

TAFELN FÜR DEN PLANETEN \odot CONCORDIA.

VON

TH. v. OPPOLZER,

WIRKLICHEM MITGLIEDE DER KAISERLICHEN AKADEMIE DER WISSENSCHAFTEN.

VORGELEGT IN DER SITZUNG AM 1. MÄRZ 1883.

In Nr. 2341 der Astronomischen Nachrichten (Band 98) habe ich die Störungswerthe publicirt, welche der Planet Concordia mit Berücksichtigung der ersten Potenzen der Massen durch Jupiter und Saturn erfährt; die Rechnung ist nach der am eirtten Orte angegebenen Methode nur mit einem solchen Grade der Annäherung durchgeführt, dass die Coordinaten der Planeten innerhalb der nächsten Decennien innerhalb weniger Bogenminuten richtig erhalten werden. Um mit diesen Störungswerthen den Ort des Planeten bequem berechnen zu können, habe ich dieselben in Tafeln bringen lassen, deren sorgfältige Berechnung ich Herrn F. K. Ginzler verdanke; ein Auszug dieser Tafeln ist in den folgenden Blättern enthalten.

Da nur die Absicht vorliegt, mit Hilfe der vorliegenden Tafeln genähert richtige Orte, etwa in der Genauigkeit, wie diese die Jahresephemeriden des Berliner Jahrbuches bieten, zu erhalten, so habe ich die periodischen Störungen, welche die Concordia durch den Saturn erfährt, fortgelassen, da aus dieser Übergehung höchstens ein Fehler von 14 Bogensekunden in der mittleren Länge des Planeten hervorgeht, die säcularen, durch Saturn bewirkten Störungen, die sich in einfacher Weise mit den analogen Jupiterstörungen verbinden, sind jedoch mitgenommen worden. Der Gebrauch der Tafeln, denen durchaus der Berliner Meridian als Ausgangspunkt der Zeitzählung diente, ist in den folgenden Zeilen auseinandergesetzt.

Die Tafel I_a und I_b (Jahrestafeln) gibt die Argumente: M (mittlere Anomalie der Concordia in Graden, Minuten und deren Decimaltheilen), M' (mittlere Anomalie des Jupiter in Graden und Decimaltheilen derselben) und t (die seit der Epoche verfllossene Zeit in Einheiten des julianischen Jahres) für die Jahresanfänge 1860 bis 1960. Ein der Jahreszahl vorgesetztes S deutet an, dass das Jahr ein Schaltjahr ist; je nachdem das Jahr ein gemeines oder Schaltjahr ist, wird der erste links stehende oder zweite rechts stehende Theil der Tafel II (Monatstafel) anzuwenden sein, welcher die Incremente der Argumente seit dem Jahresanfang bis zu dem betreffenden Monatsanfang ergibt. Die Tafel III (Tagestafel) gibt die für die einzelnen Monatstage sich ergebenden Incremente der Argumente, ausserdem enthält der Zusatz noch die Zunahme derselben für die Tagesbruchtheile. Es wird also z. B.:

Für 1885 Januar 2·0 mittl. Berl. Zeit				Für 1884 Sept. 24·0 mittl. Berl. Zeit			
	M	M'	t		M	M'	t
Taf. I_a	202°21'8	130°5	+20·0	Taf. I_a	121° 4'1	100°1	+19·0
Gem. Jahr „ II	0 0·0	0·0	0·0	Schaltjahr „ II	54 11·8	20·3	0·7
„ III	0 26·7	0·2	0·0	„ III	5 19·8	2·0	0·0
	<u>202°48'5</u>	<u>130·7</u>	<u>+20·0</u>		<u>180°35'7</u>	<u>122·4</u>	<u>+19·7</u>

Das zuerst gegebene Beispiel wird in der Folge allein fortgeführt werden.

Tafel IV gibt mit dem Argumente M die durch Jupiter und Saturn bewirkten Säcularstörungen; die dieser Tafel zu entnehmenden Zahlen sind mit t zu multipliciren; es ergibt sich also für das gewählte Beispiel:

$$\begin{aligned}\Delta M_s &= +0.116 \times 20.0 = + 2.3 \text{ (in Einheiten der Bogenminute)} \\ \log(1+\nu)_s &= +0.03 \times 20.0 = + 1 \text{ („ „ „ vierten Decimale)} \\ z_s &= -0.48 \times 20.0 = -10 \text{ („ „ „ „ „ „)}.\end{aligned}$$

Tafel V gibt mit dem horizontalen Argumente M' und dem verticalen Argumente M die periodischen Jupiterstörungen in der mittleren Anomalie in Einheiten der Bogenminute; das Intervall dieser Tafel ist 5° , während das Intervall für die folgenden Tafeln VI und VII 10° beträgt. Im Allgemeinen wird man hierbei stets mit einer linearen Interpolation ausreichen, und hierbei in den seltensten Fällen einen Fehler von 0.2 begehen, welche Genauigkeit für die vorliegenden Zwecke ausreichend ist. Die Fortsetzung des Beispiels stellt sich wie folgt:

$$\Delta M_p = -7.4 + 2.6 \times 0.14 - 2.5 \times 0.56 = -7.4 + 0.4 - 1.4 = -8.4.$$

Es ist sonach M_0 , das Argument für die Tafel VIII bestimmt durch:

$$M_0 = M + \Delta M_s + \Delta M_p = 202^\circ 42.4.$$

Tafel VI gibt mit dem horizontalen Argumente M' und dem verticalen Argumente M (Intervall 10°) die periodischen Jupiterstörungen im Logarithmus des Radius vectors; die lineare Interpolation reicht stets aus. Für das Beispiel findet sich:

$$\log(1+\nu)_p = +10 - 2 \times 0.07 + 0 \times 0.25 = +10 \text{ (in Einheiten der vierten Decimale).}$$

Tafel VII ist wie Tafel VI eingerichtet, und lässt die periodischen Jupiterstörungen in der auf der Bahnebene senkrechten Coordinate finden; es wird also:

$$z_p = -1 + 0 \times 0.07 - 1 \times 0.25 = -1 \text{ (in Einheiten der vierten Decimale).}$$

Es ist sonach z die Gesamtstörung in dieser Coordinate:

$$z = z_s + z_p = -0.0011.$$

Aus Tafel VIII erhält man mit dem Argumente M_0 die Mittelpunktsgleichung ($r - M_0$) und $\log(r)$; steht das Argument links ($M_0 < 180^\circ$), so erhält die Mittelpunktsgleichung das positive Vorzeichen, steht dasselbe aber rechts ($M_0 > 180^\circ$), das negative, wie dies in der Tafel übrigens ersichtlich gemacht ist.

Das Beispiel wird also fortgesetzt ergeben:

$$\begin{aligned}r - M_0 &= -1^\circ 44.4 - 4.6 \times 0.71 = -1^\circ 47.7 \\ \log(r) &= 0.4483 - 1 \times 0.71 = 0.4482.\end{aligned}$$

Es wird daher:

$$\begin{aligned}v &= M_0 + (r - M_0) = 200^\circ 54.7 \\ \log r &= \log(r) + \log(1+\nu)_s + \log(1+\nu)_p = 0.4493.\end{aligned}$$

Will man die mittleren rechtwinkligen Äquatoreordinaten des Planeten finden, so hat man hierzu die Formeln:

$$\begin{aligned}x' &= r \sin a \sin(A + v) + z \cos a \\ y' &= r \sin b \sin(B + v) + z \cos b \\ z' &= r \sin c \sin(C + v) + z \cos c.\end{aligned}$$

Die Tafel IX gibt die in diesen Formeln auftretenden Constanten für jedes zehnte Jahr geltend für das zugehörige mittlere Äquinocium, für das Zeitintervall 1860—1960.

Die Tafel X enthält die für die Berechnung der Oppositionshelligkeit und der Grösse erforderlichen Hilfszahlen, ρ stellt in den Formeln die geocentrische Entfernung vor.

Argumente.

Ia Jahrestafel.

Jahr	M	M'	t
S 1860	334° 0' 9"	91° 7'	- 5' 0"
61	55 18 5	122 1	- 4' 0"
62	136 22 8	152 5	- 3' 0"
63	217 27 1	182 8	- 2' 0"
S 64	298 31 4	213 1	- 1' 0"
1865	19 49 0	243 5	0' 0"
66	100 53 4	273 9	+ 1' 0"
67	181 57 7	304 2	+ 2' 0"
S 68	263 2 0	334 5	+ 3' 0"
69	344 19 6	4 9	+ 4' 0"
1870	65 23 9	35 3	+ 5' 0"
71	146 28 2	65 6	+ 6' 0"
S 72	227 32 5	95 9	+ 7' 0"
73	308 50 1	126 3	+ 8' 0"
74	29 54 4	156 6	+ 9' 0"
1875	110 58 7	187 0	+ 10' 0"
S 76	192 3 0	217 3	+ 11' 0"
77	273 20 7	247 7	+ 12' 0"
78	354 25 0	278 0	+ 13' 0"
79	75 29 3	308 4	+ 14' 0"
S 1880	156 33 6	338 7	+ 15' 0"
81	237 51 2	9 1	+ 16' 0"
82	318 55 5	39 4	+ 17' 0"
S 83	39 59 8	69 8	+ 18' 0"
84	121 4 1	100 1	+ 19' 0"
1885	202 21 8	130 5	+ 20' 0"
86	283 26 1	160 8	+ 21' 0"
S 87	4 30 4	191 1	+ 22' 0"
88	85 34 7	221 5	+ 23' 0"
89	166 52 3	251 9	+ 24' 0"
1890	247 56 6	282 2	+ 25' 0"
S 91	329 0 9	312 5	+ 26' 0"
92	50 5 2	342 9	+ 27' 0"
S 93	131 22 8	13 3	+ 28' 0"
94	212 27 1	43 6	+ 29' 0"
1895	293 31 4	73 9	+ 30' 0"
S 96	14 35 8	104 3	+ 31' 0"
97	95 53 4	134 7	+ 32' 0"
98	176 57 7	165 0	+ 33' 0"
S 99	258 2 0	195 3	+ 34' 0"
1900	339 6 3	225 6	+ 35' 0"
01	00 10 6	256 0	+ 36' 0"
02	141 14 9	286 3	+ 37' 0"
S 03	222 19 2	316 6	+ 38' 0"
04	303 23 8	347 0	+ 39' 0"
1905	24 41 1	17 4	+ 40' 0"
S 06	105 45 4	47 7	+ 41' 0"
07	186 49 7	78 0	+ 42' 0"
S 08	267 54 1	108 3	+ 43' 0"
09	349 11 7	138 8	+ 44' 0"
1910	70 16 0	169 1	+ 45' 0"
S 11	151 20 3	199 4	+ 46' 0"
12	232 24 6	229 7	+ 47' 0"
S 13	313 28 2	260 1	+ 48' 0"
14	34 46 5	290 5	+ 49' 0"
1915	115 50 8	320 8	+ 50' 0"
S 16	196 55 1	351 1	+ 51' 0"
17	278 12 8	21 5	+ 52' 0"
S 18	359 17 1	51 9	+ 53' 0"
19	80 21 4	82 2	+ 54' 0"
S 1920	161 25 7	112 5	+ 55' 0"
21	242 43 3	142 9	+ 56' 0"
S 22	323 47 6	173 2	+ 57' 0"
23	44 51 9	203 6	+ 58' 0"
S 24	125 56 2	233 9	+ 59' 0"
1925	207 13 8	264 3	+ 60' 0"
S 26	288 18 2	294 6	+ 61' 0"
27	9 22 5	325 0	+ 62' 0"
S 28	90 26 8	355 3	+ 63' 0"
29	171 44 4	25 7	+ 64' 0"

II Monatstafel.

Monat	gemeines Jahr			Schaltjahr		
	M	M'	t	M	M'	t
Januar . . .	0° 0' 0"	0° 0'	0' 0"	0° 0' 0"	0° 0'	0' 0"
Februar . . .	6 53 1	2 6 0	0 1	6 53 1	2 6 0	0 1
März	13 6 3	4 9 0	0 2	13 19 6	5 0 0	0 2
April	19 59 4	7 5 0	0 2	20 12 7	7 6 0	0 2
Mai	26 39 2	10 0 3	0 3	26 52 5	10 1 0	0 3
Juni	33 32 4	12 5 0	0 4	33 45 7	12 6 0	0 4
Juli	40 12 2	15 0 5	0 5	40 25 5	15 1 0	0 5
August	47 5 3	17 6 6	0 6	47 18 6	17 7 0	0 6
September . .	53 58 4	20 2 0	0 7	54 11 8	20 3 0	0 7
October	60 38 2	22 7 0	0 7	60 51 6	22 8 0	0 7
November . . .	67 31 4	25 3 0	0 8	67 44 7	25 3 0	0 8
December . . .	74 11 2	27 8 0	0 9	74 24 5	27 8 0	0 9

III Tagstafel.

	M	M'	M	M'
1	0° 13' 3"	0° 1'	0' 0"	0' 0"
2	0 26 7	0 2	0 1	1 3 0
3	0 40 0	0 2	0 2	2 7 0
4	0 53 3	0 3	0 3	4 0 0
5	1 6 6	0 4	0 4	5 3 0
6	1 20 0	0 5	0 5	6 7 0
7	1 33 3	0 6	0 6	8 0 0
8	1 46 6	0 7	0 7	9 3 0
9	1 59 9	0 8	0 8	10 7 0
10	2 13 3	0 8	0 9	12 2 0
11	2 26 6	0 9		
12	2 39 9	1 0		
13	2 53 2	1 1		
14	3 6 6	1 2		
15	3 19 9	1 2		
16	3 33 2	1 3		
17	3 46 5	1 4		
18	3 59 9	1 5		
19	4 13 2	1 6		
20	4 26 5	1 7		
21	4 39 9	1 7		
22	4 53 2	1 8		
23	5 6 5	1 8		
24	5 19 8	1 9		
25	5 33 2	1 9		
26	5 46 5	2 0		
27	5 59 9	2 0		
28	6 13 2	2 1		
29	6 26 5	2 1		
30	6 39 8	2 2		
31	6 53 1	2 2		

Fortsetzung der Jahrestafel.

Jahr	M	M'	t
1930	252° 48' 7"	56° 0'	+ 65' 0"
S 31	333 53 0	86 4	+ 66' 0"
32	54 57 3	116 7	+ 67' 0"
S 33	136 14 9	147 1	+ 68' 0"
34	217 19 2	187 4	+ 69' 0"
1935	298 23 5	207 7	+ 70' 0"
S 36	19 27 8	238 1	+ 71' 0"
37	100 45 5	268 5	+ 72' 0"
S 38	181 49 8	298 8	+ 73' 0"
39	262 54 1	329 1	+ 74' 0"
S 1940	343 58 4	359 5	+ 75' 0"
41	05 16 0	29 9	+ 76' 0"
S 42	146 20 3	60 2	+ 77' 0"
43	227 24 6	90 5	+ 78' 0"
S 44	308 28 9	120 8	+ 79' 0"
1945	29 46 6	151 3	+ 80' 0"
S 46	110 50 9	181 6	+ 81' 0"
47	191 55 2	211 9	+ 82' 0"
S 48	272 59 5	242 2	+ 83' 0"
49	354 17 1	272 6	+ 84' 0"
1950	75 21 4	303 0	+ 85' 0"
S 51	156 25 7	333 3	+ 86' 0"
52	237 30 0	3 0	+ 87' 0"
S 53	318 47 6	34 0	+ 88' 0"
54	39 51 9	4 4	+ 89' 0"
1955	120 56 2	94 7	+ 90' 0"
S 56	202 0 6	125 0	+ 91' 0"
57	283 18 2	155 4	+ 92' 0"
S 58	4 22 5	185 8	+ 93' 0"
59	85 26 8	216 1	+ 94' 0"
S 1960	166 31 1	246 4	+ 95' 0"

Für die Zeitangaben ist der Berliner Meridian massgebend.

IV Säculartafel.

M	ΔM_s	$\log(1+\nu)_s$	z_s
00	-0' 126	0' 00	+0' 53
5	-0' 126	0' 00	+0' 51
10	-0' 125	-0' 01	+0' 49
15	-0' 123	-0' 02	+0' 47
20	-0' 120	-0' 02	+0' 45
25	-0' 116	-0' 03	+0' 41
30	-0' 111	-0' 04	+0' 38
35	-0' 105	-0' 04	+0' 34
40	-0' 098	-0' 05	+0' 30
45	-0' 091	-0' 05	+0' 26
50	-0' 083	-0' 06	+0' 21
55	-0' 074	-0' 06	+0' 17
60	-0' 065	-0' 07	+0' 12
65	-0' 055	-0' 07	+0' 07
70	-0' 045	-0' 07	+0' 02
75	-0' 035	-0' 07	-0' 03
80	-0' 024	-0' 08	-0' 08
85	-0' 013	-0' 08	-0' 13
90	-0' 002	-0' 08	-0' 18
95	+0' 008	-0' 08	-0' 22
100	+0' 019	-0' 08	0' 27
105	+0' 030	-0' 07	-0' 31
110	+0' 040	-0' 07	-0' 35
115	+0' 050	-0' 07	-0' 39
120	+0' 060	-0' 07	-0' 43
125	+0' 069	-0' 06	-0' 46
130	+0' 078	-0' 06	-0' 49
135	+0' 086	-0' 05	-0' 51
140	+0' 093	-0' 05	-0' 54
145	+0' 100	-0' 04	-0' 55
150	+0' 106	-0' 04	-0' 57
155	+0' 111	-0' 03	-0' 58
160	+0' 115	-0' 03	-0' 59
165	+0' 118	-0' 02	-0' 59
170	+0' 121	-0' 01	-0' 59
175	+0' 123	-0' 01	-0' 58
180	+0' 123	0' 00	-0' 57
185	+0' 123	0' 00	-0' 56
190	+0' 122	+0' 01	-0' 55
195	+0' 120	+0' 02	-0' 53
200	+0' 118	+0' 02	-0' 50
205	+0' 114	+0' 03	-0' 47
210	+0' 109	+0' 04	-0' 44
215	+0' 104	+0' 04	-0' 41
220	+0' 098	+0' 05	-0' 37
225	+0' 091	+0' 05	-0' 34
230	+0' 083	+0' 06	-0' 29
235	+0' 075	+0' 06	-0' 25
240	+0' 066	+0' 07	-0' 21
245	+0' 057	+0' 07	-0' 16
250	+0' 047	+0' 07	-0' 11
255	+0' 037	+0' 08	-0' 06
260	+0' 027	+0' 08	-0' 01
265	+0' 016	+0' 08	+0' 04
270	+0' 005	+0' 08	+0' 08
275	-0' 006	+0' 08	+0' 13
280	-0' 017	+0' 08	+0' 18
285	-0' 027	+0' 08	+0' 23
290	-0' 038	+0' 08	+0' 27
295	-0' 048	+0' 07	+0' 31
300	-0' 058	+0' 07	+0' 35
305	-0' 068	+0' 07	+0' 39
310	-0' 077	+0' 06	+0' 42
315	-0' 086	+0' 06	+0' 45
320	-0' 093	+0' 06	+0' 48
325	-0' 101	+0' 05	+0' 50
330	-0' 107	+0' 04	+0' 52
335	-0' 112	+0' 04	+0' 53
340	-0' 117	+0' 03	+0' 54
345	-0' 121	+0' 02	+0' 54
350	-0' 124	+0' 02	+0' 54
355	-0' 125	+0' 01	+0' 54
360	-0' 126	0' 00	+0' 53

Man erhält ΔM_s in Einheiten der Bögenminute, $\log(1+\nu)_s$ und z_s in Einheiten der vierten Decimale.

V

ΔM_p in Einheiten der Bogenminute.

M	M'																			
	0	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	
0°	+7.6	+7.9	+7.8	+7.2	+6.0	+4.2	+2.0	-0.5	-3.0	-5.2	-6.9	-8.0	-8.3	-7.7	-6.4	-4.5	-2.3	+0.1	+2.5	
5	+8.6	+8.9	+9.1	+8.8	+7.9	+6.5	+4.5	+2.1	-0.4	-2.7	-4.7	-6.3	-6.9	-6.9	-6.1	-4.6	-2.7	-0.6	+1.7	
10	+9.6	+9.9	+10.2	+10.2	+9.6	+8.5	+6.9	+4.7	+2.3	-0.1	-2.4	-4.1	-5.3	-5.7	-5.4	-4.4	-2.9	-1.1	+1.0	
15	+10.4	+10.8	+11.1	+11.3	+11.1	+10.3	+9.0	+7.1	+4.9	+2.5	+0.1	-1.9	-3.5	-4.4	-4.5	-4.0	-2.9	-1.4	+0.4	
20	+11.3	+11.5	+11.9	+12.2	+12.3	+11.8	+10.8	+9.3	+7.3	+5.0	+2.6	+0.4	-1.4	-2.7	-3.3	-3.3	-2.6	-1.5	0.0	
25	+12.2	+12.2	+12.5	+12.9	+13.1	+13.0	+12.4	+11.2	+9.4	+7.3	+5.0	+2.7	+0.7	-0.9	-1.9	-2.3	-2.1	-1.3	0.2	
30	+13.1	+12.9	+13.0	+13.4	+13.8	+13.9	+13.6	+12.8	+11.4	+9.5	+7.3	+5.1	+2.9	+1.1	-0.3	-1.1	-1.3	-0.9	+0.2	
35	+14.1	+13.5	+13.5	+13.9	+14.3	+14.6	+14.6	+14.1	+13.0	+11.5	+9.5	+7.3	+5.1	+3.1	+1.5	+0.3	-0.3	-0.3	+0.1	
40	+15.1	+14.2	+13.9	+14.2	+14.6	+15.0	+15.2	+15.0	+14.4	+13.1	+11.4	+9.4	+7.0	+5.2	+3.4	+1.9	+1.0	+0.5	+0.6	
45	+16.1	+14.9	+14.4	+14.4	+14.7	+15.2	+15.6	+15.7	+15.3	+14.5	+13.1	+11.3	+9.3	+7.3	+5.3	+3.6	+2.4	+1.6	+1.3	
50	+17.1	+15.6	+14.8	+14.6	+14.8	+15.2	+15.7	+16.0	+15.3	+14.5	+13.0	+11.2	+9.1	+7.2	+5.4	+3.9	+2.9	+2.9	+2.2	
55	+18.1	+16.4	+15.2	+14.7	+14.7	+15.1	+15.6	+16.1	+16.3	+16.1	+15.5	+14.3	+12.8	+10.9	+9.0	+7.2	+5.5	+4.2	+3.2	
60	+19.2	+17.1	+15.7	+14.8	+14.6	+14.8	+15.4	+15.9	+16.3	+16.4	+16.1	+15.3	+14.0	+12.5	+10.7	+8.8	+7.1	+5.6	+4.4	
65	+20.2	+18.0	+16.2	+15.0	+14.5	+14.6	+15.0	+15.6	+16.2	+16.5	+16.5	+16.0	+15.1	+13.8	+12.2	+10.4	+8.7	+7.1	+5.7	
70	+21.1	+18.7	+16.6	+15.2	+14.4	+14.2	+14.5	+15.0	+15.7	+16.2	+16.4	+16.3	+15.8	+14.7	+13.4	+11.8	+10.1	+8.5	+7.0	
75	+21.9	+19.3	+17.1	+15.4	+14.3	+13.8	+13.8	+14.3	+14.9	+15.6	+16.1	+16.3	+16.0	+15.4	+14.3	+12.9	+11.4	+9.8	+8.3	
80	+22.4	+20.0	+17.6	+15.6	+14.2	+13.4	+13.2	+13.5	+14.1	+14.8	+15.5	+16.0	+16.0	+15.6	+14.9	+13.8	+12.5	+11.0	+9.5	
85	+22.8	+20.4	+18.0	+15.8	+14.1	+13.0	+12.5	+12.6	+13.1	+13.8	+14.6	+15.2	+15.6	+15.2	+14.4	+13.3	+12.0	+10.6	+9.0	
90	+23.0	+20.7	+18.3	+16.0	+14.1	+12.7	+11.9	+11.7	+12.1	+12.7	+13.3	+14.0	+14.9	+15.1	+15.1	+14.6	+13.8	+12.7	+11.5	
95	+22.9	+20.8	+18.5	+16.1	+14.0	+12.4	+11.3	+10.8	+10.9	+11.4	+12.2	+13.1	+13.8	+14.4	+14.6	+14.5	+14.0	+13.3	+12.2	
100	+22.6	+20.7	+18.5	+16.2	+13.9	+12.0	+10.8	+10.0	+9.8	+10.1	+10.8	+11.6	+12.6	+13.3	+13.9	+14.1	+13.9	+13.4	+12.7	
105	+21.9	+20.4	+18.4	+16.2	+13.9	+11.8	+10.2	+9.2	+8.7	+8.7	+9.3	+10.1	+11.1	+12.0	+12.8	+13.2	+13.4	+13.3	+12.8	
110	+21.0	+19.8	+18.1	+16.1	+13.7	+11.6	+9.7	+8.4	+7.7	+7.7	+8.3	+9.3	+10.5	+11.4	+12.2	+12.6	+12.8	+12.8	+12.6	
115	+19.6	+19.0	+17.7	+15.8	+13.6	+11.3	+9.3	+7.7	+6.7	+6.7	+7.3	+8.3	+9.5	+10.8	+11.5	+11.9	+11.9	+12.1	+12.1	
120	+18.2	+18.0	+16.9	+15.3	+13.2	+11.0	+8.9	+7.1	+5.8	+5.0	+3.9	+4.8	+5.2	+5.9	+6.9	+8.0	+9.0	+10.0	+10.8	
125	+16.4	+16.6	+16.0	+14.7	+12.8	+10.6	+8.5	+6.5	+5.0	+3.9	+2.9	+3.5	+3.5	+4.0	+5.0	+6.0	+7.2	+8.3	+9.3	
130	+14.5	+15.1	+14.9	+13.9	+12.2	+10.2	+8.1	+6.0	+4.2	+2.9	+2.2	+2.0	+2.2	+3.0	+4.0	+5.2	+6.4	+7.6	+8.6	
135	+12.5	+13.4	+13.5	+12.9	+11.5	+9.7	+7.6	+5.5	+3.3	+2.1	+1.0	+0.5	+0.5	+1.1	+2.0	+3.1	+4.4	+5.7	+6.9	
140	+10.2	+11.6	+12.0	+11.7	+10.7	+9.1	+7.1	+5.0	+3.0	+1.3	0.0	-0.8	-1.0	-0.8	0.0	+1.0	+2.2	+3.6	+4.9	
145	+8.0	+9.6	+10.4	+10.4	+9.7	+8.4	+6.6	+4.5	+2.5	+0.6	-0.9	-2.0	-2.5	-2.5	-2.0	-1.2	0.0	+1.3	+2.8	
150	+5.8	+7.6	+8.7	+9.0	+8.6	+7.6	+6.0	+4.0	+2.0	0.0	-1.7	-3.0	-3.8	-4.1	-3.9	-3.3	-2.2	-0.9	+0.5	
155	+3.6	+5.6	+6.9	+7.6	+7.4	+6.6	+5.3	+3.5	+1.5	-0.5	-2.4	-3.9	-4.8	-5.6	-5.7	-5.3	-4.4	-3.3	+1.8	
160	+1.4	+3.6	+5.1	+6.0	+6.2	+5.7	+4.5	+2.8	+1.0	-1.0	-2.9	-4.6	-5.9	-6.8	-7.2	-7.1	-6.5	-5.5	-4.2	
165	-0.6	+1.6	+3.4	+4.5	+4.9	+4.7	+3.7	+2.3	+0.5	-1.4	-3.4	-5.2	-6.8	-7.9	-8.5	-8.7	-8.4	-7.7	-6.5	
170	-2.6	-0.2	+1.6	+3.0	+3.6	+3.6	+2.9	+1.7	+0.1	-1.8	-3.8	-5.7	-7.4	-8.8	-9.7	-10.1	-10.1	-9.6	-8.8	
175	-4.5	-2.1	0.0	+1.4	+2.3	+2.5	+2.1	+1.1	-0.4	-2.2	-4.1	-6.1	-7.9	-9.4	-10.6	-11.4	-11.7	-11.5	-10.8	
180	-6.3	-3.8	-1.7	0.0	+1.6	+1.5	+1.3	+0.5	-0.8	-2.4	-4.3	-6.3	-8.2	-9.9	-11.3	-12.4	-13.0	-13.0	-12.7	
185	-8.1	-5.6	-3.3	-1.5	-0.2	+0.5	+0.5	0.0	-1.2	-2.7	-4.5	-6.5	-8.4	-10.2	-11.8	-13.1	-14.0	-14.4	-14.3	
190	-9.7	-7.2	-4.8	-2.8	-1.4	-0.5	-0.7	-0.6	-1.6	-2.9	-4.7	-6.5	-8.5	-10.4	-12.1	-13.6	-14.7	-15.5	-15.7	
195	-11.5	-8.8	-6.3	-4.1	-2.5	-1.4	-1.0	-1.1	-1.9	-3.1	-4.7	-6.5	-8.4	-10.4	-12.3	-13.9	-15.2	-16.2	-16.8	
200	-13.1	-10.4	-7.8	-5.5	-3.6	-2.3	-1.6	-1.6	-2.1	-3.2	-4.6	-6.4	-8.3	-10.3	-12.2	-14.0	-15.5	-16.7	-17.6	
205	-14.8	-12.1	-9.3	-6.8	-4.7	-3.2	-2.2	-2.0	-2.3	-3.2	-4.5	-6.2	-8.0	-10.0	-12.0	-13.8	-15.5	-17.0	-18.1	
210	-16.4	-13.7	-10.9	-8.2	-5.8	-4.0	-2.9	-2.3	-2.3	-3.1	-4.3	-5.9	-7.6	-9.6	-11.6	-13.5	-15.3	-16.9	-18.3	
215	-18.1	-15.4	-12.5	-9.6	-7.1	-5.0	-3.5	-2.7	-2.5	-3.0	-4.1	-5.5	-7.2	-9.1	-11.0	-13.0	-14.9	-16.6	-18.2	
220	-19.6	-17.1	-14.1	-11.1	-8.4	-5.9	-4.2	-3.1	-2.7	-2.9	-3.7	-5.0	-6.6	-8.4	-10.3	-12.3	-14.2	-16.1	-17.9	
225	-21.2	-18.7	-15.8	-12.7	-9.7	-7.1	-5.0	-3.5	-2.8	-2.7	-3.3	-4.4	-5.9	-7.6	-9.5	-11.5	-13.5	-15.5	-17.3	
230	-22.5	-20.3	-17.4	-14.2	-11.2	-8.3	-5.9	-4.0	-2.9	-2.6	-2.9	-3.8	-5.1	-6.7	-8.6	-10.5	-12.5	-14.5	-16.5	
235	-23.8	-21.8	-19.1	-16.0	-12.7	-9.6	-6.9	-4.7	-3.2	-2.5	-2.5	-3.1	-4.3	-5.8	-7.5	-9.4	-11.4	-13.4	-15.3	
240	-24.8	-23.1	-20.6	-17.6	-14.3	-11.0	-8.0	-5.5	-3.6	-2.5	-2.1	-2.4	-3.4	-4.7	-6.4	-8.2	-10.2	-12.1	-14.1	
245	-25.6	-24.3	-22.1	-19.2	-15.9	-12.5	-9.2	-6.4	-4.2	-2.7	-1.9	-1.9	-2.5	-3.7	-5.2	-6.9	-8.8	-10.7	-12.7	
250	-26.0	-25.1	-23.4	-20.7	-17.6	-14.1	-10.6	-7.5	-4.9	-3.0	-1.8	-1.4	-1.7	-2.6	-3.9	-5.5	-7.3	-9.2	-11.2	
255	-26.2	-25.7	-24.4	-22.1	-19.2	-15.7	-12.1	-8.7	-5.8	-3.4	-1.8	-1.1	-1.0	-1.5	-2.6	-4.1	-5.7	-7.5	-9.4	
260	-26.0	-26.1	-25.2	-23.3	-20.6	-17.3	-13.7	-10.1	-6.8	-4.1	-2.1	-0.8	-0.4	-0.6	-1.4	-2.6	-4.1	-5.8	-7.7	
265	-25.5	-26.0	-25.6	-24.2	-21.9	-18.8	-15.3	-11.6	-8.1	-5.0	-2.6	-0.9	0.0	+0.2	-0.2	-1.2	-2.5	-4.1	-5.8	
270	-24.6	-25.6	-25.7	-24.8	-22.9	-20.2	-16.8	-13.1	-9.5	-6.1	-3.2	-1.1	+0.2	+0.9	+0.7	+0.1	-0.9	-2.3	-3.9	
275	-23.5	-24.9	-25.4	-24.0	-23.7	-21.3	-18.2	-14.6	-10.9	-7.3	-4.1	-1.5	+0.2	+1.3	+1.6	+1.3	+0.5	-0.6	-2.0	
280	-22.0	-23.8	-24.8	-24.9	-24.1	-22.2	-19.4	-16.0	-12.4	-8.6	-5.2	-2.2	0.0	+1.5	+2.2	+2.4	+1.9	+1.0	-0.1	
285	-20.3	-22.3	-23.8	-24.5	-24.1	-22.8	-20.5	-17.4	-13.8	-10.1	-6.4	-3.1	-0.5	+1.4	+2.6	+3.1	+2.5	+1.5	+0.6	
290	-18.3	-20.6	-22.5	-23.5	-23.8	-23.0	-21.2	-18.5	-15.1	-11.4	-7.7	-4.2	-1.2	+1.1	+2.8	+3.7	+4.0	+3.8	+3.2	
295	-16.3	-18.7	-20.6	-22.4	-23.1	-22.8	-21.5	-19.3	-16.3	-12.8	-9.0	-5.4	-2.1	+0.5	+2.6	+4.0	+4.7	+4.8	+4.6	
300	-14.1	-16.6	-18.9	-20.8	-22.0	-22.2	-20.5	-19.8	-17.2	-14.0	-10.4	-6.6	-3.2	+0.1	+2.3	+4.0	+5.2	+5.7	+5.7	
305	-11.8	-14.3	-16.8	-18.9	-20.5	-21.3	-20.1	-20.0	-17.8	-15.0	-11.6	-7.9	-4.3	-1.1	+1.7	+3.8	+5.3	+6.2	+6.7	
310	-9.6	-11.9	-14.4	-16.8	-18.8	-20.0	-20.4	-19.8	-18.2	-15.7	-12.6	-9.1	-5.5	-2.1	+0.9	+3.4	+5.2	+6.6	+7.3	
315	-7.3	-9.4	-11.9	-14.5	-16.7	-18.4	-19.2	-19.2	-18.2	-16.2	-13.5	-10.2	-6.7	-3.2	0.0	+2.7	+4.9	+6.6	+7.7	
320	-5.1	-7.0	-9.4	-11.9	-14.4	-16.4	-17.8	-18.3	-17.8	-16.4	-14.1	-11.1	-7.8	-4.3	-1.0	+1.9	+4.4	+6.4	+7.8	
325	-2.9	-4.6	-6.8	-9.3	-11.9	-14.2	-16.0	-17.0	-17.0	-16.1	-14.4	-11.8	-8.8	-5.5	-2.1	+1.0	+3.7	+5.9	+7.7	
330	-1.0	-2.4	-4.3	-6.7	-9.2	-11.7	-13.8	-15.3	-15.9	-15.6	-14.3	-12.2	-9.5	-6.4	-3.2	0.0	+2.8	+5.3	+7.3	
335	+0.8	-0.2	-1.9	-4.0	-6.5	-9.1	-11.4	-13.3	-14.4	-14.6	-14.0	-12.4	-10.1	-7.3	-4.2	-1.0	+1.9	+4.5	+6.8	
340	+2.5	+1.7	+4.4	+7.4	+9.4	+11.4	+13.8	+15.0	+15.0	+14.4	+13.2	+12.2	+10.3	+7.8	+5.0	+2.0	+1.0	+3.6	+6.0	
345	+4.0	+3.5																		

V

ΔM_p in Einheiten der Bogenminute.

M	M'																		
	90°	95°	100°	105°	110°	115°	120°	125°	130°	135°	140°	145°	150°	155°	160°	165°	170°	175°	180°
0°	+2.5	+4.9	+6.9	+8.9	+10.7	+12.4	+14.1	+15.8	+17.3	+18.8	+19.9	+20.6	+20.6	+19.8	+18.3	+16.1	+13.1	+9.8	+6.3
5	+1.7	+3.9	+6.0	+8.0	+9.8	+11.6	+13.4	+15.2	+16.9	+18.6	+20.1	+21.3	+21.8	+21.7	+20.7	+19.0	+16.5	+13.3	+9.9
10	+1.0	+3.1	+5.1	+7.0	+8.9	+10.6	+12.5	+14.4	+16.2	+18.2	+20.0	+21.5	+22.6	+23.0	+22.6	+21.5	+19.4	+16.7	+13.4
15	+0.4	+2.3	+4.2	+6.1	+7.9	+9.7	+11.4	+13.4	+15.3	+17.4	+19.4	+21.3	+22.8	+23.8	+24.4	+23.4	+21.9	+19.7	+16.8
20	0.0	+1.7	+3.4	+5.2	+6.9	+8.6	+10.4	+12.2	+14.1	+16.3	+18.5	+20.6	+22.6	+24.0	+24.8	+24.8	+23.9	+22.2	+19.7
25	-0.2	+1.2	+2.7	+4.3	+5.9	+7.5	+9.2	+10.9	+12.8	+15.0	+17.3	+19.7	+21.9	+23.8	+25.1	+25.7	+25.5	+24.3	+22.3
30	-0.2	+0.9	+2.2	+3.6	+5.0	+6.4	+8.0	+9.6	+11.4	+13.5	+15.9	+18.3	+20.8	+23.0	+24.8	+26.0	+26.4	+25.9	+24.5
35	+0.1	+0.8	+1.8	+2.9	+4.1	+5.4	+6.8	+8.3	+10.0	+12.0	+14.2	+16.7	+19.3	+21.9	+24.1	+25.8	+26.8	+26.9	+26.1
40	+0.6	+1.0	+1.6	+2.5	+3.4	+4.5	+5.7	+7.0	+8.6	+10.4	+12.5	+15.0	+17.6	+20.6	+22.9	+25.0	+26.6	+27.4	+27.2
45	+1.3	+1.3	+1.7	+2.2	+2.9	+3.8	+4.7	+5.8	+7.1	+8.8	+10.7	+13.1	+15.6	+18.5	+21.2	+23.8	+25.9	+27.2	+27.7
50	+2.2	+1.9	+1.9	+2.2	+2.6	+3.1	+3.9	+4.7	+5.8	+7.2	+8.9	+11.1	+13.6	+16.4	+19.3	+22.1	+24.6	+26.5	+27.6
55	+3.2	+2.6	+2.3	+2.3	+2.4	+2.7	+3.2	+3.8	+4.5	+5.6	+7.1	+9.0	+11.4	+14.2	+17.1	+20.1	+22.9	+25.3	+26.9
60	+4.4	+3.6	+2.9	+2.6	+2.5	+2.5	+2.7	+2.9	+3.4	+4.3	+5.4	+7.1	+9.2	+11.8	+14.7	+17.8	+20.8	+23.6	+25.7
65	+5.7	+4.6	+3.7	+3.1	+2.7	+2.4	+2.3	+2.3	+2.5	+3.0	+3.9	+5.2	+7.0	+9.4	+12.2	+15.2	+18.4	+21.4	+24.0
70	+7.0	+5.7	+4.6	+3.8	+3.1	+2.6	+2.1	+1.9	+1.8	+2.0	+2.5	+3.5	+5.0	+7.0	+9.6	+12.6	+15.7	+19.0	+21.9
75	+8.3	+6.9	+5.6	+4.6	+3.6	+2.9	+2.2	+1.7	+1.3	+1.3	+1.9	+3.1	+4.8	+7.0	+9.8	+13.0	+16.2	+19.4	+22.3
80	+9.5	+8.1	+6.7	+5.5	+4.3	+3.3	+2.4	+1.6	+1.0	+0.5	+0.3	+0.6	+1.3	+2.6	+4.6	+7.1	+10.0	+13.3	+16.6
85	+10.6	+9.2	+7.8	+6.4	+5.1	+4.0	+2.8	+1.8	+0.9	+0.1	-0.4	-0.2	+0.2	+0.7	+2.2	+4.4	+7.1	+10.3	+13.6
90	+11.5	+10.2	+8.8	+7.4	+6.0	+4.7	+3.4	+2.2	+1.0	-0.1	-0.9	-1.2	+1.5	+1.0	+0.1	+1.9	+4.3	+7.2	+10.5
95	+12.2	+11.0	+9.7	+8.3	+6.9	+5.5	+4.0	+2.6	+1.2	0.0	-1.2	-1.1	-2.5	-2.5	-1.8	-0.4	+1.6	+4.3	+7.4
100	+12.7	+11.6	+10.4	+9.2	+7.8	+6.3	+4.8	+3.2	+1.7	+0.2	-1.2	-2.4	-3.3	-3.6	-3.4	-2.5	-0.9	+1.4	+4.2
105	+12.8	+12.0	+11.0	+9.9	+8.6	+7.1	+5.6	+4.0	+2.2	+0.5	-1.1	-2.6	-3.8	-4.6	-4.8	-4.3	-3.2	+1.3	+1.2
110	+12.6	+12.2	+11.4	+10.5	+9.2	+7.9	+6.4	+4.7	+2.9	+1.1	-0.1	-2.5	-4.0	-5.2	-5.8	-5.9	-5.2	+3.7	+1.6
115	+12.1	+12.0	+11.5	+10.8	+9.8	+8.6	+7.1	+5.5	+3.6	+1.7	-0.7	-2.2	-4.0	-5.5	-6.6	-7.1	-6.9	-6.0	-4.3
120	+11.3	+11.5	+11.3	+10.9	+10.1	+9.1	+7.8	+6.2	+4.4	+2.4	-1.7	-3.8	-5.6	-7.0	-8.0	-8.2	-7.8	-6.6	-6.6
125	+10.1	+10.6	+10.8	+10.7	+10.2	+9.4	+8.3	+6.9	+5.1	+3.2	+1.1	-1.1	-3.4	-5.4	-7.2	-8.6	-9.3	-9.4	-8.4
130	+8.6	+9.4	+10.0	+10.2	+10.0	+9.5	+8.6	+7.4	+5.8	+4.0	+1.9	-0.4	-2.8	-5.0	-7.1	-8.8	-10.0	-10.6	-10.4
135	+6.9	+8.0	+8.8	+9.3	+9.5	+9.3	+8.7	+7.8	+6.4	+4.7	+2.7	+0.4	-2.0	-4.4	-6.8	-8.8	-10.4	-11.4	-11.7
140	+4.9	+6.2	+7.3	+8.2	+8.7	+8.9	+8.7	+8.0	+6.9	+5.3	+3.5	+1.3	-1.2	-3.7	-6.2	-8.5	-10.5	-11.9	-12.7
145	+2.8	+4.3	+5.6	+6.7	+7.6	+8.1	+8.2	+7.9	+7.1	+5.8	+4.2	+2.1	-0.3	-2.9	-5.5	-8.0	-10.3	-12.1	-13.3
150	+0.5	+2.1	+3.6	+5.0	+6.2	+7.0	+7.6	+7.6	+7.1	+6.2	+4.7	+2.9	+0.6	-1.9	-4.6	-7.3	-9.8	-12.0	-13.6
155	-1.8	-0.2	+1.5	+3.1	+4.5	+5.7	+6.5	+7.0	+6.9	+6.3	+5.1	+3.5	+1.4	-1.0	-3.7	-6.4	-9.1	-11.6	-13.6
160	-4.2	-2.6	-0.9	+0.9	+2.6	+4.1	+5.3	+6.1	+6.2	+5.4	+4.1	+2.2	0.0	-2.7	-5.4	-8.3	-10.9	-13.2	-15.2
165	-6.5	-5.0	-3.3	-1.4	+0.4	+2.2	+3.7	+4.9	+5.8	+5.8	+5.4	+4.4	+2.9	+0.8	-1.7	-4.4	-7.2	-10.0	-12.6
170	-8.8	-7.4	-5.8	-3.9	-1.9	0.0	+1.9	+3.3	+4.5	+5.1	+5.1	+4.6	+3.3	+1.6	-0.7	-3.3	-6.1	-9.0	-11.7
175	-10.8	-9.7	-8.2	-6.4	-4.4	-2.3	-0.2	+1.6	+3.1	+4.0	+4.6	+4.4	+3.6	+2.2	+0.2	-2.2	-5.0	-7.8	-10.7
180	-12.7	-11.8	-10.5	-8.8	-6.9	-4.7	-2.5	-0.4	+1.4	+2.8	+3.7	+4.0	+3.6	+2.6	+1.0	-1.2	-3.8	-6.6	-9.5
185	-14.3	-13.8	-12.7	-11.2	-9.4	-7.2	-4.9	-2.7	+0.6	+1.3	+2.6	+3.3	+3.4	+2.8	+1.5	-0.3	-2.7	-5.4	-8.3
190	-15.7	-15.5	-14.7	-13.5	-11.8	-9.7	-7.4	-5.0	-2.7	-0.5	+1.2	+2.3	+2.9	+2.7	+1.9	+0.4	-1.7	-4.1	-6.9
195	-16.8	-16.9	-16.5	-15.5	-14.1	-12.2	-10.0	-7.5	-5.0	-2.6	-0.5	+1.1	+2.1	+2.4	+2.0	+0.9	-0.7	-2.9	-5.6
200	-17.6	-18.0	-18.0	-17.3	-16.2	-14.5	-12.4	-10.0	-7.4	-4.8	-2.5	-0.5	+1.0	+1.8	+1.9	+1.2	-0.1	-1.9	-4.3
205	-18.1	-18.9	-19.2	-18.9	-18.1	-16.7	-14.8	-12.5	-9.9	-7.2	-4.6	-2.3	-0.4	+0.9	+1.5	+1.3	+0.4	-1.1	-3.2
210	-18.3	-19.4	-20.0	-20.1	-19.6	-18.6	-17.0	-14.8	-12.4	-9.6	-6.9	-4.2	-2.0	-0.2	+0.8	+1.2	+0.7	-0.4	-2.1
215	-18.2	-19.5	-20.5	-21.0	-20.9	-20.2	-19.0	-17.1	-14.7	-12.1	-9.2	-6.4	-3.8	-1.7	-0.2	+0.7	+0.8	+0.1	-1.3
220	-17.9	-19.4	-20.7	-21.4	-21.8	-21.5	-20.6	-19.1	-17.1	-14.5	-11.7	-8.7	-5.9	-3.4	-1.4	-0.1	+0.5	+0.3	-0.6
225	-17.3	-19.0	-20.5	-21.6	-22.3	-22.0	-20.8	-19.1	-16.8	-14.0	-11.1	-8.1	-5.2	-2.9	-1.1	0.0	+0.2	+0.1	-0.1
230	-16.5	-18.3	-20.0	-21.4	-22.4	-23.0	-23.0	-22.2	-20.9	-18.8	-16.3	-13.4	-10.3	-7.3	-4.6	-2.4	-0.9	0.0	0.0
235	-15.3	-17.4	-19.2	-20.8	-22.2	-23.3	-23.5	-23.2	-22.3	-20.6	-18.3	-15.7	-12.6	-9.5	-6.5	-3.9	-1.9	-0.5	-0.1
240	-14.1	-16.1	-18.1	-19.9	-21.6	-22.8	-23.6	-23.8	-23.3	-22.1	-20.2	-17.7	-14.8	-11.6	-8.5	-5.6	-3.2	-1.5	-0.4
245	-12.7	-14.7	-16.8	-18.8	-20.6	-22.2	-23.4	-24.0	-24.0	-23.3	-21.7	-19.6	-16.9	-13.8	-10.6	-7.5	-4.8	-2.6	-1.1
250	-11.2	-13.1	-15.3	-17.3	-19.3	-21.2	-22.7	-23.7	-24.2	-24.0	-23.0	-21.2	-18.8	-15.9	-12.7	-9.5	-6.5	-3.7	-1.9
255	-9.4	-11.5	-13.5	-15.6	-17.8	-19.8	-21.6	-23.0	-24.0	-24.2	-23.7	-22.4	-20.4	-17.8	-14.7	-11.5	-8.3	-5.4	-3.1
260	-7.7	-9.6	-11.6	-13.8	-15.9	-18.1	-20.1	-21.9	-23.3	-24.0	-24.0	-23.2	-21.7	-19.4	-16.6	-13.4	-10.2	-7.1	-4.4
265	-5.8	-7.6	-9.6	-11.7	-13.9	-16.1	-18.3	-20.4	-22.1	-23.4	-23.9	-23.6	-22.5	-20.7	-18.2	-15.2	-12.0	-8.8	-5.9
270	-3.9	-5.6	-7.5	-9.5	-11.7	-14.0	-16.3	-18.5	-20.6	-22.2	-23.3	-23.5	-23.1	-21.7	-19.6	-16.9	-13.8	-10.6	-7.5
275	-2.0	-3.6	-5.3	-7.2	-9.4	-11.6	-14.0	-16.4	-18.6	-20.7	-22.1	-23.0	-23.0	-22.2	-20.6	-18.2	-15.4	-12.2	-9.1
280	-0.1	-1.5	-3.2	-4.9	-6.9	-9.1	-11.5	-13.9	-16.4	-18.6	-20.6	-21.9	-22.5	-22.3	-21.2	-19.3	-16.8	-13.9	-10.7
285	+1.6	+0.4	+1.0	+2.6	+4.4	+6.5	+8.8	+11.3	+13.9	+16.3	+18.6	+20.4	+21.5	+21.9	+21.4	+20.0	+17.9	+15.2	+12.2
290	+3.2	+2.3	+1.1	+0.8	+1.9	+3.8	+6.0	+8.4	+11.1	+13.7	+16.2	+18.4	+20.1	+21.0	+21.1	+20.3	+18.6	+16.3	+13.5
295	+4.6	+3.9	+3.0	+1.9	+0.5	-1.2	-3.2	-5.5	-8.1	-10.8	-13.5	-16.0	-18.1	-19.6	-20.3	-20.1	-19.0	-17.2	-14.7
300	+5.7	+5.4	+4.8	+3.9	+2.8	+1.3	-0.4	-2.5	-5.0	-7.7	-10.5	-13.3	-15.7	-17.7	-19.0	-19.4	-18.9	-17.6	-15.5
305	+6.7	+6.7	+6.4	+5.8	+4.9	+3.7	+2.3	+0.4	-1.9	-4.5	-7.3	-10.2	-13.0	-15.4	-17.2	-18.2	-18.3	-17.6	-16.0
310	+7.3	+7.7	+7.7	+7.4	+6.9	+6.0	+4.8	+3.3	+1.2	-1.2	-4.0	-6.9	-9.9	-12.7	-14.9	-16.5	-17.3	-17.1	-16.1
315	+7.7	+8.4	+8.4	+8.7	+8.5	+8.0	+7.1	+5.9	+4.2	+2.0	-0.6	-3.5	-6.6	-9.5	-12.3	-14.3	-15.7	-16.2	-15.8
320	+7.8	+8.8	+9.5	+9.9	+9.9	+9.7	+9.2	+8.4	+7.0	+5.2	+2.8	0.0	-3.1	-6.2	-9.2	-11.8	-13.7	-14.7	-15.0
325	+7.7	+9.0	+9.9	+10.6	+11.0	+11.1	+11.0	+10.5	+9.5	+8.1	+6.1	+3.5	+0.5	-2.6	-5.8	-8.8	-11.2	-12.8	-13.6
330	+7.3	+8.9	+10.2	+11.1	+11.8	+12.3	+12.5	+12.3	+11.8	+10.8	+9.1	+6.9	+4.2	+1.0	-2.2	-5.4	-8.3	-10.5	-11.9
335	+6.8	+8.6	+10.1	+11.3	+12.3	+13.0	+13.6	+13.8	+13.7	+13.1	+11.9	+10.1	+7.6	+4.7	+1.4	-1.9	-5.0	-7.7	-9.7
340	+6.0	+8.1	+9.7	+11.2	+12.4	+13.5	+14.3	+14.9	+15.2	+15.1	+14.3	+13.0	+10.9	+8.3	+5.2	+1.8	-1.5	-4.6	-7.1
345	+5.2	+7.4	+																

V

ΔM_p in Einheiten der Bogenminute.

M	M'																		
	180°	185°	190°	195°	200°	205°	210°	215°	220°	225°	230°	235°	240°	245°	250°	255°	260°	265°	270°
0°	+6.3	+3.0	0.0	-2.4	-4.0	-4.8	-4.9	-4.3	-3.3	-1.9	-0.4	+1.2	+2.9	+4.6	+6.1	+8.6	+10.9	+13.4	+15.9
5	+9.9	+6.4	+3.2	+0.4	-1.7	-3.1	-3.7	-3.7	-3.1	-2.1	-0.8	+0.6	+2.1	+3.8	+5.6	+7.6	+9.8	+12.4	+15.0
10	+13.4	+10.0	+6.5	+3.4	+0.9	-1.0	-2.2	-2.7	-2.5	-1.9	-1.0	+0.2	+1.5	+3.0	+4.7	+6.6	+8.7	+11.2	+13.9
15	+16.8	+13.4	+9.9	+6.6	+3.7	+1.3	-0.3	-1.3	-1.7	-1.5	-0.9	0.0	+1.1	+2.4	+3.8	+5.5	+7.6	+9.9	+12.6
20	+19.7	+16.7	+13.3	+9.9	+6.7	+3.9	+1.8	+0.3	-0.5	-0.8	-0.6	-0.1	+0.7	+1.1	+3.0	+4.5	+6.4	+8.6	+11.1
25	+22.3	+19.7	+16.5	+13.1	+9.8	+6.7	+4.2	+2.2	+0.9	+0.2	0.0	+0.1	+1.2	+2.4	+3.7	+5.3	+7.3	+9.6	+12.4
30	+24.5	+22.3	+19.4	+16.2	+12.8	+9.6	+6.7	+4.4	+2.6	+1.5	+0.8	+0.6	+0.8	+1.9	+2.8	+4.2	+6.0	+8.2	+10.7
35	+26.1	+24.4	+22.0	+19.1	+15.8	+12.5	+9.4	+6.7	+4.6	+3.0	+1.9	+1.3	+1.1	+2.1	+3.3	+4.7	+6.3	+8.4	+10.9
40	+27.2	+26.2	+24.2	+21.6	+18.5	+15.3	+12.1	+9.2	+6.7	+4.7	+3.2	+2.3	+1.7	+2.5	+3.9	+5.5	+7.2	+9.3	+11.8
45	+27.7	+27.2	+25.9	+23.8	+21.0	+17.9	+14.7	+11.7	+8.9	+6.6	+4.8	+3.4	+2.4	+3.1	+4.6	+6.2	+8.0	+10.1	+12.4
50	+27.6	+27.8	+27.1	+25.5	+23.2	+20.3	+17.2	+14.1	+11.2	+8.6	+6.4	+4.8	+3.5	+2.5	+3.9	+5.6	+7.4	+9.5	+11.8
55	+26.9	+27.7	+27.6	+26.7	+24.8	+22.3	+19.4	+16.4	+13.4	+10.7	+8.3	+6.3	+4.6	+3.4	+4.4	+6.1	+7.9	+9.9	+12.1
60	+25.7	+27.1	+27.7	+27.3	+26.0	+24.0	+21.4	+18.5	+15.5	+12.7	+10.1	+7.8	+5.9	+4.4	+5.1	+6.8	+8.6	+10.5	+12.4
65	+24.0	+26.0	+27.1	+27.3	+26.7	+25.1	+23.0	+20.3	+17.5	+14.6	+11.8	+9.4	+7.3	+5.5	+3.9	+2.7	+1.8	+1.1	+1.0
70	+21.9	+24.3	+26.0	+26.9	+26.8	+25.9	+24.2	+21.9	+19.2	+16.4	+13.6	+11.0	+8.7	+6.6	+4.9	+3.4	+2.2	+1.2	+0.7
75	+19.4	+22.2	+24.4	+25.8	+26.4	+26.1	+24.8	+23.0	+20.6	+18.0	+15.2	+12.6	+10.1	+7.9	+5.9	+4.2	+2.8	+1.5	+0.7
80	+16.6	+19.8	+22.4	+24.3	+25.5	+25.7	+25.1	+23.7	+21.6	+19.2	+16.6	+14.0	+11.4	+9.1	+7.0	+5.1	+3.4	+1.9	+0.8
85	+13.6	+17.0	+19.9	+22.4	+24.1	+24.8	+24.8	+23.9	+22.3	+20.2	+17.8	+15.2	+12.7	+10.3	+8.0	+6.0	+4.1	+2.4	+1.0
90	+10.5	+13.9	+17.1	+19.9	+22.2	+23.5	+24.0	+23.7	+22.6	+20.9	+18.7	+16.3	+13.8	+11.4	+9.0	+6.9	+4.8	+3.0	+1.3
95	+7.4	+10.7	+14.1	+17.2	+19.8	+21.7	+22.8	+23.0	+22.4	+21.1	+19.3	+17.1	+14.7	+12.3	+9.9	+7.7	+5.5	+3.6	+1.8
100	+4.2	+7.5	+10.8	+14.1	+17.1	+19.4	+21.1	+21.8	+21.7	+21.0	+19.5	+17.6	+15.5	+13.1	+10.7	+8.5	+6.3	+4.2	+2.2
105	+1.2	+4.2	+7.5	+10.9	+14.0	+16.8	+18.9	+20.2	+20.7	+20.3	+18.4	+17.8	+15.9	+13.7	+11.4	+9.1	+6.9	+4.7	+2.7
110	-1.6	+1.1	+4.2	+7.6	+10.9	+13.9	+16.3	+18.2	+19.1	+19.3	+18.8	+17.7	+16.0	+14.1	+11.9	+9.7	+7.4	+5.2	+3.1
115	-4.3	-1.9	+1.0	+4.2	+7.5	+10.7	+13.5	+15.7	+17.2	+17.9	+17.9	+17.2	+15.9	+14.2	+12.2	+10.1	+7.9	+5.7	+3.5
120	-6.6	-4.7	-2.1	+0.9	+4.1	+7.4	+10.4	+13.0	+14.9	+16.1	+16.5	+16.3	+15.4	+14.0	+12.3	+10.3	+8.2	+6.0	+3.8
125	-8.7	-7.2	-5.1	-2.3	+0.8	+4.0	+7.1	+10.0	+12.3	+13.9	+14.8	+15.0	+14.6	+13.6	+12.0	+10.3	+8.3	+6.3	+4.1
130	-10.4	-9.4	-7.7	-5.4	-2.5	+0.6	+3.8	+6.8	+9.4	+11.4	+12.8	+13.4	+13.4	+12.8	+11.6	+10.1	+8.3	+6.3	+4.2
135	-11.7	-11.3	-10.1	-8.1	-5.6	-2.7	+0.4	+3.5	+6.3	+8.6	+10.4	+11.5	+11.9	+11.7	+10.9	+9.7	+8.1	+6.2	+4.2
140	-12.7	-12.8	-12.0	-10.6	-8.4	-5.8	-2.9	+0.2	+3.1	+5.7	+7.8	+9.3	+10.2	+10.3	+9.9	+9.0	+7.7	+6.0	+4.1
145	-13.3	-13.9	-13.7	-12.7	-11.0	-8.7	-6.0	-3.1	-0.5	+2.7	+5.0	+6.8	+8.1	+8.7	+8.6	+8.1	+7.1	+5.6	+3.9
150	-13.6	-14.6	-14.9	-14.4	-13.2	-11.3	-9.0	-6.2	-3.9	-0.5	+2.0	+4.2	+5.8	+6.7	+7.1	+6.9	+6.2	+5.1	+3.6
155	-13.6	-15.0	-15.8	-15.8	-15.1	-13.6	-11.6	-9.2	-6.4	-3.6	-1.0	+1.3	+3.2	+4.6	+5.3	+5.5	+5.1	+4.3	+3.1
160	-13.2	-15.0	-16.3	-16.8	-16.5	-15.6	-14.0	-11.8	-9.4	-6.7	-4.0	-1.6	+0.5	+2.2	+3.3	+3.9	+3.8	+3.3	+2.4
165	-12.6	-14.7	-16.4	-17.3	-17.6	-17.0	-16.0	-14.2	-12.0	-9.5	-7.0	-4.5	-2.2	-0.3	+1.1	+2.0	+2.4	+2.1	+1.5
170	-11.7	-14.1	-16.1	-17.5	-18.2	-18.3	-17.5	-16.5	-14.4	-12.2	-9.8	-7.3	-5.0	-2.9	-1.3	0.0	+0.6	+0.8	+0.4
175	-10.7	-13.3	-15.6	-17.4	-18.5	-19.0	-18.8	-17.9	-16.4	-14.6	-12.4	-10.0	-7.7	-5.6	-3.7	-2.2	-1.2	-0.7	-0.7
180	-9.5	-12.3	-14.8	-16.9	-18.4	-19.3	-19.6	-19.1	-18.1	-16.6	-14.7	-12.6	-10.3	-8.2	-6.2	-4.5	-3.2	-2.4	-2.1
185	-8.3	-11.1	-13.8	-16.1	-18.0	-19.3	-20.0	-20.0	-19.4	-18.3	-16.7	-14.8	-12.8	-10.6	-8.7	-6.8	-5.4	-4.3	-3.7
190	-6.9	-9.8	-12.5	-15.1	-17.2	-18.9	-20.0	-20.4	-20.2	-19.5	-18.4	-16.8	-14.9	-12.9	-11.0	-9.1	-7.5	-6.2	-5.3
195	-5.6	-8.3	-11.2	-13.8	-16.2	-18.2	-19.5	-20.5	-20.7	-20.4	-19.6	-18.3	-16.8	-15.0	-13.1	-11.3	-9.6	-8.1	-7.0
200	-4.3	-6.9	-9.7	-12.4	-15.0	-17.2	-18.9	-20.1	-20.8	-20.9	-20.5	-19.6	-18.4	-16.8	-15.1	-13.4	-11.7	-10.1	-8.8
205	-3.2	-5.6	-8.3	-11.0	-13.6	-16.0	-18.0	-19.4	-20.5	-21.0	-20.9	-20.4	-19.5	-18.3	-16.9	-15.2	-13.6	-12.0	-10.6
210	-2.1	-4.3	-6.8	-9.4	-12.0	-14.5	-16.7	-18.4	-19.7	-20.6	-20.9	-20.9	-20.4	-19.4	-18.3	-16.8	-15.4	-13.8	-12.3
215	-1.3	-3.1	-5.4	-7.9	-10.4	-12.9	-15.2	-17.2	-18.8	-19.9	-20.6	-20.9	-20.7	-20.2	-19.3	-18.1	-16.8	-15.4	-13.9
220	-0.6	-2.1	-4.0	-6.3	-8.8	-11.1	-13.6	-15.7	-17.5	-18.9	-19.9	-20.5	-20.6	-20.5	-19.9	-19.1	-18.0	-16.8	-15.4
225	-0.1	-1.2	-2.9	-4.9	-7.2	-9.6	-11.9	-14.1	-16.0	-17.6	-18.9	-19.7	-20.3	-20.4	-20.2	-19.7	-18.9	-17.9	-16.7
230	0.0	-0.6	-1.8	-3.6	-5.6	-7.9	-10.2	-12.3	-14.3	-16.1	-17.5	-18.7	-19.4	-19.9	-20.1	-19.8	-19.4	-18.6	-17.6
235	-0.1	-0.2	-1.0	-2.4	-4.2	-6.2	-8.4	-10.5	-12.6	-14.4	-16.0	-17.3	-18.4	-19.1	-19.5	-19.7	-19.5	-19.1	-18.3
240	-0.4	-0.1	-0.4	-1.4	-2.9	-4.7	-6.6	-8.7	-10.7	-12.5	-14.2	-15.6	-16.9	-17.9	-18.6	-19.1	-19.2	-19.0	-18.6
245	-1.1	-0.3	-0.2	-0.7	-1.5	-2.3	-3.3	-5.0	-6.9	-8.8	-10.6	-12.3	-13.8	-15.2	-16.4	-17.4	-18.1	-18.5	-18.7
250	-1.9	-0.7	-0.1	-0.2	-0.8	-2.0	-3.5	-5.1	-6.9	-8.7	-10.3	-11.9	-13.3	-14.6	-15.8	-16.8	-17.5	-18.0	-18.2
255	-3.1	-1.3	+0.3	0.0	-0.2	-0.9	-2.1	-3.5	-5.1	-6.7	-8.3	-9.8	-11.3	-12.6	-14.0	-15.1	-16.1	-16.9	-17.4
260	-4.4	-2.2	+0.7	+0.1	-0.2	-0.1	-0.9	-2.1	-3.4	-4.8	-6.3	-7.7	-9.1	-10.6	-11.9	-13.2	-14.4	-15.4	-16.3
265	-5.9	-3.4	+1.4	+0.3	+0.5	+0.4	0.0	-0.8	-1.8	-3.1	-4.4	-5.6	-7.0	-8.3	-9.7	-11.0	-12.4	-13.6	-14.7
270	-7.5	-4.6	-2.4	-0.2	+0.4	+0.8	+0.8	+0.3	-0.5	-1.4	-2.5	-3.7	-4.8	-6.1	-7.4	-8.8	-10.2	-11.5	-12.8
275	-9.1	-6.1	-3.5	-1.4	+0.1	+0.9	+1.3	+1.1	+0.7	0.0	-0.8	-1.7	-2.8	-3.8	-5.0	-6.4	-7.8	-9.2	-10.7
280	-10.7	-7.5	-4.8	-2.3	+0.5	+0.8	+1.5	+1.8	+1.6	+1.3	+0.7	0.0	-0.8	-1.7	-2.7	-3.9	-5.3	-6.8	-8.3
285	-12.2	-9.0	-6.1	-3.4	+1.2	+0.4	+1.5	+2.1	+2.3	+2.2	+2.0	+1.6	+1.0	+0.3	-0.5	-1.5	-2.7	-4.2	-5.8
290	-13.5	-10.5	-7.5	-4.6	-2.1	-0.2	+1.2	+2.2	+2.8	+3.0	+3.0	+2.9	+2.7	+2.2	+1.6	+0.8	-0.2	-1.5	-3.1
295	-14.7	-11.8	-8.8	-5.8	-3.2	-0.9	+0.8	+2.1	+3.0	+3.6	+3.9	+4.0	+4.0	+3.9	+3.5	+3.0	+2.2	+1.1	+0.3
300	-15.5	-12.9	-10.0	-7.1	-4.3	-1.8	+0.2	+1.9	+3.0	+3.9	+4.5	+4.9	+5.2	+5.3	+5.3	+5.0	+4.5	+3.6	+2.4
305	-16.0	-13.8	-11.1	-8.3	-5.4	-2.8	+0.5	+1.3	+2.8	+3.9	+4.8	+5.5	+6.1	+6.5	+6.8	+6.8	+6.6	+6.0	+5.0
310	-16.1	-14.4	-12.0	-9.3	-6.5	-3.8	+1.4	+0.7	+2.4	+3.8	+5.0	+5.9	+6.7	+7.4	+7.9	+8.4	+8.4	+8.2	+7.5
315	-15.8	-14.5	-12.6	-10.2	-7.5	-4.9	-2.3	0.0	+1.9	+3.5	+4.9	+6.0	+7.1	+8.1	+8.9	+9.6	+10.0	+10.1	+9.8
320	-15.0	-14.3	-12.9	-10.8	-8.4	-5.8	-3.3	-0.9	+1.2	+3.0	+4.6	+6.0	+7.2	+8.5	+9.6	+10.5	+11.3	+11.8	+11.9
325	-13.6	-13.6	-12.7	-11.2	-9.1	-6.7	-4.2	-1.7	+0.4	+2.4	+4.1	+5.7	+7.2	+8.5	+9.9	+11.2	+12.3	+13.1	+13.6
330	-11.9	-12.5	-12.2	-11.1	-9.4	-7.3	-5.0	-2.6	-0.4	+1.7	+3.6	+5.3	+6.9	+8.5	+10.0	+11.5	+12.9	+14.1	+15.0
335	-9.7	-10.9	-11.2	-10.7	-9.5	-7.7	-5.6	-3.4	-1.2	+1.0	+2.9	+4.7	+6.4	+8.1	+9.9	+11.6	+13.3	+14.8	+16.1
340	-7.1	-8.9	-9.8	-9.9	-9.2	-7.8	-6.0	-4.0	-1.9	+0.2	+2.2	+4.0	+5.9	+7.7	+9.5	+11.4	+13.3	+15.1	+16.7

V

ΔM_p in Einheiten der Bogenminute.

M	M'																		
	270°	275°	280°	285°	290°	295°	300°	305°	310°	315°	320°	325°	330°	335°	340°	345°	350°	355°	360°
0°	+15 ¹ .9	+18 ¹ .5	+20 ¹ .9	+22 ¹ .8	+24 ¹ .1	+24 ¹ .7	+24 ¹ .3	+23 ¹ .3	+21 ¹ .4	+19 ¹ .0	+16 ¹ .3	+13 ¹ .6	+11 ¹ .2	+9 ¹ .3	+7 ¹ .9	+6 ¹ .2	+5 ¹ .7	+5 ¹ .3	+5 ¹ .6
5	+15 ⁰ .0	+17 ⁸ .8	+20 ⁴ .4	+22 ⁷ .7	+24 ⁶ .6	+25 ⁶ .6	+25 ⁹ .9	+25 ² .2	+23 ⁸ .8	+21 ⁶ .6	+19 ⁰ .0	+16 ³ .3	+13 ⁷ .7	+11 ⁵ .5	+9 ⁸ .8	+8 ⁷ .7	+8 ³ .3	+8 ³ .3	+8 ⁶ .6
10	+13 ⁹ .9	+16 ⁸ .8	+19 ⁷ .7	+22 ³ .3	+24 ⁶ .6	+26 ² .2	+27 ³ .3	+26 ⁹ .9	+25 ⁸ .8	+24 ¹ .1	+21 ⁷ .7	+19 ⁰ .0	+16 ² .2	+13 ⁸ .8	+11 ¹ .1	+10 ³ .3	+9 ⁶ .6	+9 ⁴ .4	+9 ⁶ .6
15	+12 ⁶ .6	+15 ⁵ .5	+18 ⁵ .5	+21 ⁵ .5	+24 ² .2	+26 ² .2	+27 ⁶ .6	+28 ⁰ .0	+27 ⁵ .5	+26 ² .2	+24 ¹ .1	+21 ⁵ .5	+18 ⁸ .8	+16 ¹ .1	+13 ¹ .1	+12 ⁰ .0	+10 ⁹ .9	+10 ⁵ .5	+10 ⁴ .4
20	+11 ¹ .1	+14 ⁰ .0	+17 ² .2	+20 ³ .3	+23 ³ .3	+25 ⁹ .9	+27 ⁷ .7	+28 ⁷ .7	+28 ⁸ .8	+27 ⁹ .9	+26 ² .2	+23 ⁹ .9	+21 ² .2	+18 ⁴ .4	+15 ⁹ .9	+13 ⁸ .8	+12 ³ .3	+11 ⁶ .6	+11 ³ .3
25	+9 ⁶ .6	+12 ⁵ .5	+15 ⁶ .6	+18 ⁹ .9	+22 ¹ .1	+25 ⁰ .0	+27 ⁴ .4	+29 ⁰ .0	+29 ⁶ .6	+29 ³ .3	+28 ⁰ .0	+26 ⁰ .0	+23 ⁵ .5	+20 ⁷ .7	+18 ⁰ .0	+15 ⁷ .7	+13 ⁹ .9	+12 ⁷ .7	+12 ² .2
30	+8 ² .2	+10 ⁸ .8	+13 ⁸ .8	+17 ¹ .1	+20 ⁵ .5	+23 ⁸ .8	+26 ⁶ .6	+28 ⁷ .7	+29 ⁹ .9	+30 ² .2	+29 ⁴ .4	+27 ⁸ .8	+25 ⁵ .5	+22 ⁹ .9	+20 ¹ .1	+17 ⁴ .4	+15 ⁵ .5	+14 ⁰ .0	+13 ¹ .1
35	+6 ⁷ .7	+9 ¹ .1	+12 ⁰ .0	+15 ³ .3	+18 ⁷ .7	+22 ² .2	+25 ⁴ .4	+28 ⁰ .0	+29 ⁸ .8	+30 ⁶ .6	+30 ⁴ .4	+29 ² .2	+27 ³ .3	+24 ⁸ .8	+22 ¹ .1	+19 ⁴ .4	+17 ¹ .1	+15 ³ .3	+14 ¹ .1
40	+5 ³ .3	+7 ⁴ .4	+10 ¹ .1	+13 ³ .3	+16 ⁷ .7	+20 ⁴ .4	+23 ⁸ .8	+26 ⁸ .8	+29 ² .2	+30 ⁶ .6	+30 ⁹ .9	+30 ³ .3	+28 ⁸ .8	+26 ⁸ .8	+23 ⁹ .9	+21 ² .2	+18 ⁷ .7	+16 ⁶ .6	+15 ¹ .1
45	+4 ⁰ .0	+5 ⁸ .8	+8 ² .2	+11 ² .2	+14 ⁶ .6	+18 ² .2	+21 ⁹ .9	+25 ³ .3	+28 ¹ .1	+30 ⁰ .0	+31 ⁰ .0	+30 ⁹ .9	+29 ⁹ .9	+28 ⁰ .0	+25 ⁶ .6	+22 ⁹ .9	+20 ² .2	+17 ⁹ .9	+16 ¹ .1
50	+2 ⁹ .9	+4 ⁴ .4	+6 ⁵ .5	+9 ² .2	+12 ⁴ .4	+16 ⁰ .0	+19 ⁷ .7	+23 ³ .3	+26 ⁵ .5	+29 ⁰ .0	+30 ⁶ .6	+31 ¹ .1	+30 ⁶ .6	+29 ² .2	+27 ⁰ .0	+24 ⁴ .4	+21 ⁷ .7	+19 ² .2	+17 ¹ .1
55	+2 ¹ .1	+3 ¹ .1	+4 ⁸ .8	+7 ¹ .1	+10 ¹ .1	+13 ⁶ .6	+17 ³ .3	+21 ¹ .1	+24 ⁶ .6	+27 ⁶ .6	+29 ⁷ .7	+30 ⁸ .8	+30 ⁹ .9	+29 ⁹ .9	+28 ¹ .1	+25 ⁷ .7	+23 ¹ .1	+20 ⁴ .4	+18 ¹ .1
60	+1 ⁴ .4	+2 ¹ .1	+3 ³ .3	+5 ³ .3	+7 ⁹ .9	+11 ¹ .1	+14 ⁸ .8	+18 ⁶ .6	+22 ⁴ .4	+25 ⁷ .7	+28 ³ .3	+30 ⁰ .0	+30 ¹ .1	+30 ³ .3	+28 ⁹ .9	+26 ⁹ .9	+24 ³ .3	+21 ⁷ .7	+19 ² .2
65	+1 ⁰ .0	+1 ³ .3	+2 ¹ .1	+3 ⁶ .6	+5 ⁹ .9	+8 ⁸ .8	+12 ² .2	+16 ¹ .1	+19 ⁹ .9	+23 ⁵ .5	+26 ⁶ .6	+28 ⁸ .8	+30 ¹ .1	+30 ² .2	+29 ⁴ .4	+27 ⁷ .7	+25 ⁴ .4	+22 ⁸ .8	+20 ² .2
70	+0 ⁷ .7	+0 ⁶ .6	+1 ⁰ .0	+2 ¹ .1	+3 ⁹ .9	+6 ⁵ .5	+9 ⁷ .7	+13 ⁴ .4	+17 ³ .3	+21 ¹ .1	+24 ⁵ .5	+27 ² .2	+28 ⁹ .9	+29 ⁶ .6	+29 ⁴ .4	+28 ¹ .1	+26 ¹ .1	+23 ⁷ .7	+21 ¹ .1
75	+0 ⁷ .7	+0 ² .2	+0 ² .2	+0 ⁸ .8	+2 ² .2	+4 ⁴ .4	+7 ² .2	+10 ⁷ .7	+14 ⁵ .5	+18 ⁴ .4	+22 ¹ .1	+25 ¹ .1	+27 ⁴ .4	+28 ⁷ .7	+29 ⁰ .0	+28 ² .2	+26 ⁶ .6	+24 ⁴ .4	+21 ⁹ .9
80	+0 ⁸ .8	0 ⁰ .0	0 ⁴ .4	0 ² .2	+0 ⁷ .7	+2 ⁴ .4	+4 ⁹ .9	+8 ¹ .1	+11 ⁷ .7	+15 ⁶ .6	+19 ³ .3	+22 ⁸ .8	+25 ⁵ .5	+27 ⁴ .4	+28 ¹ .1	+27 ⁹ .9	+26 ⁷ .7	+24 ⁸ .8	+22 ⁴ .4
85	+1 ⁰ .0	+0 ¹ .1	+0 ⁸ .8	+1 ⁰ .0	+0 ⁵ .5	+0 ⁷ .7	+2 ⁷ .7	+5 ⁵ .5	+8 ⁹ .9	+12 ⁶ .6	+16 ⁵ .5	+20 ² .2	+23 ³ .3	+25 ⁶ .6	+26 ⁹ .9	+27 ² .2	+26 ⁵ .5	+24 ⁰ .0	+22 ⁸ .8
90	+1 ³ .3	0 ⁰ .0	-1 ⁰ .0	-1 ⁶ .6	-1 ⁵ .5	-0 ⁷ .7	+0 ⁸ .8	+3 ² .2	+6 ² .2	+9 ⁸ .8	+13 ⁶ .6	+17 ³ .3	+20 ⁷ .7	+23 ⁵ .5	+25 ³ .3	+26 ² .2	+26 ⁰ .0	+24 ⁸ .8	+23 ⁰ .0
95	+1 ⁸ .8	+0 ² .2	-1 ⁰ .0	-1 ⁹ .9	-2 ³ .3	-2 ⁰ .0	-0 ⁹ .9	+1 ⁰ .0	+3 ⁷ .7	+6 ⁹ .9	+10 ⁶ .6	+14 ⁴ .4	+18 ⁰ .0	+21 ¹ .1	+23 ⁴ .4	+24 ⁷ .7	+25 ¹ .1	+24 ⁴ .4	+22 ⁹ .9
100	+2 ² .2	+0 ⁵ .5	-1 ⁰ .0	-2 ¹ .1	-2 ⁹ .9	-3 ⁰ .0	-2 ³ .3	-0 ⁹ .9	+1 ³ .3	+4 ³ .3	+7 ⁸ .8	+11 ⁴ .4	+15 ¹ .1	+18 ⁴ .4	+21 ¹ .1	+23 ⁰ .0	+23 ⁸ .8	+23 ⁶ .6	+22 ⁶ .6
105	+2 ⁷ .7	+0 ⁹ .9	-0 ⁹ .9	-2 ³ .3	-3 ² .2	-3 ⁷ .7	-3 ⁵ .5	-2 ⁵ .5	-0 ⁷ .7	+1 ⁸ .8	+4 ¹ .1	+8 ⁵ .5	+12 ² .2	+15 ⁶ .6	+20 ⁸ .8	+22 ² .2	+22 ⁵ .5	+21 ⁹ .9	+20 ³ .3
110	+3 ¹ .1	+1 ² .2	-0 ⁷ .7	-2 ² .2	-3 ⁵ .5	-4 ³ .3	-4 ⁵ .5	-4 ⁰ .0	-2 ⁶ .6	-0 ⁵ .5	+2 ² .2	+5 ⁶ .6	+9 ² .2	+12 ⁸ .8	+15 ⁹ .9	+18 ⁵ .5	+20 ³ .3	+21 ¹ .1	+21 ⁰ .0
115	+3 ⁵ .5	+1 ⁵ .5	-0 ⁴ .4	-2 ² .2	-3 ⁷ .7	-4 ⁸ .8	-5 ³ .3	-5 ¹ .1	-4 ² .2	-2 ⁵ .5	+1 ¹ .1	+2 ⁹ .9	+6 ³ .3	+9 ⁸ .8	+13 ² .2	+16 ⁰ .0	+18 ¹ .1	+19 ⁴ .4	+19 ⁶ .6
120	+3 ⁸ .8	+1 ⁷ .7	-0 ³ .3	-2 ¹ .1	-3 ⁸ .8	-5 ¹ .1	-5 ⁹ .9	-6 ¹ .1	-5 ⁶ .6	-4 ⁴ .4	+2 ³ .3	+0 ³ .3	+3 ⁵ .5	+7 ⁰ .0	+10 ³ .3	+13 ⁴ .4	+15 ⁸ .8	+17 ⁴ .4	+18 ² .2
125	+4 ¹ .1	+1 ⁹ .9	-0 ¹ .1	-2 ¹ .1	-3 ⁸ .8	-5 ⁴ .4	-6 ⁴ .4	-6 ⁹ .9	-6 ⁸ .8	-5 ⁹ .9	+4 ³ .3	-2 ⁰ .0	+0 ⁹ .9	+4 ¹ .1	+7 ⁵ .5	+10 ⁶ .6	+13 ³ .3	+15 ³ .3	+16 ⁴ .4
130	+4 ² .2	+2 ¹ .1	0 ⁰ .0	-2 ⁰ .0	-3 ⁹ .9	-5 ⁵ .5	-6 ⁸ .8	-7 ⁷ .7	-7 ⁸ .8	-7 ⁷ .7	-6 ¹ .1	-4 ¹ .1	-1 ⁵ .5	+1 ⁵ .5	+4 ⁷ .7	+7 ⁹ .9	+10 ⁷ .7	+13 ⁰ .0	+14 ⁵ .5
135	+4 ² .2	+2 ² .2	+0 ¹ .1	-2 ⁰ .0	-3 ⁹ .9	-5 ⁷ .7	-7 ¹ .1	-8 ² .2	-8 ⁷ .7	-7 ⁸ .8	-7 ⁶ .6	-6 ⁰ .0	-3 ⁸ .8	-1 ⁰ .0	+2 ⁰ .0	+5 ² .2	+8 ¹ .1	+10 ⁶ .6	+12 ⁵ .5
140	+4 ¹ .1	+2 ² .2	+0 ¹ .1	-2 ⁰ .0	-4 ⁰ .0	-5 ⁸ .8	-7 ⁴ .4	-8 ⁷ .7	-9 ⁴ .4	-8 ⁶ .6	-9 ⁰ .0	-7 ⁸ .8	-5 ⁸ .8	-3 ³ .3	-0 ⁵ .5	+2 ⁶ .6	+5 ⁶ .6	+8 ³ .3	+10 ² .2
145	+3 ⁹ .9	+2 ⁰ .0	0 ⁰ .0	-2 ⁰ .0	-4 ¹ .1	-6 ⁰ .0	-7 ⁷ .7	-9 ¹ .1	-10 ¹ .1	-10 ⁵ .5	-10 ³ .3	-9 ⁴ .4	-7 ⁷ .7	-5 ⁵ .5	-2 ⁸ .8	+0 ¹ .1	+3 ¹ .1	+5 ⁸ .8	+8 ⁰ .0
150	+3 ⁶ .6	+1 ⁸ .8	-0 ¹ .1	-2 ¹ .1	-4 ² .2	-6 ¹ .1	-8 ⁰ .0	-9 ⁵ .5	-10 ⁷ .7	-11 ³ .3	-11 ³ .3	-10 ⁷ .7	-9 ⁴ .4	-7 ⁴ .4	-4 ⁹ .9	-2 ² .2	+0 ⁷ .7	+3 ⁴ .4	+5 ⁸ .8
155	+3 ¹ .1	+1 ⁵ .5	-0 ³ .3	-2 ³ .3	-4 ³ .3	-6 ³ .3	-8 ² .2	-9 ⁹ .9	-11 ¹ .1	-12 ⁰ .0	-12 ³ .3	-11 ⁹ .9	-10 ⁹ .9	-9 ² .2	-7 ⁰ .0	-4 ⁴ .4	-1 ⁶ .6	+1 ¹ .1	+3 ⁶ .6
160	+2 ⁴ .4	+1 ⁰ .0	-0 ⁶ .6	-2 ⁵ .5	-4 ⁵ .5	-6 ⁵ .5	-8 ⁵ .5	-10 ² .2	-11 ¹ .1	-12 ⁷ .7	-13 ² .2	-13 ¹ .1	-12 ³ .3	-10 ⁹ .9	-8 ⁹ .9	-6 ⁵ .5	-3 ⁸ .8	-1 ¹ .1	+1 ⁴ .4
165	+1 ⁵ .5	+0 ⁴ .4	-1 ⁰ .0	-2 ⁸ .8	-4 ⁷ .7	-6 ⁷ .7	-8 ⁷ .7	-10 ⁵ .5	-11 ¹ .1	-13 ³ .3	-14 ⁰ .0	-14 ¹ .1	-13 ⁶ .6	-12 ⁴ .4	-10 ⁷ .7	-8 ⁴ .4	-5 ⁹ .9	-3 ² .2	-0 ⁶ .6
170	+0 ⁴ .4	-0 ³ .3	-1 ⁶ .6	-3 ¹ .1	-4 ⁹ .9	-6 ⁹ .9	-8 ⁹ .9	-10 ⁹ .9	-12 ⁵ .5	-13 ⁸ .8	-14 ⁸ .8	-15 ¹ .1	-14 ⁸ .8	-13 ⁸ .8	-12 ³ .3	-10 ² .2	-7 ⁸ .8	-5 ² .2	-2 ⁶ .6
175	-0 ⁷ .7	-1 ² .2	-2 ² .2	-3 ⁶ .6	-5 ² .2	-7 ¹ .1	-9 ¹ .1	-11 ¹ .1	-12 ⁹ .9	-14 ⁴ .4	-15 ⁴ .4	-16 ⁰ .0	-15 ⁹ .9	-15 ² .2	-13 ⁸ .8	-11 ⁹ .9	-9 ⁶ .6	-7 ⁰ .0	-4 ⁵ .5
180	-2 ¹ .1	-2 ³ .3	-2 ⁹ .9	-4 ¹ .1	-5 ⁶ .6	-7 ³ .3	-9 ³ .3	-11 ³ .3	-13 ¹ .1	-14 ⁸ .8	-16 ¹ .1	-16 ⁸ .8	-17 ⁰ .0	-16 ⁴ .4	-15 ³ .3	-13 ⁵ .5	-11 ³ .3	-8 ⁹ .9	-6 ³ .3
185	-3 ⁷ .7	-3 ⁵ .5	-3 ⁹ .9	-4 ⁷ .7	-6 ⁰ .0	-7 ⁶ .6	-9 ⁵ .5	-11 ⁴ .4	-13 ⁴ .4	-15 ¹ .1	-16 ⁶ .6	-17 ⁶ .6	-17 ⁹ .9	-17 ⁷ .7	-16 ⁷ .7	-15 ¹ .1	-13 ¹ .1	-10 ⁶ .6	-8 ¹ .1
190	-5 ³ .3	-4 ⁹ .9	-4 ⁹ .9	-5 ⁵ .5	-6 ⁵ .5	-7 ⁹ .9	-9 ⁶ .6	-11 ⁶ .6	-13 ⁵ .5	-15 ⁴ .4	-17 ⁰ .0	-18 ² .2	-18 ⁸ .8	-18 ⁰ .0	-16 ⁶ .6	-14 ⁷ .7	-12 ³ .3	-9 ⁷ .7	-7 ¹ .1
195	-7 ⁰ .0	-6 ³ .3	-6 ¹ .1	-6 ³ .3	-7 ⁰ .0	-8 ² .2	-9 ⁸ .8	-11 ⁶ .6	-13 ⁷ .7	-15 ⁶ .6	-17 ³ .3	-18 ⁷ .7	-19 ⁵ .5	-19 ⁸ .8	-19 ³ .3	-18 ¹ .1	-16 ³ .3	-14 ⁰ .0	-11 ⁵ .5
200	-8 ⁸ .8	-7 ⁹ .9	-7 ³ .3	-7 ³ .3	-7 ⁷ .7	-8 ⁶ .6	-10 ⁰ .0	-11 ⁷ .7	-13 ⁶ .6	-15 ⁷ .7	-17 ⁵ .5	-19 ¹ .1	-20 ¹ .1	-20 ⁶ .6	-20 ⁴ .4	-19 ⁴ .4	-17 ⁸ .8	-15 ⁶ .6	-13 ¹ .1
205	-10 ⁶ .6	-9 ⁴ .4	-8 ⁷ .7	-8 ³ .3	-8 ⁵ .5	-9 ¹ .1	-10 ² .2												

VI

$\log(1+v)_p$ in Einheiten der vierten Decimale.

M	M'																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
0°	-9	-10	-11	-13	-13	-12	-10	-6	-3	0	+1	+1	0	-3	-	-10	-14	-17	-17
10	-8	-8	-9	-11	-13	-13	-11	-8	-4	-1	+1	+2	+2	0	-	-6	-10	-14	-16
20	-7	-6	-7	-9	-11	-12	-11	-9	-6	-2	0	+2	+3	+3	-	-2	-6	-10	-13
30	-6	-5	-5	-7	-9	-11	-11	-10	-7	-4	-1	+2	+4	+5	+4	+2	-1	-5	-9
40	-5	-3	-3	-4	-6	-8	-10	-10	-8	-5	-2	+1	+4	+6	+6	+5	+3	0	-5
50	-3	-2	-1	-2	-3	-6	-8	-9	-7	-6	-3	0	+3	+6	+7	+8	+7	+4	0
60	-2	-1	0	+1	0	-2	-5	-7	-7	-6	-4	-1	+2	+4	+8	+9	+9	+8	+5
70	0	+1	+1	+3	+2	+1	-2	-4	-6	-6	-5	-2	+1	+3	+7	+9	+11	+10	+8
80	+2	+2	+3	+4	+4	+4	+1	-1	-4	-5	-4	-3	0	+3	+6	+9	+11	+12	+11
90	+4	+4	+4	+5	+6	+6	+5	+2	-1	-3	-4	-3	-1	+5	+8	+10	+12	+13	+13
100	+7	+5	+5	+6	+7	+8	+7	+5	+2	0	-2	-2	-2	+3	+6	+9	+12	+13	+13
110	+9	+7	+6	+7	+8	+9	+9	+8	+6	+3	0	-1	-1	+2	+4	+7	+10	+13	+13
120	+10	+9	+8	+7	+8	+9	+10	+10	+8	+6	+3	+1	+1	0	+3	+5	+8	+11	+11
130	+11	+10	+8	+8	+8	+9	+11	+11	+10	+8	+6	+3	+1	0	0	+4	+6	+9	+9
140	+11	+10	+9	+8	+8	+9	+10	+11	+12	+10	+8	+5	+3	+1	0	+2	+4	+7	+7
150	+10	+10	+9	+8	+8	+8	+10	+11	+12	+12	+10	+8	+5	+2	+1	0	+2	+4	+4
160	+9	+9	+9	+8	+8	+8	+9	+10	+11	+12	+12	+10	+7	+4	+2	0	+1	+2	+2
170	+8	+8	+8	+8	+7	+7	+7	+8	+10	+12	+12	+11	+9	+6	+3	+1	0	0	0
180	+7	+7	+7	+7	+6	+6	+6	+7	+8	+10	+11	+11	+10	+8	+5	+2	0	-1	-1
190	+6	+6	+6	+5	+5	+5	+4	+5	+6	+8	+10	+11	+11	+9	+7	+4	+1	-1	-2
200	+5	+5	+4	+4	+4	+3	+3	+3	+4	+5	+8	+9	+10	+10	+8	+5	+2	0	-2
210	+5	+4	+4	+3	+2	+2	+1	+1	+1	+3	+5	+7	+9	+10	+9	+7	+4	+1	-2
220	+4	+4	+3	+2	+1	0	-1	-1	-1	0	+2	+4	+7	+8	+7	+5	+2	-1	-1
230	+4	+4	+3	+2	0	-1	-2	-2	-3	-3	-1	+1	+3	+6	+7	+7	+6	+3	0
240	+2	+3	+3	+2	0	-1	-3	-4	-5	-5	-1	-3	0	+3	+5	+6	+6	+4	+1
250	0	+1	+2	+1	0	-2	-3	-5	-6	-7	-7	-6	-4	+1	+2	+5	+5	+5	+2
260	-2	0	+1	+1	0	-1	-3	-5	-7	-8	-9	-9	-7	-5	-1	+2	+4	+4	+3
270	-5	-3	-1	0	0	-1	-3	-5	-7	-9	-10	-11	-10	-8	-5	-2	+1	+3	+3
280	-7	-5	-3	-1	0	-1	-2	-4	-7	-9	-11	-12	-13	-12	-9	-6	-2	+1	+2
290	-9	-8	-6	-3	-1	-1	-1	-3	-6	-6	-11	-13	-14	-14	-13	-10	-6	-2	0
300	-10	-10	-8	-5	-3	-1	-1	-2	-4	-4	-10	-12	-15	-16	-15	-13	-10	-6	-2
310	-11	-11	-10	-8	-5	-3	-1	-2	-3	-3	-5	-8	-11	-14	-16	-16	-13	-9	-5
320	-11	-12	-12	-10	-8	-5	-2	-1	-2	-3	-6	-9	-12	-15	-17	-18	-16	-13	-9
330	-11	-13	-13	-12	-10	-7	-4	-2	-1	-2	-3	-6	-9	-13	-16	-18	-18	-16	-12
340	-11	-12	-13	-13	-12	-9	-6	-3	-1	-1	-3	-6	-10	-13	-17	-18	-18	-15	-11
350	-10	-11	-13	-14	-13	-11	-8	-4	-	0	-1	-3	-6	-10	-14	-17	-18	-17	-11
360	-9	-10	-11	-13	-13	-12	-10	-6	-	0	+1	+1	0	-3	-6	-10	-14	-17	-17

VII

z_p in Einheiten der vierten Decimale.

M	M'																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
0°	+2	+3	+3	+3	+2	+1	-1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+2	+1	0
10	+1	+2	+3	+3	+3	+2	-1	+1	+1	+1	+1	+2	+2	+3	+3	+3	+2	+1	+1
20	0	+2	+3	+4	+4	+3	+2	+1	+1	+1	+1	+1	+2	+2	+3	+3	+4	+3	+2
30	0	+1	+2	+4	+4	+4	+3	+2	+1	+1	+1	+1	+2	+2	+3	+3	+4	+4	+3
40	-1	0	+2	+3	+4	+4	+3	+2	+1	+1	+1	+1	+1	+2	+2	+3	+4	+4	+4
50	0	0	+1	+2	+3	+4	+4	+3	+2	+1	+1	+1	+1	+1	+2	+2	+3	+4	+4
60	0	0	0	+1	+3	+4	+4	+3	+1	+1	+1	0	0	+1	+1	+2	+2	+3	+4
70	+1	0	0	0	+2	+3	+4	+3	+2	+1	+1	0	0	0	+1	+1	+2	+3	+4
80	+2	0	0	0	+1	+2	+3	+4	+3	+2	+1	0	0	0	0	+1	+1	+2	+3
90	+3	+1	0	-1	+1	+1	+2	+3	+3	+2	+1	0	0	0	0	0	+1	+1	+2
100	+4	+2	0	-1	0	+1	+3	+3	+3	+2	+1	0	0	0	0	0	0	0	+1
110	+4	+3	+1	0	-1	0	+2	+3	+3	+2	+1	0	0	0	-1	-1	0	0	+1
120	+5	+4	+2	0	-1	-1	+1	+2	+2	+2	+1	0	0	0	-1	-1	-1	-1	0
130	+5	+4	+3	+1	0	-1	-1	+1	+1	+2	+2	+2	+1	0	-1	-1	-1	-1	-1
140	+4	+4	+4	+2	0	-1	-2	-1	0	+1	+1	+1	+1	0	0	-1	-1	-1	-1
150	+3	+4	+4	+1	+1	-1	-2	-2	-1	0	+1	+1	+1	0	0	-1	-1	-1	-1
160	+2	+3	+4	+1	+2	0	-1	-2	-2	-1	0	0	+1	0	0	-1	-1	-1	-1
170	+1	+3	+3	+3	+2	+1	-1	-2	-3	-2	-1	0	0	0	0	0	-1	-1	-1
180	0	+2	+3	+3	+3	+2	0	-2	-3	-3	-2	-1	0	0	0	0	-1	-1	-1
190	-1	+1	+2	+3	+3	+2	+1	-1	-2	-3	-3	-2	-1	-1	0	0	-1	-1	-1
200	-2	0	+1	+2	+2	+2	+1	0	-2	-3	-4	-3	-2	-1	0	0	-1	-1	-1
210	-3	-1	+1	+2	+2	+2	+1	0	-1	-3	-4	-4	-3	-2	-1	0	0	0	-1
220	-4	-2	0	+1	+2	+2	+1	0	-2	-3	-4	-4	-3	-2	-1	0	0	0	-1
230	-4	-3	0	+1	+1	+1	+1	0	-1	-3	-4	-4	-4	-3	-2	-1	0	0	-1
240	-5	-4	-1	0	+1	+1	+1	+1	0	-2	-3	-4	-4	-4	-3	-2	-1	0	0
250	-5	-4	-2	-1	0	+1	+1	+1	0	-1	-3	-4	-5	-4	-3	-2	-1	0	0
260	-5	-4	-3	-2	-1	0	+1	+1	+1	+1	0	-1	-3	-4	-5	-4	-3	-2	0
270	-4	-4	-3	-2	-1	0	+1	+1	+1	+1	0	-1	-3	-4	-5	-4	-3	-2	-1
280	-3	-4	-3	-2	-1	0	+1	+1	+1	+1	+1	0	-1	-3	-4	-4	-3	-2	-1
290	-2	-3	-3	-3	-1	0	+1	+1	+1	+1	+1	+1	0	-2	-3	-4	-4	-3	-2
300	0	-2	-2	-2	-2	0	0	+1	+1	+2	+2	+2	+1	0	-1	-2	-3	-4	-3
310	+1	0	-2	-2	-2	-1	0	+1	+2	+2	+2	+2	+1	0	-1	-2	-3	-3	-3
320	+2	+1	0	-1	-1	-1	0	+1	+2	+2	+2	+2	+2	+2	+1	0	-1	-2	-3
330	+2	+2	+1	0	-1	0	+1	+1	+2	+2	+2	+2	+2	+2	+1	0	-1	-2	-2
340	+2	+3	+2	+1	0	0	+1	+1	+2	+2	+2	+2	+2	+2	+1	0	-1	-1	-2
350	+2	+3	+3	+2	+1	0	0	0	+1	+2	+2	+2	+3	+3	+3	+2	+1	0	-1
360	+2	+3	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+2	+1	0

VI

$\log(1+\nu)_p$ in Einheiten der vierten Decimale.

M	M'																		
	180°	190°	200°	210°	220°	230°	240°	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
0°	-17	-15	-12	-8	-4	-1	0	+1	0	-2	-5	-8	-11	-13	-14	-12	-11	-9	-9
10	-16	-16	-14	-10	-6	-3	0	+1	+2	-1	-4	-8	-10	-10	-12	-10	-10	-9	-8
20	-13	-15	-14	-12	-8	-4	-1	+1	+3	+2	-1	-4	-7	-9	-10	-10	-9	-8	-7
30	-9	-12	-13	-12	-9	-6	-2	+1	+3	+4	+4	+2	0	-3	-5	-8	-8	-7	-6
40	-5	-8	-11	-11	-10	-7	-4	0	+2	+4	+5	+5	+3	0	-5	-6	-6	-6	-5
50	0	-4	-7	-9	-9	-7	-4	-1	+1	+4	+6	+7	+6	+4	1	-2	-3	-4	-3
60	+5	+1	-3	-6	-7	-7	-5	-2	+1	+3	+6	+7	+8	+7	+4	+2	-1	-2	-2
70	+8	+5	+1	-2	-4	-5	-4	-2	0	+3	+5	+7	+9	+9	+7	+5	+3	+1	0
80	+11	+9	+6	+2	-1	-3	-3	-2	0	+2	+4	+7	+9	+10	+9	+8	+6	+3	+2
90	+13	+12	+10	+6	+3	0	-1	-1	0	+2	+4	+6	+8	+10	+9	+10	+8	+6	+4
100	+13	+14	+12	+10	+6	+3	+1	0	+1	+2	+3	+5	+7	+7	+11	+11	+10	+8	+7
110	+13	+14	+14	+13	+10	+7	+4	+2	+2	+2	+3	+5	+7	+8	+10	+11	+11	+10	+9
120	+11	+14	+15	+14	+12	+10	+7	+5	+3	+3	+4	+5	+6	+8	+9	+11	+11	+11	+10
130	+9	+12	+14	+15	+14	+12	+9	+7	+5	+4	+4	+5	+6	+7	+8	+10	+11	+11	+11
140	+7	+10	+13	+14	+15	+14	+12	+9	+7	+6	+5	+5	+6	+7	+8	+9	+10	+11	+11
150	+4	+7	+10	+13	+14	+14	+13	+11	+8	+7	+6	+6	+6	+6	+7	+8	+9	+10	+10
160	+2	+4	+7	+10	+12	+14	+14	+12	+10	+8	+7	+6	+6	+6	+7	+7	+8	+8	+9
170	0	+2	+4	+7	+10	+12	+13	+12	+11	+9	+7	+6	+6	+6	+7	+7	+7	+7	+8
180	-1	0	+1	+4	+7	+9	+11	+12	+11	+9	+8	+6	+6	+6	+6	+7	+7	+7	+8
190	-2	-2	-1	+1	+3	+6	+9	+10	+10	+9	+8	+6	+5	+5	+6	+6	+6	+6	+6
200	-2	-3	-3	-2	0	+2	+5	+8	+9	+9	+8	+7	+5	+4	+5	+5	+6	+6	+5
210	-2	-3	-4	-4	-3	+1	+2	+5	+7	+7	+7	+6	+4	+3	+3	+4	+5	+5	+5
220	-1	-3	-5	-6	-6	-4	-2	+1	+4	+5	+6	+5	+4	+3	+2	+2	+3	+4	+4
230	0	-3	-5	-7	-8	-4	-6	-3	0	+2	+4	+4	+3	+2	+1	+1	+2	+3	+4
240	+1	-1	-4	-7	-8	-9	-9	-7	-4	-1	+1	+2	+2	+1	0	-1	0	+1	+2
250	+2	0	-3	-6	-9	-10	-11	-10	-8	-5	-2	0	0	0	-2	-2	-1	0	0
260	+3	+1	-2	-5	-8	-10	-12	-12	-11	-8	-5	-3	-2	-2	-3	-4	-4	-4	-2
270	+3	+2	-1	-4	-7	-10	-12	-13	-13	-12	-9	-6	-4	-3	-4	-5	-6	-6	-5
280	+2	+2	0	-2	-5	-9	-11	-14	-15	-14	-12	-9	-7	-5	-5	-6	-7	-7	-7
290	0	+1	+1	-1	-4	-7	-10	-13	-15	-16	-15	-12	-10	-7	-6	-7	-8	-9	-9
300	-2	0	+1	0	-2	-5	-8	-11	-14	-16	-16	-15	-12	-10	-8	-7	-8	-10	-10
310	-5	-2	0	0	-1	-3	-6	-9	-13	-15	-17	-16	-15	-12	-10	-9	-9	-10	-11
320	-9	-5	-2	0	0	-2	-4	-7	-10	-14	-16	-17	-16	-14	-12	-10	-9	-10	-11
330	-12	-8	-4	-1	0	-1	-2	-4	-7	-11	-14	-17	-16	-15	-13	-11	-10	-10	-11
340	-15	-11	-7	-3	-1	0	0	-2	-5	-8	-11	-14	-16	-16	-14	-12	-10	-10	-11
350	-17	-14	-10	-5	-2	0	0	0	-2	-5	-8	-11	-14	-15	-14	-12	-10	-9	-10
360	-17	-15	-12	-8	-4	-1	0	+1	0	-2	-5	-8	-11	-13	-14	-12	-11	-9	-9

VII

z_p in Einheiten der vierten Decimale.

M	M'																		
	180°	190°	200°	210°	220°	230°	240°	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
0°	0	-1	-1	-1	-1	0	0	+1	+1	+1	+1	0	-1	-1	-1	-1	0	+2	+2
10	+1	0	-1	-1	-1	0	0	+1	+1	+2	+2	+1	0	-1	-1	-1	0	+1	0
20	+2	+1	0	-1	-1	-1	0	0	+1	+1	+2	+2	+2	+1	0	0	-1	0	0
30	+3	+2	+1	0	-1	-1	0	0	0	+1	+2	+2	+2	+2	+2	0	0	-1	0
40	+4	+3	+2	0	0	-1	0	0	0	+1	+1	+2	+3	+3	+3	+2	0	0	-1
50	+4	+4	+3	+1	0	-1	-1	0	0	+1	+2	+3	+3	+3	+3	+1	0	0	0
60	+4	+4	+3	+2	+1	-1	-1	-1	0	+1	+2	+3	+3	+4	+4	+3	+1	0	0
70	+4	+4	+4	+3	+1	-1	-1	-1	0	0	+1	+2	+3	+4	+4	+4	+2	+1	+1
80	+3	+4	+4	+4	+2	-1	-1	-1	-1	0	+1	+2	+3	+4	+4	+4	+3	+2	+2
90	+2	+3	+4	+4	+3	-1	-1	-2	-1	-1	0	+1	+2	+3	+4	+5	+4	+3	+3
100	+1	+3	+4	+4	+3	+2	0	-1	-2	-2	-1	-1	0	+1	+3	+4	+5	+5	+4
110	+1	+2	+3	+4	+4	+3	+1	-1	-2	-2	-2	-1	0	+1	+2	+3	+4	+5	+4
120	0	+1	+2	+3	+3	+2	0	-2	-2	-3	-2	-1	0	+1	+2	+4	+5	+5	+5
130	-1	0	+1	+2	+3	+2	+1	-1	-2	-3	-3	-2	-1	0	+1	+3	+4	+5	+5
140	-1	-1	0	+1	+2	+3	+2	+1	0	-2	-3	-3	-3	-2	-1	0	+2	+3	+4
150	-1	-1	-1	0	+1	+2	+2	+2	0	-1	-3	-4	-4	-3	-2	-1	+1	+2	+3
160	-1	-1	-1	-1	0	+1	+2	+2	+1	-2	-4	-4	-4	-3	-2	0	+1	+2	+2
170	-1	-2	-2	-1	0	+1	+2	+1	0	-2	-3	-4	-5	-4	-3	-2	0	+1	+1
180	-1	-2	-2	-2	-1	0	+1	+1	0	-1	-3	-4	-5	-5	-4	-3	-1	0	0
190	-1	-1	-2	-2	-2	-1	0	+1	+1	0	-2	-3	-5	-5	-5	-4	-2	-1	-1
200	-1	-1	-2	-2	-2	-2	-1	0	+1	0	-1	-3	-4	-5	-5	-5	-3	-2	-2
210	-1	-1	-2	-2	-2	-3	-2	-1	0	0	0	-1	-3	-5	-5	-5	-4	-3	-3
220	-1	-1	-1	-2	-2	-3	-3	-3	-2	-1	0	0	-1	-2	-4	-5	-5	-4	-4
230	0	-1	-1	-1	-2	-3	-3	-3	-3	-1	0	0	0	-1	-3	-4	-5	-5	-4
240	0	0	-1	-1	-2	-3	-3	-3	-3	-2	-1	0	0	0	-2	-3	-5	-5	-5
250	0	0	0	-1	-1	-2	-3	-3	-4	-3	-2	-1	0	0	-1	-2	-4	-5	-5
260	0	0	0	0	-1	-2	-3	-4	-4	-4	-3	-1	0	+1	0	-1	-3	-4	-5
270	-1	0	0	0	-1	-2	-3	-3	-4	-3	-2	-1	0	0	+1	0	-1	-3	-4
280	-1	0	0	0	0	-2	-3	-3	-4	-4	-3	-2	-1	0	+1	0	-1	-3	-4
290	-2	-1	0	0	0	-1	-2	-3	-4	-4	-3	-2	-1	+1	+1	+1	0	-2	-2
300	-2	-1	0	0	0	0	-1	-2	-3	-3	-4	-3	-2	0	+1	+1	+1	0	0
310	-3	-2	-1	0	0	0	0	-1	-2	-3	-3	-3	-2	-1	+1	+2	+2	+1	+1
320	-3	-2	-1	0	0	0	0	0	0	-1	-2	-3	-3	-3	-1	0	+1	+2	+2
330	-2	-2	-1	-1	0	0	0	0	0	-1	-2	-3	-3	-3	-2	0	+1	+2	+2
340	-2	-2	-2	-1	0	0	0	0	+1	+1	0	-1	-2	-2	-1	0	+2	+2	+2
350	-1	-2	-2	-1	0	0	0	0	+1	+1	+1	+1	0	-1	-2	-1	0	+1	+2
360	0	-1	-1	-1	-1	0	0	0	+1	+1	+1	+1	0	-1	-1	-1	-1	0	+2

Mittelpunktsgleichung $(v - M_o)$ und $\log(r)$, Argument: $M_o = M + \Delta M_s + \Delta M_p$.
 Die Mittelpunktsgleichung erhält das +Vorzeichen, wenn das Argument links steht.

” ” ” — ” ” ” ” ” rechts ”

VIII

M_o	$v - M_o$	$\log(r)$	M_o
0 ^o	0 ^o 0 ^o 0 ^o	0 ^o 4125	360 ^o
1	+0 5 ^o 4 ^o	0 ^o 4125	359
2	+0 10 ^o 8 ^o	0 ^o 4125	358
3	+0 16 ^o 2 ^o	0 ^o 4126	357
4	+0 21 ^o 6 ^o	0 ^o 4126	356
5	+0 26 ^o 9 ^o 2 ^o	0 ^o 4126	355
6	+0 32 ^o 3 ^o	0 ^o 4126	354
7	+0 37 ^o 6 ^o	0 ^o 4127	353
8	+0 43 ^o 0 ^o	0 ^o 4127	352
9	+0 48 ^o 3 ^o	0 ^o 4128	351
10	+0 53 ^o 6 ^o	0 ^o 4129	350
11	+0 58 ^o 9 ^o	0 ^o 4129	349
12	+1 4 ^o 2 ^o	0 ^o 4130	348
13	+1 9 ^o 4 ^o	0 ^o 4131	347
14	+1 14 ^o 6 ^o	0 ^o 4132	346
15	+1 19 ^o 8 ^o	0 ^o 4132	345
16	+1 25 ^o 0 ^o	0 ^o 4133	344
17	+1 30 ^o 1 ^o	0 ^o 4135	343
18	+1 35 ^o 2 ^o	0 ^o 4136	342
19	+1 40 ^o 3 ^o	0 ^o 4137	341
20	+1 45 ^o 3 ^o	0 ^o 4138	340
21	+1 50 ^o 3 ^o	0 ^o 4139	339
22	+1 55 ^o 3 ^o	0 ^o 4141	338
23	+2 0 ^o 2 ^o	0 ^o 4142	337
24	+2 5 ^o 1 ^o	0 ^o 4143	336
25	+2 9 ^o 9 ^o	0 ^o 4145	335
26	+2 14 ^o 7 ^o	0 ^o 4146	334
27	+2 19 ^o 4 ^o	0 ^o 4148	333
28	+2 24 ^o 1 ^o	0 ^o 4150	332
29	+2 28 ^o 7 ^o	0 ^o 4152	331
30	+2 33 ^o 3 ^o	0 ^o 4153	330
31	+2 37 ^o 9 ^o	0 ^o 4155	329
32	+2 42 ^o 3 ^o	0 ^o 4157	328
33	+2 46 ^o 7 ^o	0 ^o 4159	327
34	+2 51 ^o 1 ^o	0 ^o 4161	326
35	+2 55 ^o 4 ^o	0 ^o 4163	325
36	+2 59 ^o 6 ^o	0 ^o 4165	324
37	+3 3 8 ^o	0 ^o 4167	323
38	+3 7 ^o 9 ^o	0 ^o 4169	322
39	+3 12 ^o 0 ^o	0 ^o 4172	321
40	+3 16 ^o 0 ^o	0 ^o 4174	320
41	+3 19 ^o 9 ^o	0 ^o 4176	319
42	+3 23 ^o 7 ^o	0 ^o 4178	318
43	+3 27 ^o 5 ^o	0 ^o 4181	317
44	+3 31 ^o 2 ^o	0 ^o 4183	316
45	+3 34 ^o 9 ^o	0 ^o 4186	315
46	+3 38 ^o 4 ^o	0 ^o 4188	314
47	+3 41 ^o 9 ^o	0 ^o 4190	313
48	+3 45 ^o 3 ^o	0 ^o 4193	312
49	+3 48 ^o 7 ^o	0 ^o 4196	311
50	+3 51 ^o 9 ^o	0 ^o 4199	310
51	+3 55 ^o 1 ^o	0 ^o 4201	309
52	+3 58 ^o 2 ^o	0 ^o 4204	308
53	+4 1 ^o 2 ^o	0 ^o 4207	307
54	+4 4 ^o 2 ^o	0 ^o 4210	306
55	+4 7 ^o 0 ^o	0 ^o 4213	305
56	+4 9 ^o 8 ^o	0 ^o 4215	304
57	+4 12 ^o 5 ^o	0 ^o 4218	303
58	+4 15 ^o 1 ^o	0 ^o 4221	302
59	+4 17 ^o 7 ^o	0 ^o 4224	301
60	+4 20 ^o 1 ^o	0 ^o 4227	300

VIII

M_o	$v - M_o$	$\log(r)$	M_o
60 ^o	+4 20 ^o 1 ^o	0 ^o 4227	300 ^o
61	+4 22 ^o 5 ^o	0 ^o 4230	299
62	+4 24 ^o 7 ^o	0 ^o 4233	298
63	+4 26 ^o 9 ^o	0 ^o 4236	297
64	+4 29 ^o 0 ^o	0 ^o 4239	296
65	+4 31 ^o 0 ^o	0 ^o 4242	295
66	+4 33 ^o 0 ^o	0 ^o 4245	294
67	+4 34 ^o 8 ^o	0 ^o 4248	293
68	+4 36 ^o 5 ^o	0 ^o 4251	292
69	+4 38 ^o 2 ^o	0 ^o 4255	291
70	+4 39 ^o 8 ^o	0 ^o 4258	290
71	+4 41 ^o 3 ^o	0 ^o 4261	289
72	+4 42 ^o 6 ^o	0 ^o 4264	288
73	+4 43 ^o 9 ^o	0 ^o 4267	287
74	+4 45 ^o 2 ^o	0 ^o 4270	286
75	+4 46 ^o 3 ^o	0 ^o 4274	285
76	+4 47 ^o 3 ^o	0 ^o 4277	284
77	+4 48 ^o 3 ^o	0 ^o 4280	283
78	+4 49 ^o 1 ^o	0 ^o 4283	282
79	+4 49 ^o 9 ^o	0 ^o 4287	281
80	+4 50 ^o 5 ^o	0 ^o 4290	280
81	+4 51 ^o 1 ^o	0 ^o 4293	279
82	+4 51 ^o 6 ^o	0 ^o 4296	278
83	+4 52 ^o 0 ^o	0 ^o 4299	277
84	+4 52 ^o 5 ^o	0 ^o 4303	276
85	+4 52 ^o 5 ^o	0 ^o 4306	275
86	+4 52 ^o 7 ^o	0 ^o 4309	274
87	+4 52 ^o 7 ^o	0 ^o 4312	273
88	+4 52 ^o 6 ^o	0 ^o 4316	272
89	+4 52 ^o 5 ^o	0 ^o 4319	271
90	+4 52 ^o 3 ^o	0 ^o 4322	270
91	+4 52 ^o 0 ^o	0 ^o 4325	269
92	+4 51 ^o 6 ^o	0 ^o 4328	268
93	+4 51 ^o 1 ^o	0 ^o 4332	267
94	+4 50 ^o 5 ^o	0 ^o 4335	266
95	+4 49 ^o 8 ^o	0 ^o 4338	265
96	+4 49 ^o 1 ^o	0 ^o 4341	264
97	+4 48 ^o 2 ^o	0 ^o 4344	263
98	+4 47 ^o 3 ^o	0 ^o 4347	262
99	+4 46 ^o 3 ^o	0 ^o 4351	261
100	+4 45 ^o 2 ^o	0 ^o 4354	260
101	+4 44 ^o 0 ^o	0 ^o 4357	259
102	+4 42 ^o 8 ^o	0 ^o 4360	258
103	+4 41 ^o 4 ^o	0 ^o 4363	257
104	+4 40 ^o 0 ^o	0 ^o 4366	256
105	+4 38 ^o 5 ^o	0 ^o 4369	255
106	+4 36 ^o 9 ^o	0 ^o 4372	254
107	+4 35 ^o 3 ^o	0 ^o 4375	253
108	+4 33 ^o 5 ^o	0 ^o 4378	252
109	+4 31 ^o 7 ^o	0 ^o 4381	251
110	+4 29 ^o 8 ^o	0 ^o 4384	250
111	+4 27 ^o 8 ^o	0 ^o 4387	249
112	+4 25 ^o 8 ^o	0 ^o 4389	248
113	+4 23 ^o 6 ^o	0 ^o 4392	247
114	+4 21 ^o 4 ^o	0 ^o 4395	246
115	+4 19 ^o 1 ^o	0 ^o 4398	245
116	+4 16 ^o 8 ^o	0 ^o 4401	244
117	+4 14 ^o 4 ^o	0 ^o 4403	243
118	+4 11 ^o 9 ^o	0 ^o 4406	242
119	+4 9 ^o 3 ^o	0 ^o 4409	241
120	+4 6 ^o 6 ^o	0 ^o 4411	240

VIII

M_o	$v - M_o$	$\log(r)$	M_o
120 ^o	+4 6 ^o 6 ^o	0 ^o 4411	240 ^o
121	+4 3 ^o 9 ^o	0 ^o 4414	239
122	+4 1 ^o 2 ^o	0 ^o 4416	238
123	+3 58 ^o 3 ^o	0 ^o 4419	237
124	+3 55 ^o 4 ^o	0 ^o 4421	236
125	+3 52 ^o 4 ^o	0 ^o 4424	235
126	+3 49 ^o 4 ^o	0 ^o 4426	234
127	+3 46 ^o 3 ^o	0 ^o 4429	233
128	+3 43 ^o 1 ^o	0 ^o 4431	232
129	+3 39 ^o 9 ^o	0 ^o 4433	231
130	+3 36 ^o 6 ^o	0 ^o 4436	230
131	+3 33 ^o 3 ^o	0 ^o 4438	229
132	+3 29 ^o 9 ^o	0 ^o 4440	228
133	+3 26 ^o 4 ^o	0 ^o 4442	227
134	+3 22 ^o 9 ^o	0 ^o 4445	226
135	+3 19 ^o 3 ^o	0 ^o 4447	225
136	+3 15 ^o 7 ^o	0 ^o 4449	224
137	+3 12 ^o 0 ^o	0 ^o 4451	223
138	+3 8 ^o 3 ^o	0 ^o 4453	222
139	+3 4 ^o 5 ^o	0 ^o 4455	221
140	+3 0 ^o 6 ^o	0 ^o 4457	220
141	+2 56 ^o 8 ^o	0 ^o 4458	219
142	+2 52 ^o 8 ^o	0 ^o 4460	218
143	+2 48 ^o 9 ^o	0 ^o 4462	217
144	+2 44 ^o 8 ^o	0 ^o 4464	216
145	+2 40 ^o 8 ^o	0 ^o 4465	215
146	+2 36 ^o 7 ^o	0 ^o 4467	214
147	+2 32 ^o 5 ^o	0 ^o 4469	213
148	+2 28 ^o 3 ^o	0 ^o 4470	212
149	+2 24 ^o 1 ^o	0 ^o 4472	211
150	+2 19 ^o 8 ^o	0 ^o 4473	210
151	+2 15 ^o 5 ^o	0 ^o 4475	209
152	+2 11 ^o 2 ^o	0 ^o 4476	208
153	+2 6 ^o 8 ^o	0 ^o 4477	207
154	+2 2 ^o 4 ^o	0 ^o 4479	206
155	+1 58 ^o 0 ^o	0 ^o 4480	205
156	+1 53 ^o 5 ^o	0 ^o 4481	204
157	+1 49 ^o 0 ^o	0 ^o 4482	203
158	+1 44 ^o 4 ^o	0 ^o 4483	202
159	+1 39 ^o 9 ^o	0 ^o 4484	201
160	+1 35 ^o 3 ^o	0 ^o 4485	200
161	+1 30 ^o 7 ^o	0 ^o 4486	199
162	+1 26 ^o 1 ^o	0 ^o 4487	198
163	+1 21 ^o 4 ^o	0 ^o 4488	197
164	+1 16 ^o 7 ^o	0 ^o 4489	196
165	+1 12 ^o 0 ^o	0 ^o 4490	195
166	+1 7 ^o 3 ^o	0 ^o 4490	194
167	+1 2 ^o 6 ^o	0 ^o 4491	193
168	+0 57 ^o 8 ^o	0 ^o 4492	192
169	+0 53 ^o 1 ^o	0 ^o 4492	191
170	+0 48 ^o 3 ^o	0 ^o 4493	190
171	+0 43 ^o 5 ^o	0 ^o 4493	189
172	+0 38 ^o 7 ^o	0 ^o 4494	188
173	+0 33 ^o 9 ^o	0 ^o 4494	187
174	+0 29 ^o 0 ^o	0 ^o 4494	186
175	+0 24 ^o 2 ^o	0 ^o 4495	185
176	+0 19 ^o 4 ^o	0 ^o 4495	184
177	+0 14 ^o 5 ^o	0 ^o 4495	183
178	+0 9 ^o 7 ^o	0 ^o 4495	182
179	+0 4 ^o 8 ^o	0 ^o 4495	181
180	0 0 ^o 0 ^o	0 ^o 4495	180

IX

Äquatorconstanten.

Mittl. Äquinoctium	A	B	C	log sin a	log sin b	log sin c	log cos a	log cos b	log cos c
1860	279° 9' 9	189° 42' 7	184° 24' 3	9.9998	9.9765	9.5073	8.450	9.506	9.976
1870	279 18.3	189 50.8	184 34.7	9.9998	9.9765	9.5072	8.447	9.506	9.976
1880	279 26.6	189 58.9	184 45.0	9.9998	9.9765	9.5071	8.443	9.505	9.976
1890	279 35.0	190 7.0	184 55.4	9.9998	9.9765	9.5070	8.440	9.505	9.976
1900	279 43.3	190 15.1	185 5.7	9.9998	9.9765	9.5069	8.437	9.505	9.976
1910	279 51.6	190 23.2	185 16.1	9.9998	9.9765	9.5068	8.433	9.505	9.976
1920	280 0.0	190 31.3	185 26.5	9.9998	9.9765	9.5067	8.430	9.505	9.976
1930	280 8.3	190 39.4	185 36.8	9.9998	9.9766	9.5065	8.427	9.505	9.976
1940	280 16.7	190 47.5	185 47.2	9.9998	9.9766	9.5064	8.424	9.505	9.976
1950	280 25.0	190 55.6	185 57.6	9.9999	9.9766	9.5063	8.420	9.505	9.976
1960	280 33.4	191 3.7	186 7.9	9.9999	9.9766	9.5062	8.417	9.505	9.976

$$r = M_0 + (v - M_0) = M + \Delta M_s + \Delta M_p + (v - M_0)$$

$$\log r = \log (r) + \log (1 + v)_s + \log (1 + v)_p$$

$$z = z_s + z_p,$$

$$x' = r \sin a \sin (A + v) + z \cos a$$

$$y' = r \sin b \sin (B + v) + z \cos b$$

$$z' = r \sin c \sin (C + v) + z \cos c$$

$$\rho \cos \alpha \cos \delta = x' + X$$

$$\rho \sin \alpha \cos \delta = y' + Y$$

$$\rho \sin \delta = z' + Z$$

X

log (Helligkeit) = 1.323	2 log (r _p)
Grösse = 8.32	+ 5 log (r _p)

Beispiel.

Berechnung der Grössen v , $\log r$ und z für 1885 Jan. 2.0 mittl. Berl. Zeit.

Tafel Ia. (1885)	202° 21' 8	130° 5	+20.0
„ II. (Januar)	0 0.0	0.0	0.0
„ III. (2)	0 26.7	0.2	0.0

$$M = 202^\circ 48' 5 \quad M' = 130^\circ 7 \quad t = +20.0$$

Tafel IV.	$\Delta M_s = + 2.3$	Tafel IV.	$\log (1 + v)_s = + 1$	Tafel IV	$z_s = -10$
„ V.	$\Delta M_p = - 8.4$	„ VI.	$\log (1 + v)_p = + 10$	„ VII	$z_p = - 1$

$$M_0 = 202^\circ 42' 4 \text{ (Argument für Tafel VIII)}$$

$$z = -0.0011$$

$$\text{„ VIII. } v - M_0 = - 47.7 \quad \text{Tafel VIII. } \log (r) = 0.4482$$

$$v = 200^\circ 54.7 \quad \log r = 0.4493$$

Mit Rücksicht auf die in diesen Tafeln vernachlässigten periodischen Saturnstörungen stellen die Tafeln die bislang beobachteten Oppositionen wie folgt dar:

	$d\alpha \cos \delta$	$d\delta$		$d\alpha \cos \delta$	$d\delta$		$d\alpha \cos \delta$	$d\delta$
1860	+0.2	0.0	1869	-0.5	+0.1	1875	+0.3	+0.1
1864	+0.3	0.0	1870	-0.2	0.0	1877	+0.3	0.0
1865	+0.2	0.0	1871	-0.4	0.0	1878	+0.4	-0.1
1866	+0.1	+0.1	1873	-0.4	+0.1	1880	0.0	0.0
1867	-0.1	0.0	1874	-0.2	0.0	1882	-0.9	+0.2

Dieser befriedigenden Darstellung einer 23jährigen Beobachtungsreihe zu Folge ist zu erwarten, dass innerhalb der nächsten 50 Jahre die vorliegenden Tafeln zur Berechnung der Jahresephemeriden völlig ausreichend sich erweisen werden.



ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

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