′17″	20.000	0.044	39.999	0.178	40.000	26.667	13.334
	30	0°34′23″	0°11′28″	15.000	0.025	30.000	0.100	30.000	20.000	10.000
	20	0°22′55″	0°07′38″	10.000	0.011	20.000	0.044	20.000	13.333	6.667
1200	130	3°06′13″	1°02′04″	64.994	0.587	129.962	2.347	129.983	86.680	43.345
	120	2°51′53″	0°57′18″	59.995	0.500	119.970	2.000	119.987	80.010	40.010
	110	2°37′34″	0°52′31″	54.996	0.420	109.977	1.680	109.990	73.341	36.674
	100	2°23′14″	0°47′45″	49.997	0.347	99.983	1.389	99.992	66.673	33.339
	90	2°08′55″	0°42′58″	44.998	0.281	89.987	1.125	89.994	60.004	30.004
	80	1°54′35″	0°39′12″	39.999	0.222	79.991	0.889	79.996	53.336	26.669
	70	1°40′16″	0°33′25″	34.999	0.170	69.994	0.681	69.997	46 669	23.335
	60	1°25′57″	0°28′39″	29.999	0.125	59.996	0.500	59.998	40.001	20.001

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
1200	50	1°11′37″	0°23′52″	25.000	0.087	49.998	0.347	49.999	33.334	16.667
	40	0°57′18″	0°19′06″	20.000	0.056	39.999	0.222	40.000	26.667	13.334
	30	0°42′58″	0°14′19″	15.000	0.031	30.000	0.125	30.000	20.000	10.000
	20	0°28′39″	0°09′33″	10.000	0.014	20.000	0.056	20.000	13.333	6.667
1000	150	4°17′50″	1°25′57″	74.986	0.937	149.916	3.748	149.963	100.029	50.027
	140	4°00′39″	1°20′13″	69.989	0.817	139.931	3.266	139.970	93.357	46.688
	130	3°43′27″	1°14′29″	64.991	0.704	129.945	2.916	129.976	86.686	43.351
	120	3°26′16″	1°08′45″	59.993	0.600	119.957	2.399	119.981	80.015	40.014
	110	3°09′05″	1°03′02″	54.994	0.504	109.967	2.016	109.985	73.345	36.677
	100	2°51′53″	0°57′18″	49.996	0.417	99.975	1.666	99.989	66.675	33.341
	90	2°34′42″	0°51′34″	44.997	0.337	89.982	1.350	89.992	60.006	30.006
	80	2°17′31″	0°45′50″	39.998	0.267	79.987	1.067	79.994	53.338	26.671
	70	2°00′19″	0°40′06″	34.999	0.204	69.991	0.817	69.996	46.670	23.336
	60	1°43′08″	0°34′23″	29.999	0.150	59.995	0.600	59.998	40.002	20.002
	50	1°25′57″	0°28′39″	24.999	0.104	49.997	0.417	49.999	33.334	16.668
	40	10°8′45″	0°22′55″	20.000	0.067	39.998	0.267	39.999	26.667	13.334
	30	0°51′34″	0°17′11″	15.000	0.037	29.999	0.150	30.000	20.000	10.000
	20	0°34′23″	0°11′28″	10.000	0.017	20.000	0.067	20.000	13.333	6.667
800	170	6°05′16″	2°01′45″	84.968	1.505	169.808	6.016	169.915	113.400	56.728
	160	5°43′46″	1°54′35″	79.973	1.333	159.840	5.330	159.929	106.723	53.384
	150	5°22′17″	1°47′26″	74.978	1.172	149.868	4.685	149.941	100.046	50.042
	140	5°00′48″	1°40′16″	69.982	1.021	139.893	4.091	139.952	93.371	46.701
	130	4°39′19″	1°33′06″	64.986	0.880	129.914	3.519	129.962	86.697	43.361
	120	4°17′50″	1°25′57″	59.989	0.750	119.933	2.999	119.970	80.024	40.021
	110	3°56′21″	1°18′47″	54.991	0.630	109.948	2.520	109.977	73.352	36.683
	100	3°34′52″	1°11′37″	49.993	0.521	99.961	2.083	99.983	66.680	33.346
	90	3°13′22″	1°04′27″	44.995	0.422	89.972	1.687	89.987	60.010	30.009

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
800	80	2°51′53″	0°57′18″	39.997	0.333	79.980	1.333	79.991	53.340	26.673
	70	2°30′24″	0°50′08″	34.998	0.255	69.987	1.021	69.994	46.671	23.338
	60	2°08′55″	0°42′58″	29.999	0.187	59.992	0.750	59.996	40.003	20.003
	50	1°47′26″	0°35′49″	24.999	0.130	49.995	0.521	49.998	33.335	16.668
	40	1°25′57″	0°28′39″	20.000	0.083	39.998	0.333	39.999	26.668	13.334
	30	1°04′27″	0°21′29″	15.000	0.047	29.999	0.187	30.000	20.000	10.000
	20	0°42′58″	0°14′19″	10.000	0.021	20.000	0.083	20.000	13.333	6.667
700	170	6°57′26″	2°19′09″	84.958	1.719	169.750	6.874	169.889	113.421	56.746
	160	6°32′53″	2°10′58″	79.965	1.523	159.791	6.090	159.907	106.740	53.400
	150	6°08′20″	2°02′47″	74.971	1.339	149.828	5.353	149.924	100.060	50.055
	140	5°43′46″	1°54′35″	69.977	1.166	139.860	4.663	139.938	93.382	46.711
	130	5°19′13″	1°46′24″	64.981	1.006	129.888	4.021	129.950	86.706	43.369
	120	4°54′40″	1°38′13″	59.985	0.857	119.912	3.427	119.961	80.031	40.028
	110	4°30′07″	1°30′02″	54.989	0.720	109.932	2.880	109.970	73.357	36.688
	100	4°05′33″	1°21′51″	49.991	0.595	99.949	2.380	99.977	66.684	33.350
	90	3°41′00″	1°13′40″	44.994	0.482	89.963	1.928	89.983	60.013	30.012
	80	3°16′27″	1°05′29″	39.996	0.381	79.974	1.523	79.988	53.342	26.675
	70	2°51′53″	0°57′18″	34.997	0.292	69.983	1.166	69.992	46.673	23.339
	60	2°27′20″	0°49′07″	29.998	0.214	59.989	0.857	59.995	40.004	20.003
	50	2°02′47″	0°40′56″	24.999	0.149	49.994	0.595	49.997	33.336	16.669
	40	1°38′13″	0°32′44″	19.999	0.095	39.997	0.381	39.999	26.668	13.334
	30	1°13′40″	0°24′33″	15.000	0.054	29.999	0.214	29.999	20.000	10.000
	20	0°49′07″	0°16′22″	10.000	0.024	20.000	0.095	20.000	13.333	6.667
600	160	7°38′22″	2°32′47″	79.953	1.777	159.716	7.102	159.874	106.766	53.424
	150	7°09′43″	2°23′14″	74.961	1.562	149.766	6.243	149.896	100.082	50.075
	140	6°41′04″	2°13′41″	69.968	1.360	139.810	5.439	139.915	93.400	46.727
	130	6°12′25″	2°04′08″	64.975	1.173	129.848	4.691	129.932	86.720	43.382

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
600	120	5°43′46″	1°54′35″	59.980	1.000	119.880	3.997	119.947	80.042	40.038
	110	5°15′08″	1°45′03″	54.985	0.840	109.908	3.359	109.959	73.366	36.696
	100	4°46′29″	1°35′30″	49.988	0.694	99.931	2.776	99.969	66.691	33.355
	90	4°17′50″	1°25′57″	44.992	0.562	89.949	2.249	89.978	60.018	30.016
	80	3°49′11″	1°16′24″	39.994	0.444	79.964	1.777	79.984	53.346	26.678
	70	3°20′32″	1°06′51″	34.996	0.340	69.976	1.361	69.989	46.675	23.341
	60	2°51′53″	0°57′18″	29.997	0.250	59.985	1.000	59.993	40.005	20.005
	50	2°23′14″	0°47′45″	24.999	0.174	49.991	0.694	49.996	33.336	16.669
	40	1°54′35″	0°38′12″	19.999	0.111	39.996	0.444	39.998	26.668	13.335
	30	1°25′57″	0°28′39″	15.000	0.062	29.998	0.250	29.999	20.001	10.001
	20	0°57′18″	0°19′06″	10.000	0.028	19.999	0.111	20.000	13.334	6.667
550	160	8°20′02″	2°46′41″	79.944	1.938	159.662	7.746	159.850	106.785	53.441
	150	7°48′47″	2°36′16″	74.954	1.703	149.721	6.809	149.876	100.098	50.089
	140	7°17′32″	2°25′51″	69.962	1.484	139.773	5.933	139.899	93.413	46.739
	130	6°46′17″	2°15′26″	64.970	1.280	129.819	5.116	129.919	86.730	43.391
	120	6°15′02″	2°05′01″	59.976	1.090	119.857	4.360	119.937	80.050	40.045
	110	5°43′46″	1°54′35″	54.982	0.916	109.890	3.664	109.951	73.372	36.702
	100	5°12′31″	1°44′10″	49.986	0.757	99.917	3.029	99.963	66.696	33.360
	90	4°41′16″	1°33′45″	44.990	0.613	89.940	2.453	89.973	60.021	30.019
	80	4°10′01″	1°23′20″	39.993	0.485	79.958	1.939	79.981	53.348	26.680
	70	3°38′46″	1°12′55″	34.995	0.371	69.972	1.484	69.987	46.677	23.342
	60	3°07′31″	1°02′30″	29.997	0.273	59.982	1.091	59.992	40.006	20.006
	50	2°36′16″	0°52′05″	24.998	0.189	49.990	0.757	49.995	33.337	16.670
	40	2°05′01″	0°41′40″	19.999	0.121	39.995	0.485	39.998	26.669	13.335
	30	1°33′45″	0°31′15″	15.000	0.068	29.998	0.273	29.999	20.001	10.001
	20	1°02′30″	0°20′50″	10.000	0.030	19.999	0.121	20.000	13.334	6.667
500	150	8°35′40″	2°51′53″	74.944	1.873	149.663	7.488	149.850	100.118	50.108

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
500	140	8°01′17″	2°40′26″	69.954	1.632	139.726	6.524	139.878	93.429	46.754
	130	7°26′54″	2°28′58″	64.963	1.407	129.780	5.627	129.903	86.744	43.403
	120	6°52′32″	2°17′31″	59.971	1.199	119.827	4.795	119.923	80.060	40.055
	110	6°18′09″	2°06′03″	54.978	1.008	109.867	4.030	109.941	73.380	36.709
	100	5°43′46″	1°54′35″	49.983	0.833	99.900	3.331	99.956	66.702	33.365
	90	5°09′24″	1°43′08″	44.988	0.675	89.927	2.698	89.968	60.025	30.023
	80	4°35′01″	1°31′40″	39.991	0.533	79.949	2.132	79.977	53.351	26.683
	70	4°00′39″	1°20′13″	34.994	0.408	69.966	1.633	69.985	46.679	23.344
	60	3°26′16″	1°08′45″	29.996	0.300	59.978	1.200	59.990	40.008	20.007
	50	2°51′53″	0°57′18″	24.998	0.208	49.988	0.833	49.994	33.338	16.671
	40	2°17′31″	0°45′50″	19.999	0.133	39.994	0.533	39.997	26.669	13.335
	30	1°43′08″	0°34′23″	15.000	0.075	29.997	0.300	29.999	20.001	10.001
	20	1°08′45″	0°22′55″	10.000	0.033	19.999	0.133	20.000	13.334	6.667
450	*150	9°32′57″	3°10′59″	74.931	2.081	149.584	8.317	149.815	100.146	50.133
	140	8°54′46″	2°58′15″	69.944	1.813	139.662	7.247	139.850	93.452	46.775
	130	8°16′34″	2°45′31″	64.955	1.564	129.729	6.250	129.880	86.762	43.420
	120	7°38′22″	2°32′47″	59.964	1.332	119.787	5.327	119.905	80.075	40.068
	110	7°00′10″	2°20′03″	54.973	1.120	109.836	4.477	109.927	73.391	36.719
	100	6°21′58″	2°07′19″	49.979	0.926	99.877	3.700	99.945	66.710	33.373
	90	5°43′46″	1°54′35″	44.985	0.750	89.910	2.998	89.960	60.031	30.029
	80	5°05′35″	1°41′52″	39.989	0.592	79.937	2.369	79.972	53.355	26.687
	70	4°27′23″	1°29′08″	34.993	0.454	69.958	1.814	69.981	46.681	23.347
	60	3°49′11″	1°16′24″	29.996	0.333	59.973	1.333	59.988	40.009	20.008
	50	3°10′59″	1°03′40″	24.997	0.231	49.985	0.926	49.993	33.339	16.672
	40	2°32′47″	0°50′56″	19.999	0.148	39.992	0.593	39.996	26.669	13.336
	30	1°54′35″	0°38′12″	14.999	0.083	29.997	0.333	29.999	20.001	10.001
	20	1°16′24″	0°25′28″	10.000	0.037	19.999	0.148	20.000	13.334	6.667

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
400	*160	11°27′33″	3°49′11″	79.893	2.663	159.361	10.636	159.717	106.891	53.538
	*150	10°44′35″	3°34′52″	74.912	2.341	149.474	9.351	149.766	100.185	50.168
	140	10°01′36″	3°20′32″	69.929	2.039	139.572	8.149	139.810	93.484	46.803
	130	9°18′38″	3°06′13″	64.943	1.759	129.657	7.028	129.848	86.787	43.443
	120	8°35′40″	2°51′53″	59.955	1.499	119.730	5.990	119.880	80.095	40.086
	110	7°52′41″	2°37′34″	54.965	1.260	109.792	5.035	109.908	73.406	36.733
	100	7°09′43″	2°23′14″	49.974	1.041	99.844	4.162	99.931	66.721	33.383
	90	6°26′45″	2°08′55″	44.981	0.843	89.886	3.372	89.949	60.040	30.036
	80	5°43′46″	1°54′35″	39.987	0.666	79.920	2.665	79.964	53.361	26.692
	70	5°00′48″	1°40′16″	34.991	0.510	69.946	2.041	69.976	46.685	23.350
	60	4°17′50″	1°25′57″	29.994	0.375	59.966	1.499	59.985	40.012	20.011
	50	3°34′52″	1°11′37″	24.997	0.260	49.980	1.041	49.991	33.340	16.673
	40	2°51′53″	0°57′18″	19.998	0.167	39.990	0.667	39.996	26.670	13.337
	30	2°08′55″	0°42′58″	14.999	0.094	29.996	0.375	29.998	20.001	10.001
	20	1°25′57″	0°28′39″	10.000	0.042	19.999	0.167	19.999	13.334	6.667
350	130	10°38′26″	3°32′49″	64.925	2.009	129.552	8.028	129.801	86.824	43.476
	120	9°49′20″	3°16′27″	59.941	1.712	119.648	6.843	119.844	80.124	40.113
	110	9°00′13″	3°00′04″	54.955	1.439	109.729	5.752	109.880	73.428	36.753
	100	8°11′06″	2°43′42″	49.966	1.190	99.796	4.755	99.909	66.738	33.398
	90	7°22′00″	2°27′20″	44.975	0.964	89.851	3.853	89.934	60.052	30.047
	80	6°32′53″	2°10′58″	39.983	0.762	79.896	3.045	79.954	53.370	26.700
	70	5°43′46″	1°54′35″	34.988	0.583	69.930	2.332	69.969	46.691	23.356
	60	4°54′40″	1°38′13″	29.993	0.428	59.956	1.713	59.980	40.015	20.014
	50	4°05′33″	1°21′51″	24.996	0.298	49.974	1.190	49.989	33.342	16.675
	40	3°16′27″	1°05′29″	19.998	0.190	39.987	0.762	39.994	26.671	13.337
	30	2°27′20″	0°49′07″	14.999	0.107	29.994	0.429	29.998	20.002	10.002
	20	1°38′13″	0°32′44″	10.000	0.048	19.998	0.190	19.999	13.334	6.667

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
300	130	12°24′51″	4°08′17″	64.898	2.343	129.391	9.357	129.730	86.881	43.529
	120	11°27′33″	3°49′11″	59.920	1.997	119.521	7.977	119.787	80.168	40.153
	110	10°30′15″	3°30′05″	54.938	1.679	109.631	6.706	109.836	73.463	36.785
	100	9°32′57″	3°10′59″	49.954	1.388	99.723	5.545	99.877	66.764	33.422
	90	8°35′40″	2°51′53″	44.966	1.124	89.798	4.493	89.910	60.071	30.065
	80	7°38′22″	2°32′47″	39.976	0.888	79.858	3.551	79.937	53.383	26.712
	70	6°41′04″	2°13′41″	34.984	0.680	69.905	2.720	69.958	46.700	23.364
	60	5°43′46″	1°54′35″	29.990	0.500	59.940	1.999	59.973	40.021	20.019
	50	4°46′29″	1°35′30″	24.994	0.347	49.965	1.388	49.985	33.345	16.678
	40	3°49′11″	1°16′24″	19.997	0.222	39.982	0.889	39.992	26.673	13.339
	30	2°51′53″	0°57′18″	14.999	0.125	29.993	0.500	29.997	20.003	10.002
	*20	1°54′35″	0°38′12″	10.000	0.056	19.998	0.222	19.999	13.334	6.667
250	*130	14°53′49″	4°57′56″	64.854	2.810	129.124	11.212	129.612	86.976	43.616
	*120	13°45′04″	4°35′01″	59.885	2.395	119.311	9.561	119.694	80.243	40.222
	110	12°36′18″	4°12′06″	54.911	2.013	109.469	8.039	109.764	73.520	36.837
	100	11°27′33″	3°49′11″	49.933	1.664	99.601	6.648	99.823	66.807	33.461
	90	10°18′48″	3°26′16″	44.951	1.348	89.709	5.388	89.871	60.102	30.093
	80	9°10′02″	3°03′21″	39.966	1.066	79.795	4.259	79.909	53.405	26.732
	70	8°01′17″	2°40′26″	34.977	0.816	69.863	3.262	69.939	46.715	23.377
	60	6°52′32″	2°17′31″	29.986	0.600	59.914	2.398	59.962	40.030	20.027
	50	5°43′46″	1°54′35″	24.992	0.417	49.950	1.665	49.978	33.351	16.683
	40	4°35′01″	1°31′40″	19.996	0.267	39.974	1.066	39.989	26.676	13.341
	30	3°26′16″	1°08′45″	14.998	0.150	29.989	0.600	29.995	20.004	10.003
	20	2°17′31″	0°45′50″	9.999	0.067	19.997	0.267	19.999	13.334	6.668
200	90	12°53′30″	4°17′50″	44.924	1.684	89.545	6.726	89.798	60.160	30.146
	80	11°27′33″	3°49′11″	39.947	1.331	79.681	5.318	79.858	53.446	26.769
	70	10°01′36″	3°20′32″	34.964	1.020	69.786	4.074	69.905	46.742	23.402

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_0	t_1	t_2
200	60	8°35′40″	2°51′53″	29.977	0.749	59.865	2.995	59.940	40.047	20.043
	50	7°09′43″	2°23′14″	24.987	0.521	49.922	2.081	49.965	33.361	16.692
	40	5°43′46″	1°54′35″	19.993	0.333	39.960	1.332	39.982	26.681	13.346
	30	4°17′50″	1°25′57″	14.997	0.187	29.983	0.750	29.993	20.006	10.005
	20	2°51′53″	0°57′18″	9.999	0.083	19.995	0.333	19.998	13.335	6.668
180	70	11°08′27″	3°42′49″	34.956	1.133	69.736	4.525	69.883	46.759	23.418
	60	9°32′57″	3°10′59″	29.972	0.833	59.834	3.327	59.926	40.058	20.053
	50	7°57′28″	2°39′09″	24.984	0.578	49.904	2.312	49.957	33.367	16.697
	40	6°21′58″	2°07′19″	19.992	0.370	39.951	1.480	39.978	26.684	13.349
	30	4°46′29″	1°35′30″	14.997	0.208	29.979	0.833	29.991	20.007	10.007
	20	3°10′59″	1°03′40″	9.999	0.093	19.994	0.370	19.997	13.335	6.669
150	*100	19°05′55″	6°21′58″	49.815	2.767	98.895	11.023	99.511	67.059	33.693
	*90	17°11′19″	5°43′46″	44.865	2.243	89.193	8.942	89.643	60.285	30.261
	*80	15°16′44″	5°05′35″	39.905	1.773	79.433	7.075	79.749	53.533	26.849
	70	13°22′08″	4°27′23″	34.936	1.358	69.620	5.423	69.831	46.800	23.455
	60	11°27′33″	3°49′11″	29.960	0.999	59.760	3.989	59.894	40.084	20.077
	50	9°32′57″	3°10′59″	24.977	0.694	49.861	2.772	49.938	33.382	16.711
	40	7°38′22″	2°32′47″	19.988	0.444	39.929	1.776	39.968	26.692	13.356
	30	5°43′46″	1°54′35″	14.995	0.250	29.970	0.999	29.987	20.010	10.010
	*20	3°49′11″	1°16′24″	9.999	0.111	19.991	0.444	19.996	13.336	6.669
*125	*110	25°12′37″	8°24′12″	54.645	4.005	107.889	15.910	109.070	74.091	37.365
	*100	22°55′06″	7°38′22″	49.733	3.314	98.412	13.181	99.299	67.234	33.855
	*90	20°37′35″	6°52′32″	44.806	2.688	88.841	10.700	89.488	60.413	30.378
	*80	18°20′05″	6°06′42″	39.863	2.126	79.185	8.471	79.639	53.622	26.931
	*70	16°02′34″	5°20′51″	34.909	1.629	69.453	6.497	69.758	46.860	23.510
	*60	13°45′04″	4°35′01″	29.942	1.198	59.655	4.780	59.847	40.121	20.111

第二表　缓和曲线函数表

R	l	β	δ	m	P	X_0	Y_0	C_c	t_1	t_2
*125	*50	11°27′33″	3°49′11″	24.967	0.832	49.800	3.324	49.911	33.403	16.731
	*40	9°10′02″	3°03′21″	19.983	0.533	39.898	2.129	39.955	26.703	13.366
	*30	6°52′32″	2°17′31″	14.993	0.300	29.957	1.199	29.981	20.015	10.014
	*20	4°35′01″	1°31′40″	9.998	0.133	19.987	0.533	19.994	13.338	6.671

第三表　缓和曲线偏角表

置镜缓和曲线上任一点（见图3），观测缓和曲线上其他一点的偏角，按下列公式计算：

$$\delta_{。}=\frac{30}{\pi RI}(l_{。}-l_{不})(l_{。}+2l_{不}) \qquad (5)$$

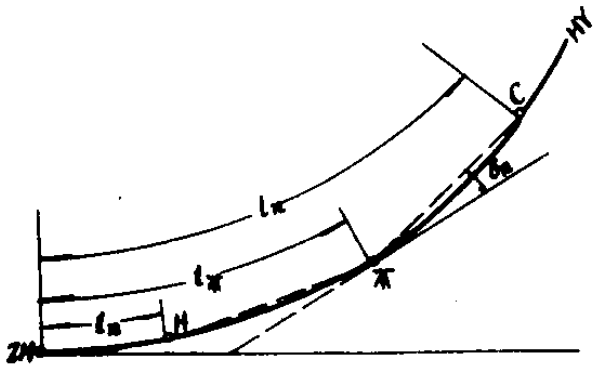

图3　用偏角法设置缓和曲线示意图

公式（5）及图3中的符号意义如下：

$\delta_{。}$——观测点之切线偏角，以度计；　　C——前视点；

不——缓和曲线上的置镜点；　　H——后视点；

$l_{不}$——自缓和曲线始点（ZH）至置镜点（不）的曲线距离；

$l_{。}$——自缓和曲线始点（ZH）至前视点（C）或后视点（H）的曲线距离。

按公式（5）算出来的偏角，前视为正值后视为负值。

置镜点及观测点均在整10m桩之倍数时，使用本表的偏角值由直行查取。

置镜整10m桩，前后视观测零桩求偏角时，可按直行上、下相邻两偏角的内插值加上非整10m偏角改正值（查第四表）即得。无论前后视，改正值均为负。

置镜零桩，前后视观测整10m桩求偏角时，可按横行左右相