M.5101/15. Eötvös Lóránd jegyzetei. Magyarul

1913. április 17-én a Könyvtár adatai-

ról eltett vegyes számlálások.

Ezek könyvanyagi jelzése: nem szükséges.

Albonias	Magneses ξ	η	ζ	Gravitatios A	B	C	D
2326	+ 8	− 22	− 6	−7,6	−9,2	+1,5	+2,3
27	− 26	− 30	− 61	−11,0	−7,4	−3,7	−0,5
28	− 7	− 31	+ 2	−9,3	−5,8	+5,3	−5,1
29	− 10	− 47	+ 17	−18,8	−10,6	+0,2	−2,4
30	− 17	− 45	+ 27	−5,3	−15,5	+3,8	+1,5
31	− 102	− 35	− 75	−4,9	−11,7	+2,1	+3,1
33	− 68	− 50	− 48	−1,4	−9,7	−1,2	+0,6
34	− 28	− 24	+ 74	−6,3	−10,2	−1,0	+1,2
35	+ 15	+ 13	+ 21	+14,5	−3,2	−6,1	+8,1
36	+ 24	+ 34	− 37	+7,9	+5,1	−8,9	+2,6
37	+ 26	+ 19	− 2	+2,8	+9,2	−2,9	+1,6
38	+ 6	+ 19	− 42	−1,1	+9,3	−6,9	+0,9
39	− 7	+ 28	− 7	−5,6	+16,4	−4,0	+0,5
40	+ 10	+ 39	− 18	−0,6	+7,7	+4,3	+2,1
41	+ 15	+ 24	+ 2	+6,8	+3,6	+3,2	+2,1
42	+ 25	+ 20	− 2	+9,0	+6,1	+3,4	+0,1
43	+ 36	+ 6	− 14	+6,9	+6,4	+1,2	+5,6
44	+ 36	− 3	− 9	+11,2	+5,4	+2,3	+2,9
45	+ 56	+ 39	+ 72	+9,6	+7,9	+2,2	+0,9
46	+ 8	+ 40	+ 112	+2,8	+6,4	+5,8	+1,4

$$(-A\beta_0 - 2D\gamma_0)x + (\xi - A\alpha_0 - C\gamma_0 - 2B\beta_0)y + (2\eta - 2D\alpha_0 - C\beta_0 - 4B\gamma_0)z =$$

$$= -\left[(\xi - A\alpha_0)\beta_0 + (2\eta - 2D\alpha_0)\gamma_0 - C\beta_0\gamma_0 - B(\beta_0^2 + 2\gamma_0^2)\right] \quad \text{II.}$$

$\alpha_0 = +1,65$

$\beta_0 = -0,15$

$\gamma_0 = +2,93$

$$(\zeta - B\beta_0 + C\gamma_0 - 2A\alpha_0)x + (-2D\gamma_0 - B\alpha_0)y + (2\zeta - 2D\beta_0 + C\alpha_0 - 4A\gamma_0)z =$$

$$= -\left[(\zeta - D\beta_0)2\gamma_0 + (\zeta - B\beta_0)\alpha_0 + C\alpha_0\gamma_0 - (\alpha_0^2 + 2\gamma_0^2)A\right] \quad \text{III.}$$

Aead-Szeged 1908.

	ΔX	Δy
2301	−13	+26
2	−39	+33
3	−37	+20
4	−43	+19
5	−18	+23
6	−25	−1
10	−40	+80
13	−38	+33
14	−17	+24
15	−24	+12
18	+5	+4
19	−8	+21
20	−43	−16
21	−15	+12
22	−8	−1
23	−24	+11
24	−20	+13
25	−21	+10
26	+13	−22
27	−21	−30
28	−2	−31
29	−5	−47
30	−12	−45
31	−97	−35
33	−63	−50
34	−25	−24
35	+20	+13
36	+29	+34
37	+21	+19
38	+11	+19
39	−2	+28
40	+15	+39
		+197.

	ΔX	Δy
2341	+20	+24
42	+30	+20
43	+41	+6
44	+41	−3
45	+61	+39
46	+13	+40
47	−19	+39
48	+20	+48
49	+38	+63
50	+39	+44
57	+40	+43
53	+17	+30
54	+38	+31
		+424

Szeged Gyulaka Vaja

Szombor 1909

2348	+15	+57
2345	+68	+22
2356	+70	+45
2357	+60	+45
58	+48	+4
59	+27	+29
60	+17	+47
61	+41	+19
62	+25	+28
63	+15	+20
64	+27	+6
65	+25	+8
66	+26	+5
67	+29	+15
		+250

	ΔX	Δy
2368	+37	+3
69	+15	+3
70	+39	−1
71	+31	+29
72	+7	+38
73	+33	+24
74	+4	+20
75	+8	+22
76	+19	+14
77	+30	+21
80	+21	+7
81	+41	+8
82	+27	+27
83	−31	+18
84	+62	−5
85	+63	+5
86	+45	+13
87	+43	+22
88	+53	+8
89	+57	0
90	+35	+16
91	−19	+24
92	−37	+77
93	0	+58
94	+24	+20
95	+35	+10
96	+19	+18
97	+39	+3
98	+38	−1
99	+42	+14
2401	+21	+18
2	+18	−3
		+530

	ΔX	Δy
2403	+35	+2
4	+31	-1
5	+15	+29
7	+13	+14
8	+20	+4
9	+26	+19
10	+21	+21
11	+24	+21
12	+25	+12
13	+18	+11
15	+10	+15
17	+6	+6
21	+7	+28
22	+6	+21
23	0	+25
24	+18	+14
25	+14	+29
26	+26	+15
27	+16	+24
28	+18	+25
30	+23	+12
31	+29	+21
32	+19	+24
35	+21	+21
36	+29	+21
37	+23	+26
38	+18	+23
39	+30	+65
		+578

Перед Кенкмия

	ΔX	Δy
2246	+17	+56
2517	-32	+48
18	-46	+20
19	-46	+18
20	-59	+8
21	-41	+23
22	-32	+4
23	-53	-2
24	-24	+16
25	-21	+18
26	-29	+24
28	+49	+18
29	+22	+2
40	+21	+4
41	-11	+11
42	-22	+9
43	+7	+8
44	0	+3
45	+25	+8
46	+12	+1
47	-14	+29
		+768

	ΔX	Δy
2549	-15	+17
50	+1	+11
52	+6	+10
53	-9	+8
55	-16	+33
57	-18	+29
58	-8	+20
59	+12	+37
x 60	-2	+57
61	-38	+60
62	+16	+77
63	-16	+50
64	+8	+48
65	+5	+24
66	+3	+45
67	+6	+44
68	+15	+49
69	+21	+48
70	+11	+57
71	+11	+44
72	+27	+34
73	+30	+94
74	+21	+21
75	+24	+28
76	+29	+47
77	+27	+43
78	+24	+20
79	+19	+24
80	+17	+27
81	+31	+16
82	+32	+21
83	+27	+29
		+1232

		ΔX	ΔY		ΔX	ΔY			
	2584	+57	+41	*2616	+16	+47			
	85	+54	+26	*17	+5	+26			
0	86	+52	+25	18	+9	+20			
7	87	+42	+20	19	+16	+41			
0	88	+57	+42	20	+24	+27			
9	89	+26	+48	22	+37	+24			
0	90	+21	+56	23	+21	+43			
7	91	+41	+50	25	+22	+26			
1	92	+44	+59	26	+25	+24			
0	93	+38	+46	* 29	−18	+49			
7	94	+22	+56	* 30	−5	+45			
50	95	+31	+119	31	+8	+28			
8	96	−15	+106	* 32	+6	+36			
4	97	+6	+85	* 33	+4	+20			
15	98	+28	+63	34	−2	+20			
4	99	+69	+24	35	−22	+1			
9	2600	+135	+14	36	+25	+32			
8	1	+98	+9	37	+78	+82			
7	2	+40	+9	38	+19	+73			
4	3	−10	+16	39	+23	+11			
4	4	+23	+11	40	+21	+7			
4	5	+21	+2	42	+29	+14			
1	6	+34	−5	43	+55	+22			
8	7	+94	−16	44	+66	−10			
7	8	+69	+73						
13	9	−19	+57			+728			
0	10	+15	+42						
4	* 11	+22	+48			Vejbrany			
7	12	+41	+27			+6180			
6	* 13	+31	+59			239			
1	14	−26	+82			Konig			
9	15	−2	+55			=+25,86			
2			+1363						

$b^2 + 2A$

$4a^2 + 4c^2 - 8ac$

$-2c^2 + 4ac$

$4a^2 + 2c^2 - 4ac$

$4(a-c)^2 - 2c^2$

$(2a-c)^2 + c^2$

$4a^2 + 4c^2 + 8ac$

$-2c^2 - 4ac$

$4a^2 + 2c^2 + 4ac$

$(2a+c)^2 + c^2$

$-2ac - c^2 + 2ac + 2c^2 + 2(a+c)H.$

$2(2a-c)^2 + c^3 - \frac{1}{3}c^3$

$+ c(2a - c^2)$

$2c(2a-c)^2 + \frac{2}{3}c^3$

$-2c(2a+c)^2 + \frac{2}{3}c^3$

$H = a \quad c = 0.$

$\frac{\pi}{2}\frac{1}{a^3}\left\{4a^3\sqrt{2} - \frac{2}{3}a^3\sqrt{2}\right.$ $\boxed{\frac{5}{3}\pi\sqrt{2}}$

$C = 2a \quad H = a$

$-\frac{\pi}{2}\frac{1}{a^3}\left\{-\frac{16}{3}a^3 + 4a^3\sqrt{2} - \frac{2\sqrt{2}}{3}a^3\right\}$

$+\frac{\pi}{2}\left(\frac{16}{3} - \frac{10}{3}\sqrt{2}\right)$

$\frac{8}{3}\pi - \frac{5}{3}\pi\sqrt{2}.$

$(\sqrt{2})^2$

$\frac{4}{3}\pi$

$\frac{1}{3}\sqrt{2^3}$

$4 - \frac{2}{3}$ $\frac{10}{3}\sqrt{2}$ $(2a^2)^{\frac{3}{2}}$

x –

+8,4

155

–15,2

KFr=...

0,145

290

23,6

$\frac{K}{f\sigma} = \frac{0,00145}{23,6}$

$\frac{K}{\sigma} = \frac{0,097}{23,6} = 0,00414.$

236 | 97,1 / 414

32°

$K = 0,001242$

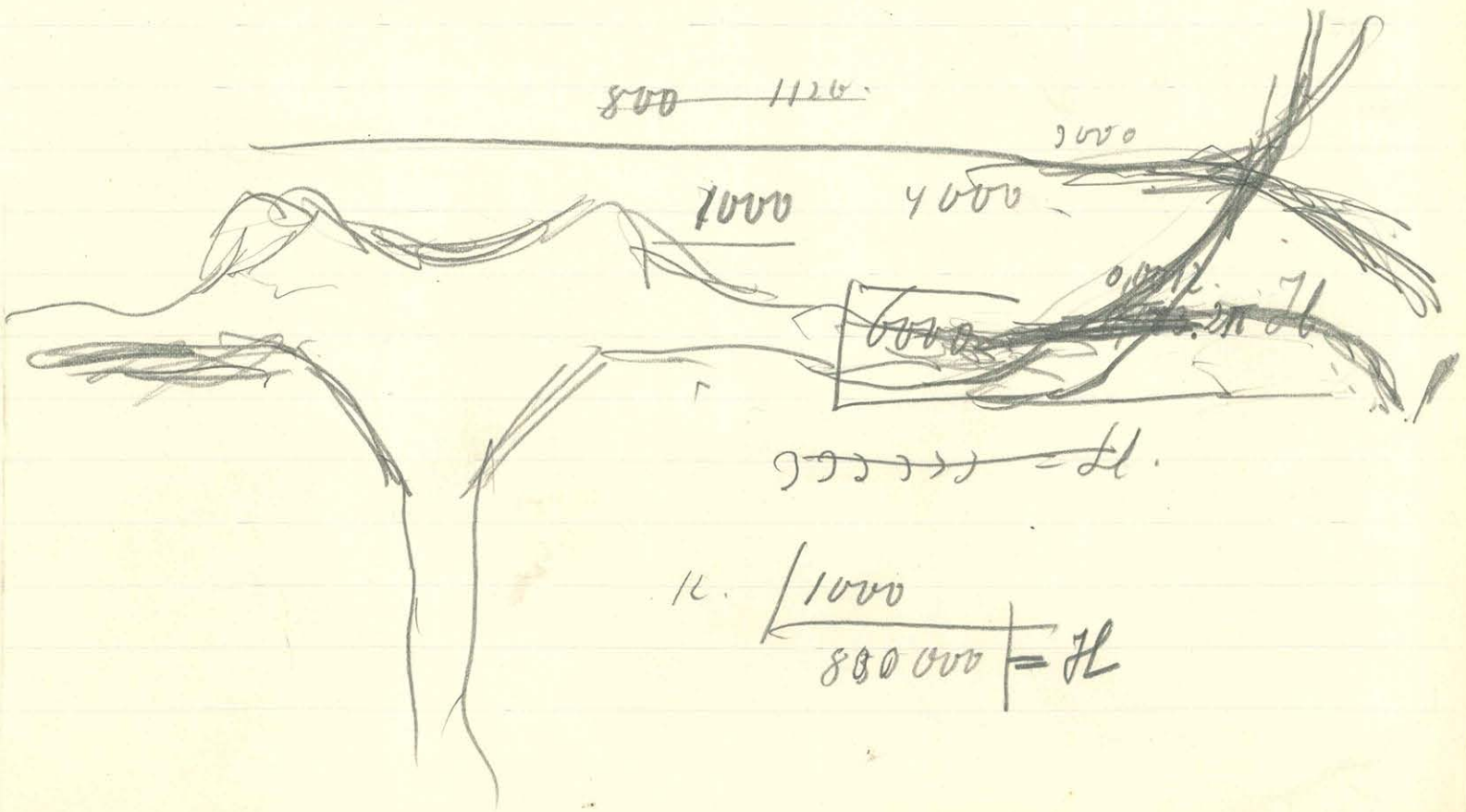
–0,9

+9,5

$\frac{K}{\sigma f}(23,6 - 5,4) = 0,00145,$

$\frac{K}{f\sigma} = \frac{0,00145}{18,2}.$

$\frac{K}{\sigma f}(19,0 + 1,7) = 0,00141$



$$(A_1+D_1z)+(C_1+D_1z)\frac{z}{x}+\xi_1\frac{xy}{x}$$

$$(A_2+D_2)z+\dots$$

$$\frac{y}{x}=\frac{y}{x_1}$$

$$\frac{xy}{x}=\frac{u}{x_1}$$

$$\frac{x}{xy}=\frac{1}{u}$$

$$y=\frac{xy}{x}$$

$$y(x^2-y^2)=$$

$$y\,\frac{x^2-y^2}{x^2u}=$$

$$1-\left(\frac{y}{x}\right)^2=$$

$$1-\frac{y^2}{x^2}=$$

$$\frac{xyv}{x^2u}=$$

$$\frac{xyv}{x^2u}=$$

$$y=\frac{xyv}{x^2u}$$

$$\frac{y}{x}=\frac{v}{x}$$

$$\frac{x}{y}=\frac{x}{v}$$

$$\frac{x^2-y^2}{x}=$$

$$\frac{x^2-y^2}{x}=0$$

$$f_1(x^2-y^2)$$

$$+97,556 \mid -283,134996$$
$$214,289375 \quad 32,983920$$
$$+316,118916$$
$$+31\,845375$$
$$-4,273541$$

$$-175409 \quad 1732$$
$$-192741 \quad 800$$
$$-28770 \quad 38651$$
$$139.$$
$$-175468 \quad 17343$$
$$192811$$

$$-70.-94$$

$$34161 \quad 22040 \quad 12121$$

$$39906 \quad 133 \quad 857$$

$$24172 \quad 22040$$

$$0,00413$$

Pénzintézet

$$2180$$

$$42735.$$

$$29 \quad 6004$$

$$116 \quad 1740$$

$$21905210 \quad 606$$

$$2905039^4$$

$$175464,4 \quad 17342,7$$

$$192807$$

259.

126.

$$+28700 \quad -3000 \quad +9902^{2}$$
$$-4250 \quad -7910 \quad -110$$
$$+2500$$
$$+1930$$

$$+15800 \quad -2070 \quad +8352^{2}$$

$$M = +19280 - 6000^{2} - 2052^{2}$$

$$V = -1990 + 1113902 - 15162^{2}$$

$$4477 \quad 3129 \quad 1990$$
$$3170 \quad 1298 \quad 6000$$
$$+7651 \quad +1238 \quad \cancel{+}1920$$
$$5723 \quad 1290 \quad 3090$$
$$19280 \quad 6000 \quad 1929$$
$$1928 \quad 1929$$
$$5019$$
$$1992$$
$$2052$$

$$-3110 \quad +1990 \quad +2849 \quad 2$$
$$-4000 \quad 1319 \quad 1113$$
$$-8250 \quad 6305 \quad 1990$$
$$1990 \quad 6170 \quad +5348$$
$$-5500 \quad +5348$$
$$1562$$

$$+2870 \quad -3000 \quad +9902^{2}$$
$$-4250 \quad -7910 \quad -110$$
$$+2500$$
$$+1930$$

$$+15800 \quad -2070 \quad +8352^{2}$$

$$M = +19280 - 6000^{2} - 2052^{2}$$

$$V = -1990 + 1113902 - 15162^{2}$$

$$4477 \quad 3129 \quad 1990$$
$$3170 \quad 1298 \quad 6000$$
$$+7651 \quad +1238 \quad \cancel{+}1920$$
$$5723 \quad 1290 \quad 3090$$
$$19280 \quad 6000 \quad 1929$$
$$1928 \quad 1929$$
$$5019$$
$$1992$$
$$2052$$

$$-3110 \quad +1990 \quad +2849 \quad 2$$
$$-4000 \quad 1319 \quad 1113$$
$$-8250 \quad 6305 \quad 1990$$
$$1990 \quad 6170 \quad +5348$$
$$-5500 \quad +5348$$
$$1562$$

$$-3000 \quad +2070 \quad -2902^{2}$$
$$+2500 \quad +9902 \quad +852 \quad 2$$
$$-1030 \quad 2 \quad +852 \quad 2$$
$$-1000 \quad -4535 \quad 6 \quad +8866 \quad 2^{2}$$
$$\cancel{9+600}$$

$$-2890 \quad +1200 \quad 2 \quad -2902^{2}$$
$$+9902 \quad +852 \quad 2$$
$$+1680 \quad -2076$$
$$-7210$$
$$-1210 \quad -20702 + 8362$$

$$+6980 \quad -19210 \quad +8272^{2}$$
$$-6000 \quad -11890 \quad -11782^{2}$$
$$+25750 \quad 2$$
$$+920 \quad +27066 \quad -8652^{2}$$
$$5310$$
$$+920 \quad 3160$$
$$+2260 \quad 2$$

$z = -0,6$

$z^2 = +0,36$

$z^3 = -0,216$

$z^4 = +0,1296$

$-0,5 \quad +42,8231$

$-0,6 \quad -100,3442$

$-0,4 \quad +159,7821$

$-0,54 \quad +0,3062$

$z = -0,540193$

$+0,1296$

$394,610$

$-52,6579$

$-340,6453$

$-107,7792$

$-495,0838$

$394,1796$

$100\,3442$

$z = -0,4$

$z^2 = +0,16$

$z^3 = -0,064$

$z^4 = +0,0256$

$+0,0256$

$394,610$

$394,6356$

$234\,8535$

1597821

$-15,6028$

$-151,3979$

$-67,8528$

$234\,8535$

$z = -0,5$

$z^2 = +0,25$

$z^3 = -0,125$

$z^4 = +0,0625$

$0,0625$

$-30,4741$

$236,5593$

$84,8160$

$351,8494$

$394,6725$

$42,8231$

$z = -0,54$

$z^2 = +0,2803$

$z^3 = -0,1517$

$z^4 = +0,0789$

$+0,0789$

$-36,9834$

$265,7980$

$91,6013$

$394,3827$

$394\,6859$

$+0,3062$

278396

409553

41932

794000

-74648

56299

-52100

4199

56299

08770

7186

45956

$8,259862$

$+1,6902 = +1,325$

-275509

-404917

-680426

450400

230026

$$-1603.87\nu 09\beta - 10\nu 1.00\nu 62\nu 2 + 3052.3026382^{-}$$
$$+ 789.5\nu 8368\,Z + 512.\nu 80573L\,2^{-}$$
$$2\zeta 1\nu 56256 \quad - \quad 82.096787\,2^{2}$$
$$3566\nu\ 783170$$
$$-1502.6508\beta 52^{3} + 156\,2\nu 2\,6\beta 62^{\nu}$$
$$- 53.287\nu 282^{3}$$

$$\lambda\psi U = -1603.87\nu 09\beta - 257.\nu 56252 + 9\nu 82.6863892^{-}$$
$$- 5\nu 5.56\beta 21\nu - 672.505052\,2 + 1671.328\beta 702^{-}$$
$$- 21\nu 9.38231\,2 - 929.961315\,2 + 515\nu.01525\,92^{-}$$

$$- 155\zeta.918293\,2^{3} + 156.2\nu 26\beta 62^{\nu}$$
$$+ 228.0109332^{3} - 167.6\beta 95\nu 02^{\nu}$$
$$- 1327.907360\,2^{3} - 5.\nu\nu 685\nu\,2^{\nu}$$

$$\lambda\cdot\psi\ U\cdot \quad X\psi = +2079.917020 - 99\nu.39\nu 102$$

$$+3702020 \qquad +870\,6\nu 0 \qquad 3093\,9\nu$$
$$1803202 \qquad 55\zeta\text{-}6\beta 0 \qquad 886121$$
$$+21732\,00 \qquad 1\nu 26290 \qquad 19209\beta$$
$$1722\beta\nu 0 \qquad 9162\nu 0 \qquad 1387611$$
$$\nu 50\nu 00 \qquad 5100202$$

$$+3\nu \qquad -3\nu 02\nu 00 \qquad -8020020$$
$$+6\zeta^{-} \qquad +189802\nu 0 \qquad +102\nu 9\nu 50$$
$$+50. \qquad -2352\nu 00 \qquad -72\nu 8\nu 02$$
$$\cancel{-9000000} \qquad \cancel{2\zeta 3\nu 27 0}$$
$$-26920000 \qquad 15\zeta\nu 820$$
$$+28\nu 302\beta \quad 189\beta \qquad 1009\nu 50$$
$$+976235 \qquad -702\nu 00\beta \qquad 5\zeta 15\text{-}370$$
$$25050\nu 0$$
$$15\zeta 11103$$

$$x^2 = 2714.480000 - 809.946600 z + 60.419529 z^2$$
$$y^2 = 1503.112900 - 1031.437080 z + 176.943204 z^2$$

$$x^2 - y^2 = 1211.297100 + 121.490480 z - 116.523675 z^2$$
$$n = +0{,}450400 + 0{,}510020 z - 1{,}387671 z^2$$

$$+545.568214 + 617.785747 z - 1680.809180 z^2 - 168.581526 z^3$$
$$+ 54.719312 z + 61.962575 z^2 - 59.429407 z^3$$
$$- 52.482265 z^2$$

$$+161.689540 z^4$$

$$+545.568214 + 672.505059 z - 1671.328870 z^2 - 228.010933 z^3$$

$$+161.689540 z^4$$

$$z = 3$$
$$z' = 152{,}0000$$
$$z^2 = 42{,}875$$
$$z^3 = 12{,}25$$
$$z^4 = 3{,}5$$

$$(42^3 + 731{,}379\,z^2 - 1892{,}7742 + 169{,}632) = \Delta f$$

$$\Delta f = 0{,}0392$$

$$f$$

$$z = 3{,}0 = -99{,}216$$
$$z = 2{,}9$$
$$z = 2{,}8 = -115{,}7090$$
$$z = 2{,}5 = -0{,}1392$$

$$z = 3{,}50017$$

$$z = 3$$
$$87 \quad 1785{-}1\bar{5} \quad \bar{5}216$$
$$\bar{5}82{,}41 \quad 2235{-}\bar{5}45 \quad 2772$$
$$5081{,}89 \quad 3773 \quad 2958$$
$$39{,}\bar{6}01{,}176 \quad 718 \quad 2\bar{5}\bar{5}\bar{5}$$
$$7566{,}917$$
$$8316{,}133$$
$$9\,9\,9{,}216$$

$$z = 2{,}8$$
$$z' = 7{,}84$$
$$z^2 = 21{,}52$$
$$z^3 = 61{,}456$$
$$z^4 = 171{,}5$$

$$61{,}456$$
$$476{,}9696$$
$$5351{,}7439$$
$$39\,4{,}6\bar{7}06$$
$$+\ 6282{,}7891$$
$$7418{,}4981$$
$$11\bar{5}{,}709$$

$$-150{,}0625$$
$$1045\bar{2}{,}6249$$
$$593{,}7120$$
$$39\,4{,}6706$$
$$1159{,}0094$$
$$1159{,}4072$$
$$0{,}9938$$

$y = +593{,}103$

$x = -1895{,}509$

$z = +3{,}500147.$

410
395577
14483

$-14{,}483.x + 179{,}077y + 38{,}223888 - 119.923778$

$$\left.\begin{array}{ll} a = \{ & l = \beta \\ & g = \gamma \\ h = 1 + 2 + 3 = 6 & \varphi = 1 \\ \xi = 1 + 2 + 3 = 6 & \lambda = 1 \end{array}\right\}$$

$(-179{,}072)x + 1471{,}582y - 695{,}328 - 329{,}315$

$+0{,}02\,2031$
$0{,}00087\,1$
$0{,}0773\,20$
$92.$
38

$x = -0{,}0779676$
$y = -0{,}0773\,8373$
$z = +0{,}0773\,4827$

$+0{,}0777371\,x - 0{,}0770324\,y$

$+0{,}0772\,326$
$+0{,}0777\,123$
$-0{,}0773\,6\,26$
167
$-0{,}0780777.$

~~$-0{,}0771767\,x - 830$~~

$$(\eta - \gamma B)\alpha + (-\xi + A\gamma)\beta - C\alpha\beta - D(\alpha^2 - \beta^2) = 0 \qquad I$$

$$(\xi - A\alpha)\beta + (2\eta - 2D\alpha)\gamma - C\beta\gamma - B(\beta^2 + 2\gamma^2) = 0 \qquad II$$

$$(\eta - \gamma B - C\beta - 2D\alpha)x + (-\xi + A\gamma - C\alpha + 2D\beta)y + (-B\alpha + A\beta)z = -I$$

$$(-A\beta - 2D\gamma)x + (\xi - A\alpha - C\gamma - 2B\beta)y + (2\eta - 2D\alpha - C\beta - 4B\gamma)z = -II$$

$\alpha = kx =$ $\qquad k = \frac{\mu}{\rho_6 \delta} = 0{,}0000715 \cdot \lambda$

$\beta = ky =$

$\gamma = kz =$

$$+\,450\,621$$
$$-\,248\,899$$
$$+\,201\,732$$

$$+\,712\,341$$
$$-\,266\,790$$
$$445\,551$$

$$+\,322\,661$$
$$-\,239\,821$$
$$82\,840$$

$$+8{,}4 - 6{,}2 - 0{,}4 = -5{,}1$$

$$(-22 + 128{,}8)1{,}5 = (-8 - 22{,}8)0{,}2 + 0{,}45 - 5{,}08 = 0$$

$$(-22 + 128{,}8)7 - 8 - 106{,}4 - 10{,}5 - 10{,}4 = 0$$

$0{,}0008$

$0{,}0008 \cdot 0{,}0032$

$0{,}0032$

$F(x + h) = 0$,

$F(x) + h\frac{\partial I}{\partial x} = 0$

$$K = \frac{\mu}{\rho\delta} 10^{-9}$$

$\alpha = 0{,}$ $\quad k = 0{,}$

$\beta = 0{,}2$

$\gamma = 0{,}00003$

α

$7{,}6$
$1{,}4$
304
76
$106{,}4$

14
82
28
126
$126{,}8$

8 — 6 —

7 14 1

$\lambda = 7$ $\quad \beta = 1$ $\quad \gamma = 14$.

$3{,}25$

821
$2{,}3$
663
442
5083

48
$2{,}3$
144
26
1104

$$\left(\mathcal{N} - \beta\frac{\partial^2 u}{\partial x \partial y}\right)\gamma + \left(\mathcal{L} - \beta\frac{\partial^2 u}{\partial y \partial z}\right)\alpha + (\alpha\gamma)\left(\frac{\partial^2 u}{\partial y^2} - \frac{\partial^2 u}{\partial x^2}\right) - (\alpha^2+\gamma^2)\frac{\partial^2 u}{\partial x \partial z} = 0$$

$$(\xi - \delta\beta)\gamma + (\xi - B\beta)\alpha + C\alpha\gamma - (\alpha^2+\gamma^2)A = 0 \,.$$

$$(\xi - B\beta_0 + C\gamma_0 - 2A\alpha_0)x + (-2\delta\gamma_0 - B\alpha_0)y + (2\xi - 2\delta\beta_0 + C\alpha_0 - 4A\gamma_0)z =$$

$$- \left[(\xi - \delta\beta_0)2\gamma_0 + (\xi - B\beta_0)\alpha_0 + C\alpha_0\gamma_0 - (\alpha_0^2 + 2\gamma_0^2)A\right]$$

$\frac{\mu \cancel{X}}{f\sigma} = \alpha$ $\frac{\mu Y}{f\sigma} = \beta$ $\frac{\mu Z}{f\sigma} = \gamma$.

$$= -\frac{\mu H}{66 \cdot 10^{-9}\sigma}\left(10^{-9}\frac{\partial^2 u}{\partial x \partial y} + - - \right)$$

$$\cancel{X} H \sin(\delta - \delta_0) = -\frac{\mu H}{f\sigma}\left(\frac{\partial^2 u}{\partial x \partial y} + \xi i \frac{\partial^2 u}{\partial y \partial z}\right)^{10}$$

150
100

$k = \frac{\mu}{f\sigma}$

$k = \frac{\mu \; \cancel{10}}{66 \cdot \sigma \, 10^9} = 0,000079$

16 66
75

$X = 0,22$

$Y = -0,02$

$Z = 0,39$

$\alpha = k \cdot X = \cancel{\frac{\mu}{666}} = 0,0000165$
1,7

$\beta = k\,Y = -0,0000015$
0,2

$\gamma = k\,Z = 0,0000293$
3

$$\left(-0,00022 + \frac{9,2}{10^9} 0,0000293\right)$$

2,7225
225
2,70

-355427
+173880
181547

-169563
+171262
1699

-636051
+8438
627613

$$\left(y - \gamma \frac{\partial^2 u}{\partial y^2} - \left(\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial z^2}\right)\alpha - \alpha \frac{\partial^2 u}{\partial x \partial z}\right) x$$

$$\left(-x + \frac{\partial^2 u}{\partial x \partial z}\gamma - \left(\frac{\partial^2 u}{\partial z^2} - \frac{\partial^2 u}{\partial x^2}\right)\alpha + \alpha \frac{\partial^2 u}{\partial x \partial z}\right) y$$

$$\left(-\frac{\partial^2 u}{\partial y \partial z}\alpha + \frac{\partial^2 u}{\partial z^2}\gamma\right) z \qquad = 0(1)$$

$$y' - y = \alpha\left(\frac{\partial^2 u'}{\partial y \partial z} - \frac{\partial^2 u}{\partial y \partial z}\right)$$

~~$$\Delta y' = \alpha \frac{\partial^2 u'}{\partial y \partial z}$$~~

$$\begin{array}{r} -225 \\ +325 \\ \hline +100 \end{array}$$

$$\begin{array}{r} -287 \\ +287 \\ \hline 0 \end{array}$$

z

$$\begin{array}{r} +373 \\ -267 \\ \hline 106 \end{array}$$

5.

$$\begin{array}{r} -719 \\ +715 \\ \hline -4 \end{array}$$

$$\begin{array}{r} -626 \\ +1090 \\ \hline +464 \end{array}$$

$$\begin{array}{r} +555 \\ -219 \\ \hline 336 \end{array}$$

16

$$\begin{array}{r} -412 \\ +719 \\ \hline 307 \end{array}$$

1

$$\bar{x}y = +854.490800 - 594.535290z + 103.396446z^2$$

$$x^2 - y^2 = -1017.357300 + 688.803240z - 116.523675z^2$$

$$Vxy = -166.540257 + 95.187730z - 13.122415z^2$$
$$+115.874928z - 66.225286z^2 + 9.130278z^3$$
$$- 20.151968z^2 + 11.577331z^3 - 1.587859z^4$$

18495
187200
199695

$$Vxy = -166.540257 + 211.056658z - 99.499669z^2 + 20.647609z^3 - 1.587859z^4$$
$$+196.145331 - 194.249284z + 61.978825z^2 - 5622539 - 2394562^4$$

87 −222
185 28
266 16
266

$$(x^2-y^2)V = -196.145331 + 61.448019z + 2.090657z^2 - 1.415491z^3$$
$$+ 132.801265z - 41.603716z^2 + 7.038030z^3 + 23945 6z^4$$
$$- 22.465766z^2$$
$$- 6406948 2$$

$$+29.605074 + 16.807374z - 37.520844z^2 + 15.025070z^3 - 1.827315z^4 = 0$$

$$z^4 - 8,222485z^3 + 20,533320z^2 - 9,197853z - 16,201407 = 0$$

z=0 87

+87 −222,007095
+184,799880 27,593559
265,799880 16 201407
802061 265,862061
0,002181

$z = +2,0 \quad F = -0,002181$

410
31,078

250
31292

$-441,078x + 287,292y - 1388,459 + 1636,528$
$-2329,061 + 2175,129$
$-3717,520 + 3811,677$

$z^2 + 9,387995z =$

$z^2 + 29,391727 = +93,879950$

$z = -14,695864 \pm \sqrt{}$
$\pm 17,60079$
$2,904,93$
$02,29665$

93,879950
215,968419
309,788369

2,491664.
1,245502

$z = -0,25$

$z^2 = +0,0625$

$z^3 = -0,015625$

$z^4 = +0,00390625$

$-10_{3\,2}$

$z = -0,28$

$z^2 = +0,0784$

$z^3 = -0,021952$

$z^4 = +0,00614656$

$z = -0,274$

$z^2 = +0,075076$

$z^3 = -0,020577082$

$z^4 = +0,005636441$

0,00390625
0,17534619
2,309152~~76~~
8,24598000

10,73438519
12,075364

1,340979

0,00614656
0,24634877
2,89660121
9,23549760

12,38459414
075364

309230

$-0,08228276$
$-2,52754375$
$-20,24665131$
$-32,98392000$

$-55,84039731$

$z = -0,25$ ~~$-1,340979$~~ $-1,340979$

$z = -0,28$ $+0,309230$

$z = -0,274$ $-0,027493$

$z = -0,274492$

0,00563641
0,23084895
2,77379123
9,03759408

12,04787067
12,075364

0,027493

0,000492

22040
3229

25269

28770
3651

42421

192800
16579

209379
155

209224

$$\Sigma y = +854.490800 - 749.227590z + 156.471426z^2$$

$$x^2 - y^2 = -1017.351300 + 512.924040z - 38.575035z^2$$

$$\begin{array}{llll}
 & -166.540257z & +95.187730z & -12.955790z^2 \\
 & & +146.024457z & -83.456461z^2 + 11.359789z^3 \\
 & & & -30.496282z^2 + 17.429353z^3 - 2.372420 \\
\hline
 & -166.540257z & +241.206187z & -126.908533z^2 + 28.789142z^3 - 2.372420z^4 \\
 & +196.145331 & -160.339774z & +36.327232z^2 - 1.275873z^3 - 79272z^4 \\
\hline
+ & 29.605074 & +80.866413z & -90.581301z^2 + 27.513269z^3 - 2.451692z^4
\end{array}$$

$$\begin{array}{llll}
 & -196.145231 & +61.448019z & +2.090657z^2 \\
 & & +98.891755z & -30.980622z^2 - 1.054059z^3 \\
 & & & -7.437267z^2 + 2.329922z^3 + 79272z^4 \\
\hline
 & 160.339774 & & -38417889 \\
 & & & -36327232 \\
 & & & 1.275873
\end{array}$$

$z = 2,9$
$z^2 = 8,41$
$z^3 = 24,389$
$z^4 = 70,7287$

$$z^4 - 11,222156z^3 + 36,946444z^2 - 32,983920z - 12,075364 = 0$$

$z = 2,9051$
$z^2 = 8,439606$
$z^3 = 24,517899$
$z^4 = 71,226948$

$-70x + 90y - 24xy - 37$

$+71,226948$
$311,813400$

$-275,140687$
$95,821586$
$12,075364$
$-383,640637$
$+383,040378$

$z = 3$

$-30,998212$
$-98,951760$
$12,075364$

$14,025336$
$13,517996$
$-0,507340$

$87,000000$
$332,517956$
$-273,697163$
$95,653368$
$12,075364$
$-381,425895$
$381,447695$
$+0,021800$
$-0,000259$

$70,7287$
$310,719594$
$381,447694$

F

$z = +2,0$	$-0,567240$
$z = +2,9$	$+0,021800$
~~$z = 2,9043$~~	
$z = 2,9051$	$-0,000259$

$$X = -22040 + 7773z$$
$$Y = -38770 + 13302z$$
$$U = +192800 - 60400z - 2055z^2$$
$$V = -194900 + 111390z - 15357z^2$$

$$XYV - U(X^2 - Y^2) = 0.$$

$$XY = +92396446z^2 - 59453529z + 8541490800.$$
$$\quad 103396446$$
$$X^2 = +6041952\,9z^2 - 3426338\,40z + 485761600.$$
$$Y^2 = +176943204z^2 - 103143708\,0z + 1503112980.$$

$$X^2 - Y^2 = -116523675z^2 + 68803240z - 101351300$$

$$XYV = -1,\overset{58}{41}\overset{859}{8936}z^4 + \overset{20}{19}\overset{647}{820}\overset{609}{383}z^3 - 99,499669z^2$$
$$+211,056\,658z - 166,540257.$$

$$U(X^2 - Y^2) = \pm 0,239456z^4 \pm 5,622539z^3 \mp 61,978825z^2$$
$$\mp 194,249284z \mp 196,145331.$$

$$-1,827315z^4 + 15,025070z^3 - 37,520844z^2$$
$$+16,807374z + 29,605074. = 0.$$

$$z^4 - 8,222485z^3 + 20,533320z^2 - 9,197853z - 16,201407 = 0$$

$$X = -22040 + 7773z$$

$$Y = -38770 + 13302z$$

$$U = +192800 - 60400z - 2055z^2$$

$$V = -194900 + 111390z - 15357z^2$$

$z = +3,0$	$f = -0,002187$
$z = 2,5662$	$f = -0,173049$
$z = +3,1$	$f = +0,006503$
$z = +3,05$	$f = -0,000627$
$z = +3,051$	$f = -0,000542$
$z = +3,055$	$f = +0,000210$
$z = +3,0525$	$f = -0,000177$
$z = +3,057$	$f = -0,000031$

$z = +3,0$ $\qquad f = -0,002187$

$+108 \quad -222,007095$

$+123,199920 \quad -9,197853$

$231,199920 \quad 221,204948$

$-231,204948$

$-0,005028$

$0,4338$

$z = 2,5662$

$z^2 = 6,585382$

$z^3 = 16,899408$

$z^4 = 43,367261$

$+42,367261 \quad -138,955129$

$+135,219756 \quad -23,603530$

$178,587017 \quad 16,201407$

$178,760066$

-87017

173049

$z = +3,1$

$z^2 = +9,61$

$z^3 = +29,791$

$z^4 = +92,3521$

$+92,3521 \quad -244,956057$

$+197,325205 \quad -28513344$

$289,677305 \quad 16201407$

$289,670802 \quad -289,670802$

$0,006503$

$z = +3,05$

$z^2 = 9,3025$

$z^3 = 28,372625$

$z^4 = 86,536506$

$+86,536506 \quad -233,292483$

$191,011209 \quad 16,201407$

$277,547715 \quad 28,053452$

$-277,548342$

-547715

$0,000627$

$$z = +8{,}073$$

$$\underline{\qquad\qquad}$$

$$x = +1725$$

$$y = +1898$$

$$u = -1066$$

$$\underline{\qquad\qquad}$$

$$x = -5{,}8319215$$

$$y = -6{,}1205\overline{3}9$$

$$\underline{\qquad\qquad}$$

$$-6{,}515x - 98{,}5325y - 1273{,}099 + 266{,}839 =$$

$$+376{,}305\overline{\cdots}$$

$$+632{,}698$$

$$\underline{\qquad\qquad}$$

$$\overline{1375{,}772}$$

$$\begin{array}{r} 2376 \\ 22.096 \\ \hline 1725 \end{array}$$

$$\begin{array}{r} 18466 \\ 1925 \\ \hline -2038\overline{69} \\ \hline 19280 \\ -1166\overline{9} \end{array}$$

$$\begin{array}{r} 25 \\ 398\overline{32} \\ 25\overline{0} \end{array}$$

$$\begin{array}{r} 910 \\ 3\overline{5}{,}\overline{97}5\overline{7} \\ \hline 6{,}5\overline{2}25\overline{7} \end{array}$$

$z = 3,051$

$z^2 = 9,308601$

$z^3 = 28,400542$

$z^4 = 86,650053$

+ 86,650053
191,136483
277 786536

− 233,523031
− 28,062650
16,201407
277,787088
277 786506
542

$z = 3,055$

$z^2 = 9,333025$

$z^3 = 28,512391$

$z^4 = 87,105356$

+ 87,105356
+ 191,637989
278 743345

− 234,442707
− 28,099441
16,201407
278,743555
743345
~~210~~
190

15275
15275
1650
9
933625
9

$z = 3,0525$

$z^2 = 9,317756$

$z^3 = 28,442451$

$z^4 =$

+ 86,820587
191,~~321166~~
29
278,145047

867627
− 233,~~870916~~
− 28,076446
16,201407
~~278,148769~~
278 145480
647

$z = 3,057$

$z^2 = 9,345249$

$z^3 = 28,568426$

$z^4 = 87,333679$

+ 87,333679
191,888988

− 234,903454
− 16,201407
28,117837
− 279222698
+ 279222667
− 21.

$$X = \begin{vmatrix} +250-114z, & -34-37 \\ -70+84z, & +65+59 \\ -170+29z, & -20-23 \end{vmatrix}$$

$$\begin{array}{rr} 1770 & \\ -1495 & -1110 \\ \hline 275 & +782 \\ & \hline & 328 \end{array}$$

$$\begin{array}{r} +2405 \\ 2006 \\ \hline 399 \end{array}$$

$$+275(+250-114z) + 328(-70+84z) + 399(-170+29z) = X$$

$$-275(-410+113z) - 328(+170-10z) - 399(+240-103z) = Y$$

X

$$\begin{array}{rr} +68750 & -31350z \\ -22960 & +27522 \\ -67830 & +11571z \\ \hline -90790 & 39123 \\ 68750 & 31350 \\ \hline -22040 & +7773z \end{array}$$

Y

$$\begin{array}{rr} +112750 & -31075z \\ -55760 & +3280z \\ -95760 & +41097z \\ \hline -151520 & 44377 \\ 112750 & 21075 \\ \hline -38770 & +13302z \end{array}$$

$$U = \begin{vmatrix} -37, & -410+113z, & +250-114z \\ +59, & +170-10z, & -70+84z \\ -23, & +240-103z, & -170+29z \end{vmatrix}$$

$$U =$$

$$-37\left[(+170-10z)(-170+29z) - (240-103z)(-170+84z)\right] = -37(-12100-2074z+8362z^2)$$

$$-59\left[(-410+113z)(-170+29z) - (240-103z)(+250-114z)\right] = -59(+9700+22010z-8465z^2)$$

$$-23\left[(-410+113z)(-70+84z) - (170-10z)(+250-114z)\right] = -23(+13800-20470z+8352z^2)$$

$$V =$$

$$+34\left[+854.490800 - 456.057510 - 293.176080 = -749.233590 \right]$$

$$+65\left[X^2 = +485.761600 - 578.573040z + 138.968169 \right]$$

$$+30\left[Y^2 = +1503.112900 - 1031.437080z + 176.943204 \right]$$

$$-1017.351900 + 512.924040z - 38.575035$$

4,183811 3,398797 4,357344 4,000213
~~2,091906 1,699399 2,178672 2,000107~~

4,374547 4,001676 4,209220 3,404611
2,187274 2,000838 2,104610 1,702306 0,03174

227,429
204,229
23,130

$\pi \cdot 782 \cdot 33$ / 57 = 787/20 = 39.60

$100\pi \cdot 9 - 28\pi \cdot 4 \cdot 5$

90°
713
787

$\frac{2107.0}{5772} 10^{-9}$

$\pi \cdot 25 \cdot 8$ 618 Siv.

$\frac{1.0}{4201}$

232 - 22

210,971
153,911
57,058

$\frac{1'22}{0.59}$
643,002
223,593

2131,080
1533,212
597,868

$\frac{4,0076497}{3,1003711}$
$\frac{2,0703497}{1,1700356}$

$0,666964 - 2$
$2,730736$
$\frac{1,397990}{25}$

$3794,5-6$

$3794,5\frac{8}{3}$
$\frac{67,803}{22,993}$

$3,582019$
$1179102 -$
$-0,999074i - 1$
$\frac{1,781198}{}$

82,876
81,036
1,860

$\frac{60,415}{23,2}$
$\frac{83,675}{81,036}$
2,579

$1,361671$
~~$0,680836$~~
$0,980282 - 1$
$\frac{1,396195}{232}$
21,976
$+1,224$

$\frac{2,379}{1,826}$

$0,999074i - 1$
$1,928356$
$\frac{1,918537}{}$
~~$0,999074i - 1$~~
~~$1,928356$~~
$1,908678$

$0,357216$
$0,15209 - 1$
$0,999074i - 1$
$0,67298 - 2$
$1,928396$
$\frac{0,068100}{}$

$0,977575 - 1$
$0,957612$
$\frac{0,021989}{}$

152,966
152,352
0,113

$\frac{1,202}{0,022}$
$\frac{0,011}{}$

$\frac{y_{18}}{y_{58}}$

9802242

$\frac{6'11}{2'11} = y$
$111 = y$

$\frac{2208,022}{102,80}$

$IV = -0,0005$

$3{,}2x + 4{,}1 = 8{,}2{,}8 + x{,}2{,}7.$

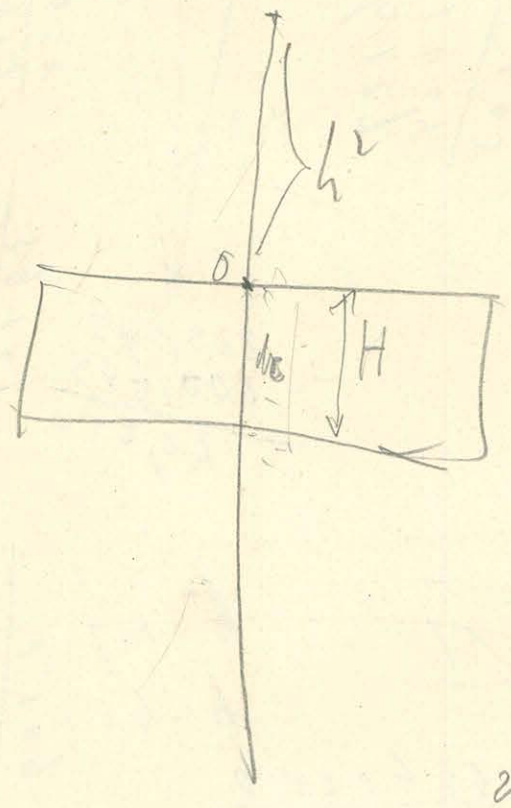
$\frac{22{,}4 - 4}{0{,}5} = 18{,}4 \qquad 36{,}8$

$3{,}2{,}1x = 4{,}2{,}7 + x{,}2{,}7.$

$6{,}8 \qquad 13{,}6.$

$= \frac{10{,}8}{0{,}5} = 21{,}6.$

$3{,}2x + y = 4$



$c - z = \zeta_c$

$2\pi\rho\sigma\, dc \left(1 - \frac{(c-z)\,dc}{\sqrt{(c-z)^2 + r^2}}\right)$

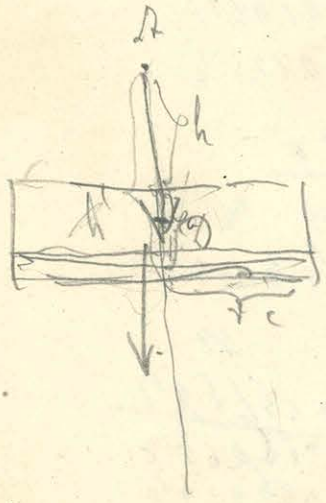
$2\pi\rho\sigma H \int_{-z}^{c-z} \frac{\zeta\, d\zeta}{\sqrt{r^2+\zeta^2}}$

$2\pi\rho\sigma\left\{H + \sqrt{r^2+\zeta^2}\Big|_{-z}^{c-z}\right\}$

$2\pi\rho\sigma\left\{H - \sqrt{r^2+(H-z)^2} + \sqrt{r^2+z^2}\right\}$

$\zeta_h = \sigma = \rho(H - x)\operatorname{tg}\alpha.$

$\sigma = \rho(H-x)\operatorname{tg}\alpha$



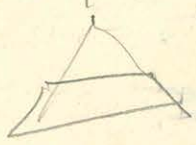
$\frac{2\pi\rho\, dx\, dz\,(c-z)}{(r^2+(c-z)^2)^{3/2}}$

$2\pi\rho\sigma\left\{H - \sqrt{r^2+(h+D)^2} + \sqrt{r^2+h^2}\right\}$

$P = 2\pi\rho\sigma\left\{(h-h) - \sqrt{r^2+h^2} + \sqrt{r^2+h^2}\right\}$

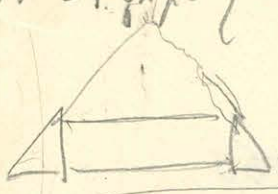
$$P_1 = \varkappa^2 \rho\sigma \Big\{ C - C' - \cos^2\alpha \Big(\sqrt{(C-z)^2 + c'^2\eta^2\alpha} - \sqrt{(C'-z)^2 + c'^2\eta^2\alpha} \Big)$$

$$+ 2 \sin^2\alpha \cos\alpha \log \frac{C - z\cos^2\alpha + \cos\alpha \sqrt{(C-z)^2 + c'^2\eta^2\alpha}}{C' - z\cos^2\alpha + \cos\alpha \sqrt{(C'-z)^2 + c'^2\eta^2\alpha}}$$



$$\gamma = C - C' \qquad h = c' - z \qquad r = c'\eta\alpha .$$

$$P' = +\varkappa^2 \rho\sigma \Big\{ -(C-C') + \sqrt{c'^2\eta^2\alpha + (C-z)^2} - \sqrt{c'^2\eta^2\alpha + (C'-z)^2} \Big\}$$



$$P_3 = \varkappa^2 \rho\sigma \Big\{ \sqrt{c'^2\eta^2\alpha + (C-z)^2} - \cos^2\alpha \sqrt{(C'-z)^2 + c'^2\eta^2\alpha} - \sin^2\alpha \sqrt{c'^2\eta^2\alpha + (C'-z)^2}$$

$$+ 2 \sin^2\alpha \cos\alpha \log \frac{C - z\cos^2\alpha + \cos\alpha \sqrt{(C-z)^2 + c'^2\eta^2\alpha}}{C' - z\cos^2\alpha + \cos\alpha \sqrt{(C'-z)^2 + c'^2\eta^2\alpha}}$$

$$\gamma = C - C' \qquad h = z - C \qquad r = c'\eta\alpha .$$

$$-C + C'$$

$$C' - C \quad + \sqrt{c'^2\eta^2\alpha + (C'-z)^2}$$

$\sqrt{48^2 + \quad} = 110{,}924$

1,130862
2,869138

12304

~~4,08809~~
4,090046
2,045023

27,2
13,32145 X

13,87855
46,08658
60,56513

$\sqrt{65{,}6^2 + \quad} = 79{,}338$

3794,56
2500

6294,56

3,798965
1,899483

0,278555
33,39241

22,6709,6

2,19463

28,84674
12,6

42,44674
5,122497

37,22177

31,586

1,782223
1,527256

0,254967

0,406484
0,362216
1,876218

15,79463

1,709387
1,570798

0,138589

3794,56
2500

6294,56

5,462

0,96758

22,23242

20,5210

1,7114

0,8557

7078
2429

4649

232
0,3795-1

33,39241
232

56,5924
15,0221

$\lg = 41{,}5703$
$N = 20{,}6692$

0,141729-1
0,362216
1,876218
0,420933-1
0,968726-1

0,769822
15,7946
5,8860

9,9086
4954

1,618783
1,815323

0,303460

0,482101-1
0,362216
1,928396
0,624167-1
0,915318-1

0,312198

$C = 23,2 \qquad Z = \mp 84,8 \qquad \alpha$

0,698970
1,365488
0,333482 −1

4,6
18,4

$7691,2 \times 0,920255$

0,079745

2304

2,869138
0,130862 −1
2,000000
100,00

3794,56

2,267078
0,130862 −1
1,397940
25,00

$\sqrt{48^2+} = 49,030$
$\sqrt{6,6^2+} = 61,803$
−12,773

1,106293
~~803404~~
0,844942 −1
0,951235

2304

3,380934
1,690467

4,6621
0,1072

3879,56

3,582014
1,791007

13,6
8,9379
4,6621

1,876218
0,844942 −1
1,721160

52,621
27,2

−25,421 + 46,079
−39,021 + 59,358

0,972471 −1
1,690467
1,662938

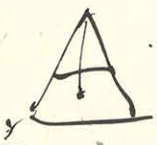
0,972471 −1
1,791007
1,763478

20,598
20,337

1,313825
1,308287
0,005538

0,362216
0,743353 − 3
0,972471 −1
0,075804 −1
1,876218
0,030062 −1

4,5549
2,27745



$$P = 2\pi f\sigma \left\{ -\frac{1}{2}\frac{c^2 \sin^2\alpha}{z\cos\alpha}\left(1+\frac{1}{2}\frac{c\sin^2\alpha}{c-z}\left(1-\frac{1}{4}\frac{c^2\sin^2\alpha}{(c-z)^2}\right)\frac{1}{\cos\alpha(1+\cos\alpha)}\right)\right\}^2$$

$$-\frac{1}{2}\frac{c^2\sin^2\alpha}{(c-z)\cos\alpha}\left(1-\frac{1}{4}\frac{c^2\sin^2\alpha}{(c-z)^2}\right)\frac{1}{1+\cos\alpha}\Bigg\}$$

$$\frac{1}{c-z} = \frac{1}{z} + \frac{c}{z^2}$$

$$+\frac{1}{2}\frac{c^3\sin^4\alpha}{z^2\cos^2\alpha(1+\cos\alpha)} + \frac{1}{2}\frac{c^3\sin^2\alpha}{z^2\cos\alpha}$$

$$\frac{1}{2}\left(1+\frac{c}{z}\right.$$

$$\frac{1}{2}c^3$$

$$\frac{1}{2}\frac{c^3}{z^2}\operatorname{tg}^2\alpha\left(\frac{\sin^2\alpha}{1+\cos\alpha}+\cos\alpha\right)$$

$$\pi f\sigma\frac{c^3}{z^2}\operatorname{tg}^2\alpha.$$

$$\pi\frac{c^3}{3}\operatorname{tg}^2\alpha\,\sigma\frac{1}{\left(z+\frac{2}{3}c\right)^2}$$

$$-2\cos\alpha\sin^2\alpha\,\frac{1}{3}\,\frac{c^3}{z^3\cos^3\alpha} = -\frac{1}{3}\,\frac{c^3}{z^2}\operatorname{tg}^2\alpha.$$

$$\frac{c\sin^2\alpha + c\cos\alpha}{c\cos\alpha - c\cos^2\alpha}$$

$$2\pi f\sigma\left\{-2+\cos^2\alpha - 2\sin\alpha\cos\alpha + \sin^2\alpha\cos\alpha\ln\frac{2\sin^2\alpha+2\sin\alpha}{\cos\alpha-\cos^2\alpha}.\right\}$$

$$2\pi f\sigma\left\{+\cos^2\alpha -\right.$$

$$2\pi f\sigma\left(-2+2\cos^2\alpha + \operatorname{tg}^2\alpha\sin^2\alpha\ln\frac{\cos\alpha+\cos^2\alpha}{\cos\alpha-\cos^2\alpha}\right.$$

$H = c \qquad a = c\operatorname{tg}\alpha. \qquad$ ~~$z = r$~~ $\quad r - z$

$$V = \frac{1}{2}c\left(-\frac{cz}{c^2\operatorname{tg}^2\alpha + c^2}\left(\sqrt{(c-z)^2 + c^2\operatorname{tg}^2\alpha} + z\right) + \sqrt{(c-z)^2 + c^2\operatorname{tg}^2\alpha} + 2z - c\right)$$

$$- \frac{1}{2}z\frac{c^3\operatorname{tg}^2\alpha}{\left(c^2 + c^2\operatorname{tg}^2\alpha\right)^{\frac{3}{2}}}\ln\frac{c^2\operatorname{tg}^2\alpha + c^2 + \sqrt{c^2 + c^2\operatorname{tg}^2\alpha}\,\sqrt{(c-z)^2 + c^2\operatorname{tg}^2\alpha}}{-2c - 2\sqrt{c^2 + c^2\operatorname{tg}^2\alpha}}$$

~~$V = z$~~

$$\sqrt{(r+h)^2 + (h-r)^2\frac{a^2}{H^2}}\,dh$$

$$\sqrt{r^2\left(1 + \frac{a^2}{H^2}\right) + 2rh\left(1 - \frac{a^2}{H^2}\right) + h^2\left(1 + \frac{a^2}{H^2}\right)}\,dh$$

$$\frac{1}{H}\int\sqrt{r^2(a^2+H^2) + 2r(H^2-a^2)h + (H^2+a^2)h^2}\,dh$$

$$\frac{\sqrt{a^2+H^2}}{H}\int\sqrt{r^2 + 2r\frac{H^2-a^2}{H^2+a^2}h + h^2}\,dh.$$

V_0

$$\frac{\sqrt{a^2+H^2}}{H}\left\{\left(\frac{1}{2}H + \frac{1}{2}r\frac{H^2-a^2}{H^2+a^2}\right)\sqrt{H^2 + r^2 + 2r\frac{H^2-a^2}{H^2+a^2}H - \frac{1}{2}r^2\frac{H^2-a^2}{H^2+a^2}}\right.$$

$$\left.+\left(\frac{1}{2}r^2 - \frac{1}{2}r^2\left(\frac{H^2-a^2}{H^2+a^2}\right)^2\right)\ln\frac{2H + 2r\frac{H^2-a^2}{H^2+a^2} + 2\sqrt{H^2 + r^2 + 2r\frac{H^2-a^2}{H^2+a^2}H}}{2r\frac{H^2-a^2}{H^2+a^2} + 2r}\right.$$

$$\left. - rH - \frac{H^2}{2}\right\}$$

$$-\frac{1}{2}\sin^2\alpha\,\frac{c^2}{c-z}\,\frac{1}{1+\cos\alpha}-\frac{1}{2}\,\frac{c^2\sin^2\alpha}{z\cos\alpha}\left(1+\frac{c\sin^2\alpha}{c-z}\,\frac{1}{\cos\alpha(1+\cos\alpha)}\right.$$

$$-\frac{1}{2}\sin^2\alpha\,c^2\left(\frac{1}{(c-z)(1+\cos\alpha}+\frac{1}{z\cos\alpha}+\frac{c\sin^2\alpha}{z(c-z)}\right.$$

$$H^4+a^4+2H^2a^2-H^4-a^4+2H^2a^2$$

$$+\frac{1}{2}\chi^2$$

$$\sqrt{t^2+(h-r)^2\frac{a^2}{H^2}}\,dh$$

$$\int\sqrt{r^2\left(1+\frac{a^2}{H^2}\right)-2r\frac{a^2}{H^2}h+\frac{a^2}{H^2}h^2}\,dh$$

$$\left(\frac{1}{2}r^2\left(1+\frac{a^2}{H^2}\right)\frac{H^2}{a^2}+\frac{r^2}{2}\frac{a^2H^2}{H^4a^2}\right)\frac{H}{a}$$

$$a\cdot H\operatorname{tg}\alpha$$

$$\frac{1}{H}\int\sqrt{r^2(H^2+a^2)-2ra^2h+a^2h^2}\,dh \qquad \sqrt{h^2(+}$$

$$\frac{1}{H}\left[\frac{1}{2}r^2(H^2+a^2)-\frac{1}{2}r^2a^2\right]\frac{1}{a} \qquad \frac{1}{H}\sqrt{a^2r^2-2ra^2h+(H^2+a^2)h^2}\,dh$$

$$\frac{1}{2}r^2\,\frac{1}{H^2\operatorname{tg}\alpha}\left[H^2(1+\operatorname{tg}^2\alpha)\right.$$

$$\frac{1}{2}r^2\,\frac{1}{H^2\operatorname{tg}\alpha}\left[\right. \qquad \frac{1}{2}r^2\,\frac{1}{\operatorname{tg}\alpha}$$

$$\frac{1}{H}\left[\frac{1}{2}a^2r^2-\frac{1}{2}r^2\frac{a^4}{a^2+H^2}\right]\frac{1}{\sqrt{a^2+H^2}} \qquad \frac{\sin^2\alpha}{\cos^2\alpha}$$

$$\frac{1}{2}r^2\,\frac{1}{H}\left\{\frac{a^2H^2}{(a^2+H^2)^{3/2}}\right\} \qquad \frac{H^3\operatorname{tg}^2\alpha}{H^3(1+\operatorname{tg}^2\alpha)^{3/2}}$$

$$-\frac{1}{2}c^2\sin^2\alpha\left(\frac{1}{2c\cos\alpha}+\frac{\frac{1}{2}\sin^4\alpha}{\frac{1}{2}\cos^2\alpha(1+\cos\alpha)^2(c-z)^2}+\frac{\sin^2\alpha}{2\cos^2\alpha(c-z)(1+\cos\alpha)}\right.$$

$$\left.+\frac{1}{(c-z)(1+\cos\alpha)}\right)$$

$$-\frac{1}{2}\frac{c^2\sin^2\alpha}{2c\cos\alpha}\left\{\frac{2c\cos\alpha}{(1+\cos\alpha)(c-z)}+1+\frac{\sin^2\alpha}{(c-z)\cos\alpha(1+\cos\alpha)}+\frac{\sin^2\alpha}{(c-z)^2}\right.$$

$$1+\frac{2c\cos^2\alpha+\sin^2\alpha}{(c-z)\cos\alpha(1+\cos\alpha)}$$

$$(\cos\alpha+\cos^2\alpha)$$

$$c-z$$

$$\frac{c\cos\alpha-2c\cos\alpha+c\cos^2\alpha-2c\cos^2\alpha+2c\cos^2\alpha+\sin^2\alpha}{(c-z)(\cos\alpha+\cos^2\alpha)}$$

$$-\frac{1}{2}\frac{c^2\sin^2\alpha}{2c\cos\alpha}\left\{1+\frac{\sin^2\alpha}{(c-z)2}\frac{1}{\cos\alpha(1+\cos\alpha)}\right\}+\frac{\frac{1}{4}\sin^4\alpha}{\frac{1}{4}(c-z)^2}$$

$$-\frac{1}{2}\frac{c^2\sin^2\alpha}{c-z}\frac{1}{(1+\cos\alpha)}\qquad 1-\cos^2\alpha$$

$$-\frac{1}{2}c^2\sin^2\alpha\left\{\frac{(c-z)\cos\alpha(1+\cos\alpha)+\sin^2\alpha+2c\cos^2\alpha}{2(c-z)\cos^2\alpha(1+\cos\alpha)}\right.$$

$$\frac{1}{2c\cos\alpha}+\frac{\frac{1}{2}\sin^2\alpha}{(c-z)\cos^2\alpha}\left(\right.$$

$$+\frac{\sin^2\alpha}{}$$

$$\frac{1}{2c\cos\alpha}+\frac{1}{(c-z)(1+\cos\alpha)}\left(\frac{\frac{1}{2}\sin^2\alpha}{2c\cos^2\alpha}+1\right)$$

$$+2c\cos^2\alpha$$

$$\left(\frac{1}{2}\tan^2\alpha+1\right)$$

$$1+\frac{\sin^2\alpha}{c-z}\frac{1}{\cos\alpha+\cos^2\alpha}$$

$$-\frac{1}{2}\sin^2\alpha\,\frac{c^2}{c-z}\,\frac{1}{1+\cos\alpha}-\frac{1}{2}\sin^2\alpha\,\frac{c^2}{z\cos\alpha}$$

$$-\frac{1}{2}\sin^4\alpha\,\frac{c^3}{c-z}\,\frac{1}{z\cos^2\alpha(1+\cos\alpha)}$$

$$-\frac{1}{2}\sin^2\alpha\,c^2\left(\frac{1}{(c-z)(1+\cos\alpha)}+\frac{1}{z\cos\alpha}+\frac{c\sin^2\alpha}{(c-z)z\cos^2\alpha(1+\cos\alpha)}\right)$$

$$z\cos^2\alpha+(c-z)\frac{\cos\alpha(1+\cos^2\alpha)}{(\cos\alpha+\cos^2\alpha)}+c\sin^2\alpha$$

$$z\cos^2\alpha+c\cos\alpha-z\cos\alpha+c\cos^2\alpha-z\cos^2\alpha+c-c\cos^2\alpha$$

$$\frac{+c+(c-z)\cos\alpha}{z(c-z)\cos^2\alpha(1+\cos\alpha)}\qquad\frac{c(1+\cos\alpha)-z\cos\alpha}{z(c-z)\cos^2\alpha(1+\cos\alpha)}$$

$$\frac{c}{z\cos^2\alpha}-\frac{1}{(c-z)\cos\alpha(1+\cos\alpha)}\qquad\frac{\cos\alpha(c-z)+c}{z\cos^2\alpha(1+\cos\alpha)}$$

$$-\frac{1}{2}\sin^2\alpha\,\frac{c^2}{c-z}$$

$$\left(1-\frac{1}{4}\sin^2\alpha\frac{c}{c-z}\left(1-\frac{1}{4}\frac{c^2k^2\alpha}{(c-z)^2}\right\}\frac{1}{\cos\alpha(1+\cos^2}\right)\Bigg($$

$$-\frac{1}{2}\sin^2\alpha\frac{c^2}{c-z}\left(1-\frac{1}{4}\frac{c^2k^2\alpha}{(c-z)^2}\right)\frac{1}{1+\cos\alpha}-\frac{1}{2}\sin^2\alpha\frac{c^2}{z\cos\alpha}\Bigg($$

$$\left(1+\frac{\sin^2\alpha}{c-z}\left(1-\frac{1}{4}\frac{c^2k^2z}{(c-z)^2}\right)\frac{1}{\cos\alpha(1+\cos\alpha)}+\frac{1}{4}\frac{\sin^4\alpha}{(c-z)^2}\frac{1}{\cos^2\alpha(1+\cos\alpha)^2}\right)$$

$$1+\frac{c\sin^2\alpha}{c-z}\frac{1}{\cos\alpha(1+\cos\alpha)}\left(1-\frac{1}{4}\frac{c^2k^2\alpha}{(c-z)^2}+\frac{1}{4}\frac{\sin^2\alpha}{\cos^2\alpha}\right.$$

$$\sqrt{(c-z)^2 + c^2 tg^2\alpha} = (c-z)\sqrt{1+\frac{c^2}{(c-z)^2}tg^2\alpha} = (c-z)\left\{1+\frac{1}{2}\frac{c^2tg^2\alpha}{(c-z)^2} - \frac{1}{8}\frac{c^4tg^4\alpha}{(c-z)^4}\right\}$$

$$\log \frac{c - z\cos^2\alpha + c\cos\alpha - z\cos\alpha + \left\{\frac{1}{2}\cos\alpha\frac{c^2tg^2\alpha}{(c-z)^2} - \frac{1}{8}\frac{c^4tg^4\alpha}{(c-z)^4}\cos\alpha\right\}(c-z)}{-z(\cos\alpha+\cos^2\alpha)} =$$

$$= \log\left(1 + \frac{c(1+\cos\alpha) + \frac{1}{8}\cos\alpha tg^2\alpha\frac{c^2}{(c-z)^3}\left\{4(c-z)^2 - c^2tg^2\alpha\right\}}{-z(\cos\alpha+\cos^2\alpha)}\right) =$$

$$= \frac{c(1+\cos\alpha) + \frac{1}{8}\cos\alpha tg^2\alpha\frac{c^2}{(c-z)^3}\left\{4(c-z)^2 - c^2tg^2\alpha\right\}}{-z(\cos\alpha+\cos^2\alpha)} -$$

$$- \frac{1}{2}\frac{c^2(1+\cos\alpha)^2 + \frac{1}{4}\cos\alpha tg^2\alpha(1+\cos\alpha)\frac{c^3}{(c-z)^3}\left\{4(c-z)^2 - c^2tg^2\alpha\right\} +}{z^2(\cos\alpha+\cos^2\alpha)^2}$$

$$+ \frac{\frac{1}{64}\cos^2\alpha tg^4\alpha\frac{c^4}{(c-z)^6}\left\{16(c-z)^4 - 8c^2(c-z)^2tg^2\alpha + c^4tg^4\alpha\right\}}{z^2(\cos\alpha+\cos^2\alpha)^2}$$

$$P = 2\pi f\sigma\left\{c - z\cos^2\alpha - c\cos^2\alpha + z\cos^2\alpha - \frac{1}{2}\cos^2\alpha\frac{c^2tg^2\alpha}{(c-z)} + \frac{1}{8}\cos^2\alpha\frac{c^4tg^4\alpha}{(c-z)^3} + -\right.$$

$$- c\sin^2\alpha - \frac{1}{2}\frac{c^2\sin^2\alpha}{z\cos\alpha} - \frac{1}{8}\cos^2\alpha\sin^2\alpha tg^2\alpha\frac{c^2}{(c-z)^2}\left\{4(c-z)^2 - c^2tg^2\alpha\right\}\times -$$

$$\left.\times\left\{\frac{1}{\cos\alpha+\cos^2\alpha} + \frac{c(1+\cos\alpha)}{z(\cos\alpha+\cos\alpha)^2}\right\} - \frac{1}{64}\frac{\cos^3\alpha\sin^2\alpha tg^4\alpha\frac{c^4}{(c-z)^6}\left\{\cdots\right\}}{z(\cos\alpha+\cos^2\alpha)^2}\right\}$$

$$P = 2\pi f\sigma\left\{-\frac{1}{2}\cos^2\alpha\frac{c^2tg^2\alpha}{(c-z)} + \frac{1}{8}\cos^2\alpha\frac{c^4tg^4\alpha}{(c-z)^3} - \frac{1}{2}\frac{c^2\sin^2\alpha}{z\cos\alpha} - \frac{1}{16}\sin^4\alpha\frac{c^2}{(c-z)^3}\times\right.$$

$$\left.\times\left\{8(c-z)^2 - c^2tg^2\alpha\right\}\left\{\frac{1}{\cos\alpha(1+\cos\alpha)} + \frac{c}{z}\frac{1}{\cos^2\alpha(1+\cos\alpha)}\right\} - \frac{1}{\cos\alpha}\left\{\cdots\right\}\right\}$$

$$= -\frac{1}{2}\sin^2\alpha\frac{c^2}{(c-z)} - \frac{1}{2}\sin^4\alpha\frac{c^2}{(c-z)}\times\frac{1}{\cos\alpha(1+\cos\alpha)} + \frac{1}{8}\frac{c^4}{(c-z)^3}\cos^2\alpha tg^4\alpha$$

$$+ \frac{1}{16}\frac{c^4}{(c-z)^3}\frac{\sin^4\alpha tg^2\alpha}{\cos\alpha(1+\cos\alpha)}$$

$$P = 2\pi f\sigma\left\{-\frac{1}{2}\sin^2\alpha\frac{c^2}{(c-z)} + \frac{1}{8}\sin^4\alpha\frac{c^4}{(c-z)^3} - \frac{1}{2}\sin^2\alpha\frac{c^2}{z\cos\alpha} -\right.$$

$$- \frac{1}{2}\sin^4\alpha\frac{c^2}{(c-z)}\frac{1}{\cos\alpha(1+\cos\alpha)}\left(1+\frac{c}{z\cos\alpha}\right) + \frac{1}{16}\frac{\sin^4\alpha}{\cos^2\alpha}\frac{c^4}{(c-z)^3}\frac{1}{\cos\alpha(1+\cos\alpha)}\left\{1+\frac{c}{z\cos\alpha}\right\}$$

$$\left.+\frac{1}{256}\left\{\cdots\right\}\right\}$$

$$P = 2\pi/\sigma \left\{ -\frac{1}{2}\sin^2\alpha \frac{c^2}{c-z}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\} - \frac{1}{2}\sin^2\alpha \frac{c^2}{z\cos\alpha} \right.$$

$$-\frac{1}{2}\sin^4\alpha \frac{c^2}{c-z}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\}\frac{1}{\cos\alpha(1+\cos\alpha)}$$

$$-\frac{1}{2}\sin^4\alpha \frac{c^3}{c-z}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\}\frac{1}{z\cos^2\alpha(1+\cos\alpha)} \rightarrow$$

$$\left(-\frac{1}{128}\frac{\cos^3\alpha \sin^2\alpha tg^4\alpha \frac{c^4}{(c-z)^6}\left\{16(c-z)^4 - 8c^2(c-z)^2 tg^2\alpha + c^4 tg^4\alpha\right\}}{z^2\cos^2\alpha(1+\cos\alpha)^2}\right)$$

$$-\frac{1}{8}\sin^6\alpha \frac{c^4}{(c-z)^2}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\}^2 \frac{1}{z\cos^3\alpha(1+\cos\alpha)^2}$$

$$P = \frac{1}{2} - \frac{1}{2}\left(\frac{1}{z\cos\alpha}\left\{\frac{1}{2}\sin^2\alpha\frac{c^2}{c-z}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\}\frac{1}{\cos\alpha(1+\cos\alpha)}\right\}^2\right.$$

$$\left. -\frac{1}{2}\frac{1}{z\cos\alpha}\left\{\sin^2\alpha\, c\right\}^2\right.$$

$$\left. -\frac{1}{2}\frac{c\sin\alpha}{z\cos\alpha}\left\{c\sin\alpha + \frac{1}{2}\sin^2\alpha\frac{c}{c-z}\left(1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right)\frac{1}{\cos\alpha(1+\cos\alpha)}\right\}^2\right.$$

$$\left. -\frac{1}{2}\left\{\frac{1}{2}\frac{c^2\sin^2\alpha}{z\cos\alpha}\left(1+\frac{1}{2}\frac{c\sin^2\alpha}{c-z}\left(1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right)\frac{1}{\cos\alpha(1+\cos\alpha)}\right)^2\right.\right.$$

$$\left.\left. -\frac{1}{2}\sin^2\alpha\frac{c^2}{c-z}\left\{1-\frac{1}{4}\frac{c^2 tg^2\alpha}{(c-z)^2}\right\}\frac{1}{1+\cos\alpha}\right.\right.$$

$\pi \int_0 \frac{c^3}{3z^2} \operatorname{tg}^2\alpha \cdot$

$$\sqrt{(c-z)^2 + c^2\operatorname{tg}^2\alpha} = (c-z)\sqrt{1 + \frac{c^2}{(c-z)^2}\operatorname{tg}^2\alpha}$$

$$\sqrt{(c-z)^2 + c^2\operatorname{tg}^2\alpha} = (c-z)\left(1 + \frac{1}{2}\frac{c^2}{(c-z)^2}\operatorname{tg}^2\alpha\right)$$

$$\ln \frac{c - z\cos^2\alpha + c\cos\alpha - z\cos\alpha + \frac{1}{2}\cos\alpha\operatorname{tg}^2\alpha\frac{c^3}{(c-z)^2} - \frac{1}{2}\cos\alpha\operatorname{tg}^2\alpha\frac{c^2 z}{(c-z)}}{-z(\cos\alpha + \cos^2\alpha)}$$

$$\ln\left(1 + \frac{c(1+\cos\alpha) + \frac{1}{2}\cos\alpha\operatorname{tg}^2\alpha\frac{c^3}{(c-z)^2} - \frac{1}{2}\cos\alpha\operatorname{tg}^2\alpha\frac{c^2 z}{c-z^2}}{-z(\cos\alpha + \cos^2\alpha)}\right)$$

$$c - z\cos^2\alpha - c\cos^2\alpha + z\cos^2\alpha - \frac{1}{2}\frac{c^3}{(c-z)^2}\sin^2\alpha - c\sin^2\alpha$$

$$+ \frac{1}{2}\frac{\sin^2\alpha\frac{c^3}{(c-z)^2} - \sin^2\alpha\frac{c^2 z}{(c-z)^2}}{\cos\alpha + \cos^2\alpha}$$

$-z$ $-dx$

$$+\frac{1}{2}\frac{c^2\sin^2\alpha}{z(1-\frac{c}{z})} \qquad +\frac{1}{2}\frac{c^2\sin^2\alpha}{z}+\frac{1}{2}\frac{\sin^2\alpha\, c^3}{z^2}$$

$$+\frac{1}{2}\frac{c^2\sin^2\alpha}{z(1+\cos\alpha)} - \frac{1}{2}\frac{c^2\sin^2\alpha}{z\cos^2\alpha(1+\cos\alpha)^2}$$

$$-\frac{c^2\sin^2\alpha}{z(1-\frac{c}{z})} = -\frac{c^2\sin^2\alpha}{z}+\frac{c^3\sin^2\alpha}{z^2}$$

$$1-\frac{1}{\cos^2\alpha(1+\cos^2\alpha)}$$

$$-\cos\alpha\sin^2\alpha\frac{1}{2}\frac{c^2(1+\cos\alpha)^2}{z^2\cos^2\alpha(1+\cos\alpha)^2}$$

$$-\frac{1}{2}\frac{\sin^2\alpha}{\cos\alpha}\frac{c^2}{z} + \frac{1}{2}\cos^2\alpha\sin^2\alpha\, tg^2\alpha\frac{c^2}{z}\frac{1}{(\cos\alpha+\cos^2\alpha)}$$

17

10201 121,5 $-\frac{1}{2}\sin^2\alpha\frac{c^2}{z}$

$$P=2\pi f\sigma\left\{1+\frac{1}{2}\left(100+\sqrt{10201,5}\right)\right.$$

$$P=2\pi f\sigma\left\{1+\frac{1}{2}\left(10+\sqrt{121,5}\right) - 3,53554 \log\frac{6+0,707107\sqrt{121,5}}{12,07107}\right\}$$

$$\sqrt{} = \cos\alpha\sqrt{z^2-2cz+\frac{c^2}{\cos^2\alpha}}$$

$$z^2-2cz+c^2tg^2\alpha+c^2$$

$$(z-c)^2+c^2tg^2\alpha.$$

$\sqrt{122}=11,0454$

$\sqrt{121,5}=11,0227$
5,5114

0,43180

2 084576
1,042288
9 849486 −1
0,891774

7,79424
6

$$P=2\pi f\sigma\left\{\left(6-\frac{1}{2}\sqrt{121,5}\right)-3,53554\log\frac{6+0,707107\sqrt{121,5}}{12,07107}\right.$$ 9058458

$$P=2\pi f\sigma\left\{0,4886-3,53554\log\frac{13,79424}{12,07107}\right.$$

~~4,1779~~

13

50227

0,0168

1,043182
849486
0,892668

1,140204
~~1,139698~~
1,081746
0,057952

114053
1,142753

60
55072
5,5227

{ ~~0,4~~
~~0,4928~~

0,4783 −
4759

0024

78703
13,8103
0,677515

766844
~~0,762069~~ 2
0,548455
0,361216
0,673789 −1
677515

$H - z \quad h - z$.

$$\frac{\partial P}{\partial z} = +2\pi f \sigma \left\{ -\cos^2\alpha - \cos\alpha \frac{-(H+h) + h\cos^2\alpha}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} \right.$$

$$+ \sin^2\alpha \cos\alpha \log \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha}$$

$$+ h\sin^2\alpha\cos\alpha \frac{h\cos^2\alpha + h\cos\alpha}{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} \left(+ \frac{-(H+h) + h\cos^2\alpha}{(h\cos^2\alpha + h\cos\alpha)\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} \right.$$

$$\left. \left. - \frac{\cos^2\alpha}{h\cos^2\alpha + h\cos\alpha} + \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{(h^2\cos^2\alpha + h^2\cos\alpha)^2} \right) \right\}$$

$$\frac{\partial P}{\partial z} = 2\pi h\sigma \left\{ -\cos^2\alpha \left(+ \cos\alpha \frac{H\cos^2\alpha}{\sqrt{\quad}} \right) + \sin^2\alpha\cos\alpha \log \right.$$

$$- h\sin^2\alpha\cos\alpha \frac{h\cos\alpha + h\cos^2\alpha}{(H-h) + h\cos^2\alpha + \sqrt{\quad}} \left(\frac{-\cos^2\alpha - \frac{H\cos^2\alpha}{\sqrt{\quad}}}{h\cos\alpha + h\cos^2\alpha} + \frac{(\cos\alpha + \cos^2\alpha)}{h^2(\cos\alpha + \cos^2\alpha)^2} \times \right.$$

$$\left. (H-h) + h\cos^2\alpha + \sqrt{\quad} \right)$$

$$+ h\sin^2\alpha\cos\alpha \frac{H\cos^2\alpha + \cos^2\alpha\sqrt{\quad}}{\sqrt{\quad}} \cdot \frac{1}{(H-h) + h\cos^2\alpha + \sqrt{\quad}}$$

$$+ \cos\alpha \frac{H\cos^2\alpha}{\sqrt{\quad}}$$

$$\frac{-\sin^2\alpha\cos\alpha\sqrt{\quad}\,.(\quad) + H\cos^3\alpha(\quad) + h\sin^2\alpha\cos\alpha(H\cos^2\alpha + \cos^2\alpha\sqrt{\quad})}{\sqrt{\quad}\,.(\quad)}$$

$$-z\sin^2\alpha\cos^2\alpha\sqrt{\quad}+z(z-c)\sin^2\alpha\cos^2\alpha-\cos^2\alpha(z-c)c$$

$$+\cos^5\alpha\,z(z-c)-\cos^2\alpha(z-c)\sqrt{\quad}$$

$$\frac{\partial P}{\partial z} = +2\pi\rho\sigma\left\{1 + \frac{c-z}{\sqrt{(c-z)^2 + r^2}}\right\} + 2\pi\rho\sigma \int_0^c \frac{dr\, r\, \mathrm{tg}\,\alpha\,(c-z)}{\left(r^2 + (c-z)^2\right)^{\frac{3}{2}}}$$

$$r = c\,\mathrm{tg}\,\alpha.$$

$$\frac{\partial P}{\partial z} = 2\pi\rho\sigma\left\{1 + \frac{c-z}{\sqrt{(c-z)^2 + c^2\mathrm{tg}^2\alpha}}\right\} + 2\pi\rho\sigma \int_0^c \frac{c^2\mathrm{tg}^2\alpha\, d\alpha}{\left((c-z)^2 + c^2\mathrm{tg}^2\alpha\right)^{\frac{3}{2}}} - 2\pi\rho\sigma z \int_0^c \frac{c\, d\alpha\, \mathrm{tg}^2\alpha}{\left((c-z)^2 + c^2\mathrm{tg}^2\alpha\right)^{\frac{3}{2}}}$$

$$+ 2\pi\rho\sigma\,\mathrm{tg}^2\alpha \int_0^c \frac{c^2 d\alpha}{\left(z^2 - 2cz + \frac{c^2}{\cos^2\alpha}\right)^{\frac{3}{2}}} - 2\pi\rho\sigma z\,\mathrm{tg}^2\alpha \int_0^c \frac{c\, d\alpha}{\left(z^2 - 2cz + \frac{c^2}{\cos^2\alpha}\right)^{\frac{3}{2}}}$$

$$K = \frac{4z^2}{\cos^2\alpha} - 4z^2 = 4z^2\mathrm{tg}^2\alpha.$$

$$\int_0^c \frac{c^2 d\alpha}{\left(z^2 - 2cz + \frac{c^2}{\cos^2\alpha}\right)^{\frac{3}{2}}} = -\frac{\left(\frac{4z^2}{\cos^2\alpha} - 8z^2\right)c + 4z^3}{4z^2\frac{\mathrm{tg}^2\alpha}{\cos^2\alpha}} \frac{1}{\sqrt{\quad}} + \frac{\cos^3\alpha\, d\log}{\cos^3\alpha}$$

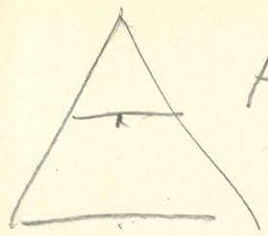
$$\log\left(\frac{2c}{\cos^2\alpha} - 2z + \frac{2}{\cos\alpha}\right)\sqrt{z^2 - 2cz + \frac{c^2}{\cos^2\alpha}}$$

$$\int_0^c \frac{c\, d\alpha}{\left(z^2 - 2cz + \frac{c^2}{\cos^2\alpha}\right)^{\frac{3}{2}}} = -\frac{2(2z^2 - 2zc)}{4z^2\mathrm{tg}^2\alpha} \frac{1}{\sqrt{\quad}}$$

$$\frac{i}{2\pi\rho\sigma}\frac{\partial P}{\partial z} = 1 + \frac{(c-z)}{\sqrt{(c-z)^2 + c^2\mathrm{tg}^2\alpha}} - \left\{(1 - 2\cos^2\alpha)c + 2\cos^2\alpha\right\}\frac{1}{\sqrt{(c-z)^2 + c^2\mathrm{tg}^2\alpha}} + \cos^2\alpha + \log\cos\alpha$$

$$+ 2\sin^2\alpha\cos\alpha \log\frac{c - z\cos^2\alpha + \cos\alpha\sqrt{(c-z)^2 + c^2\mathrm{tg}^2\alpha}}{-z\cos^2\alpha + z\cos\alpha}$$

$$+ (z - c)\frac{1}{\sqrt{(c-z)^2 + c^2\mathrm{tg}^2\alpha}} - 1$$



$H = c - z \qquad h = z \qquad c = H + h.$

$$\frac{dP}{2\pi\rho\, dz} = -2 + \cos^2\alpha - \cos\alpha\,\frac{2\cos^2\alpha - c\cos^2\alpha}{\sqrt{c^2 - 2cz\cos^2\alpha + z^2\cos^2\alpha}} + 2\sin^2\alpha\cos\alpha\,\log\frac{c - z\cos^2\alpha + \sqrt{\quad}}{z\cos\alpha - z\cos^2\alpha}$$

$$+ z\,\frac{2\cos\alpha - 2\cos^2\alpha}{c - z\cos^2\alpha + \sqrt{\quad}}\left\{\frac{-\cos^2\alpha + \dfrac{2\cos^2\alpha - c\cos^2\alpha}{\sqrt{\quad}}}{z\cos\alpha - z\cos^2\alpha} - \frac{(\cos\alpha - \cos^2\alpha)(c - z\cos^2\alpha + \sqrt{\quad})}{(z\cos\alpha - z\cos^2\alpha)^2}\right\}$$

$$= \left(\frac{-z\cos^2\alpha\sqrt{\quad} + z^2\cos^2\alpha - zc\cos^2\alpha}{(c - z\cos^2\alpha + \sqrt{\quad})\sqrt{\quad}} - 1\right)2\sin^2\alpha\cos\alpha - \cos\alpha\,\frac{2\cos^2\alpha - c\cos^2\alpha}{\sqrt{\quad}}$$

$$-2 + \cos^2\alpha + 2\sin^2\alpha\cos\alpha\,\log$$

$$= \frac{\left(-z\cos^2\alpha\sqrt{\quad} + z^2\cos^2\alpha - zc\cos^2\alpha\right)2\sin^2\alpha\cos\alpha - \cos\alpha(2\cos^2\alpha - c\cos^2\alpha)(c - z\cos^2\alpha + \sqrt{\quad})}{(c - z\cos^2\alpha + \sqrt{\quad})\sqrt{\quad}}$$

$$-2\sin^2\alpha\cos\alpha \quad -2 + \cos^2\alpha + 2\sin^2\alpha\cos\alpha\,\log$$

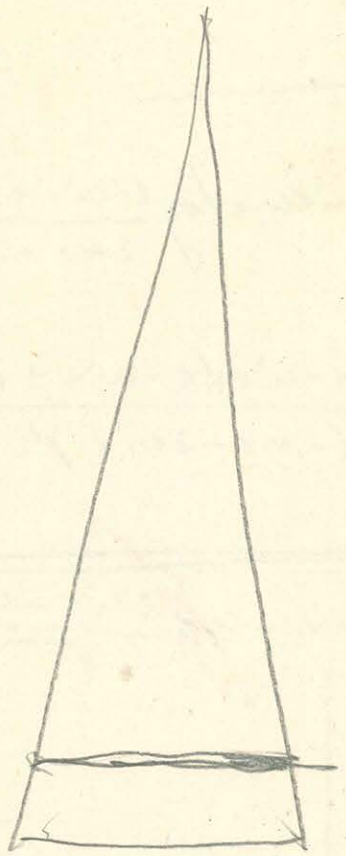
$$= \frac{-2z\sin^2\alpha\cos^3\alpha\sqrt{\quad} + z(2-c)2\sin^2\alpha\cos^3\alpha - \cos^3\alpha(2-c)c + \cos^5\alpha(2-c)z - \cos^3\alpha(2-c)\sqrt{\quad}}{(c - z\cos^2\alpha + \sqrt{\quad})\sqrt{\quad}}$$

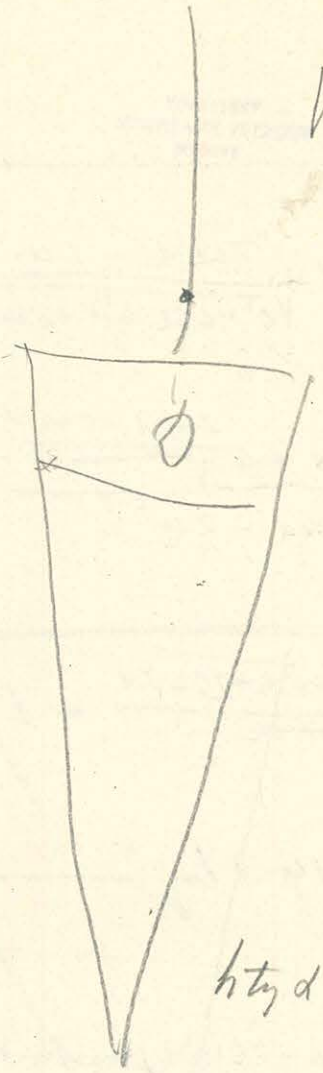
$$-2\sin^2\alpha\cos\alpha\,\underline{-2 + \cos^2\alpha + 2\sin^2\alpha\cos\alpha\,\log}$$

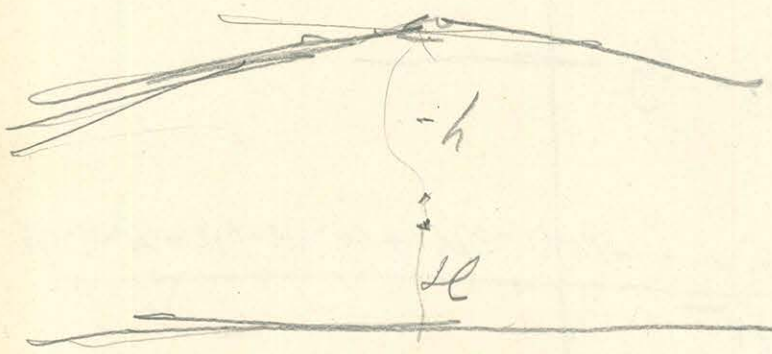
$$-2 + \cos^2\alpha + 2\sin^2\alpha\cos\alpha\,\log$$

$$-c\sin^2\alpha\cos\alpha\sqrt{\quad} + cz\cos^3\alpha\sin^2\alpha\sqrt{\quad} - c^2\sin^2\alpha\cos\alpha + 2c z\sin^2\alpha\cos^2\alpha - z^2\sin^2\alpha\cos^3\alpha$$

$h - H$







$(h-H)\operatorname{tg}\alpha = b.$

$(h-H)^2(1-\cos^2\alpha) = b\cos^2\alpha.$

$\cos^2\alpha =$

$$\frac{\partial P}{2\pi f \sigma \partial z} = -2+\cos^2\alpha - \cos\alpha \frac{-H\cos^2\alpha}{\sqrt{(H+h)^2 - 2Hh\cos^2\alpha - h^2\cos^2\alpha}} + \sin^2\alpha\cos\alpha \ln \frac{(H+h) - h\cos^2\alpha + \sqrt{\quad}}{h\cos\alpha - h\cos^2\alpha}$$

$$+ h\sin^2\alpha\cos\alpha \frac{h\cos\alpha - h\cos^2\alpha}{(H+h) - h\cos^2\alpha + \sqrt{\quad}} \left\{ \frac{-\cos^2\alpha - \frac{H\cos^2\alpha}{\sqrt{\quad}}}{h\cos\alpha - h\cos^2\alpha} - \frac{(\cos\alpha - \cos^2\alpha)\left((H+h) - h\cos^2\alpha + \sqrt{\quad}\right)}{(h\cos\alpha - h\cos^2\alpha)^2} \right\}$$

$$-\sin^2\alpha\cos\alpha = h\sin^2\alpha\cos\alpha \frac{\cos^2\alpha\sqrt{\quad} + H\cos^2\alpha}{\{(H+h) - h\cos^2\alpha + \sqrt{\quad}\}\sqrt{\quad}} + \frac{2H\cos^3\alpha}{\sqrt{\quad}}$$

$$-\sin^2\alpha\cos\alpha\left((H+h) - h\cos^2\alpha + \sqrt{\quad}\right)\sqrt{\quad} - h\sin^2\alpha\cos^3\alpha\sqrt{\quad} - h\sin^2\alpha\cos^3\alpha$$

$$+ 2H(H+h)\cos^2\alpha - H\cdot h\cos^2\alpha + H\cos^2\alpha\sqrt{\quad}$$

$$+ H\cos^3\alpha\left((H+h) - h\cos^2\alpha + \sqrt{\quad}\right)$$

$$-\sin^2\alpha\cos\alpha(H+h)\sqrt{\quad} + \sin^2\alpha\cos^3\alpha\, h\sqrt{\quad} \rightarrow \sin^2\cos\alpha(H+h)^2 + \sin^2\alpha\cos^3\alpha h^2$$

$$- h\sin^2\alpha\cos^2\alpha\sqrt{\quad} \qquad + 2\sin^2\cos^3\alpha\cdot Hh$$

$$h\sin^2\alpha\cos^3\alpha(H+h)$$

$$-\sin^2\alpha\cos\alpha(H+h)\left((H+h) - h\cos^2\alpha + \sqrt{\quad}\right)$$

$$\frac{H\cos^3\alpha - 2\sin^2\alpha\cos\alpha(H+h)}{\sqrt{\quad}} = \frac{-(H+h) - }{\cos\alpha}$$

$$= \cos\alpha = \frac{H\cos^2\alpha - (H+h) + (H+h)\cos^2\alpha}{\sqrt{\quad}}$$

$$\cos\alpha \frac{-(H+h) + (2H+h)\cos^2\alpha}{\sqrt{\quad}} \qquad \cos\alpha \frac{2H\cos^2\alpha}{}$$

Helyes

$$\frac{\partial P}{\partial z} = 2\pi f\sigma\left\{-2 + \cos^2\alpha + \cos\alpha \frac{-(H+h) + (2H+h)\cos^2\alpha}{\sqrt{(H+h)^2 - 2Hh\cos^2\alpha - h\cos^2\alpha}} + \sin^2\alpha\cos\alpha \ln \frac{(H+h) - h\cos^2\alpha + \sqrt{\quad}}{h\cos\alpha - h\cos^2\alpha}\right\}$$

$$\cos^2\alpha\sqrt{(C-z)^2 + c^2\sin^2\alpha} = \cos\alpha\sqrt{C^2 + z^2\cos^2\alpha - 2Cz\cos^2\alpha + C^2\sin^2\alpha}$$

$$H - h = c$$

$$h = -z$$

$$H = c - z \qquad 2c - z$$

$$H = c - z$$

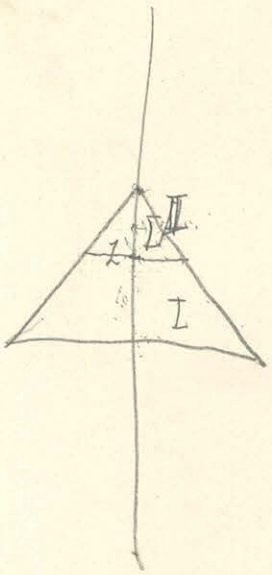
$$h = z$$

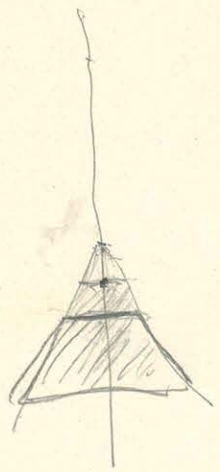
$$H + h = C$$

$$C^2 - 2(C - z)z\cos^2\alpha - z^2\cos^2\alpha$$

$$C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha$$

C





$$\frac{P}{2\pi fo} = (C-z) - \int_z^C \frac{c\,dc}{\sqrt{(c-z)^2 + c^2\eta^2\alpha}} + z\int_z^C \frac{dc}{\sqrt{(c-z)^2 + c^2\eta^2\alpha}} - z - \int_0^z \frac{c\,dc}{\sqrt{(c-z)^2 + c^2\eta^2\alpha}} + z\int_0^z \frac{dc}{\sqrt{(c-z)^2 + c^2\eta^2\alpha}}$$

$$-\int_z^C \frac{c\,dc}{\sqrt{}} = -\cos\alpha\sqrt{C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha} + z\sin\alpha\cos\alpha$$
$$-z\cos^2\alpha\,\log\frac{C - z\cos^2\alpha + \sqrt{C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha}}{z\sin^2\alpha + z\sin\alpha}$$

$$-\int_0^z \frac{c\,dc}{\sqrt{}} = -z\sin\alpha\cos\alpha + z\cos^2\alpha - z\cos^2\alpha\,\log\frac{z\sin^2\alpha + z\sin\alpha}{-z\cos^2\alpha + z\cos\alpha}$$

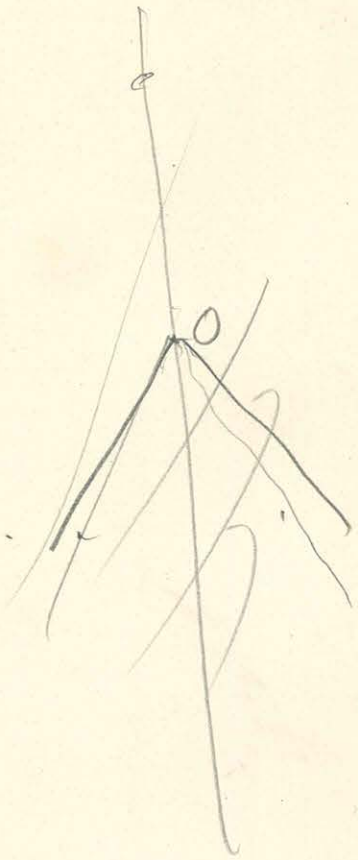
$$+z\int_z^C \frac{dc}{\sqrt{}} = +z\cos\alpha\,\log\frac{C - z\cos^2\alpha + \sqrt{C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha}}{z\sin^2\alpha + z\sin\alpha}$$

$$+2\int_0^z \frac{dc}{\sqrt{}} = +2\cos\alpha\,\log\frac{z\sin^2\alpha + z\sin\alpha}{-z\cos^2\alpha + z\cos\alpha}$$

III
$$\frac{P}{2\pi fo} = (C - zz) + z\cos^2\alpha - \cos\alpha\sqrt{C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha} + z\cos\alpha\sin^2\alpha\log\cdot$$
$$\log\frac{C - z\cos^2\alpha + \sqrt{C^2 - 2Cz\cos^2\alpha + z^2\cos^2\alpha}}{z\cos\alpha - z\cos^2\alpha}$$

(Vedro)

$$\frac{P}{2\pi fo} = (2l - h) + h\cos^2\alpha - \cos\alpha\sqrt{(H+h)^2 - 2Hh\cos^2\alpha - h^2\cos^2\alpha} + h\sin^2\alpha\cos\alpha\log\frac{(H+h) - h\cos^2\alpha + \sqrt{(H+h)^2 - 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h\cos\alpha - h\cos^2\alpha}.$$



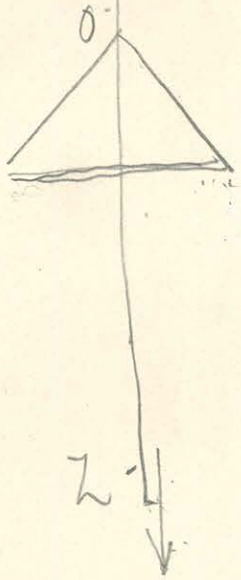
$x = \cancel{z(z+b)}\, \mathrm{tg}\,\alpha$

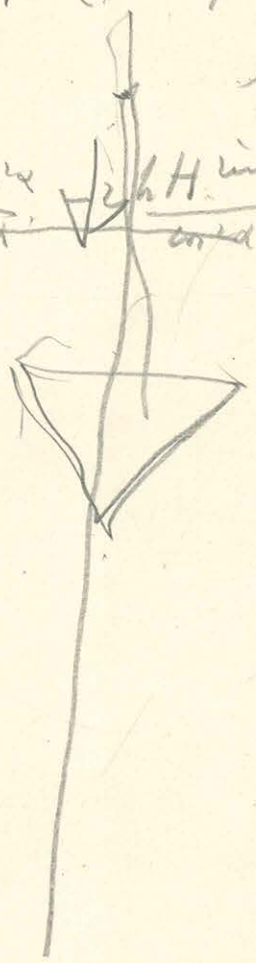
$x = c\,\mathrm{tg}\,\alpha.$

$$-2\pi\rho\left(1 - \frac{H}{\sqrt{H^2 + (h-H)^2\,\mathrm{tg}^2\alpha}}\right)$$

$$\frac{H^2}{\cos^2\alpha} + \frac{h^2\sin^2\alpha}{\cos^2\alpha} \sqrt{2}\,\frac{hH\sin^2\alpha}{\cos^2\alpha}.$$

~~$2\pi\rho\,dz\,r$~~



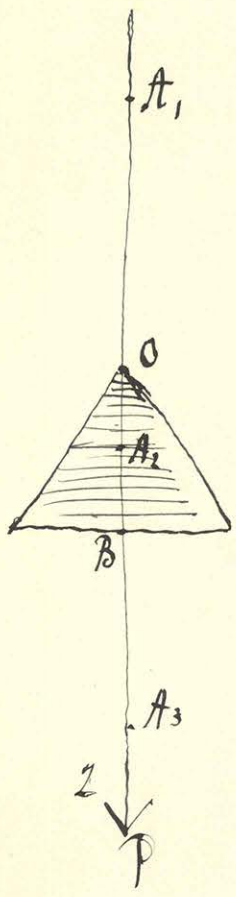


Kúp kúp vonzása tengelyében

Coordinata Rendszert a kúp csúcsa O, kúp magassága $OB = c$

z legyen a csúcstól a bázis felé

Pozitív az erő a $+z$ irányában.



I eset (A_1) z negatív.

$$P = 2\pi f \sigma \left\{ C - z \cdot \ldots - \ldots \sqrt{\ldots z^2 \cos^2 \ldots - 2Cz \cos \ldots + \ldots} \right.$$

$$\int_0^{\zeta} \frac{c\,dc}{r} = \cos\alpha \left\{ \sqrt{z^2\cos^2\alpha - 2\zeta z\cos^2\alpha + \zeta^2} - z\cos\alpha + z\cos^2\alpha \ln\left(\frac{\zeta - z\cos^2\alpha + \sqrt{\cdot}}{-z\cos^2\alpha + z\cos\alpha} \right) \right\}$$

$$z\int_{\alpha} \frac{dc}{r} = z\cos\alpha \ln$$

$$\Pi = -2\pi f\sigma \left\{ \zeta - z\cos^2\alpha + \cos\alpha \sqrt{z^2\cos^2\alpha + 2\zeta z\cos^2\alpha + \zeta^2} - z\cos^2\alpha\cos^2\alpha \ln \right\}$$

$z =$ $\zeta = (h - H)$ $z = h$

$$\Pi = -2\pi f\sigma \left\{ (h-H) - h\cos^2\alpha + \cos\alpha \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha} \right.$$
$$\left. - h\cos\alpha\sin^2\alpha \ln \frac{(h-H) - h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{-h\cos^2\alpha + h\cos\alpha} \right\}$$

$$\Pi = 2\pi f\sigma \left\{ (h-H) + h\cos^2\alpha + \cos\alpha \sqrt{(H-h)^2 + (H^2 + 3h^2)\cos^2\alpha} \right.$$

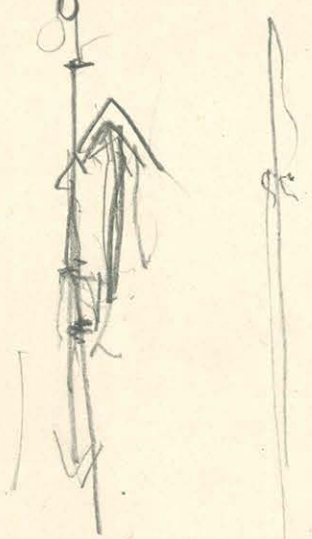
$z = h$

$C = h - H$

$H = z - C$

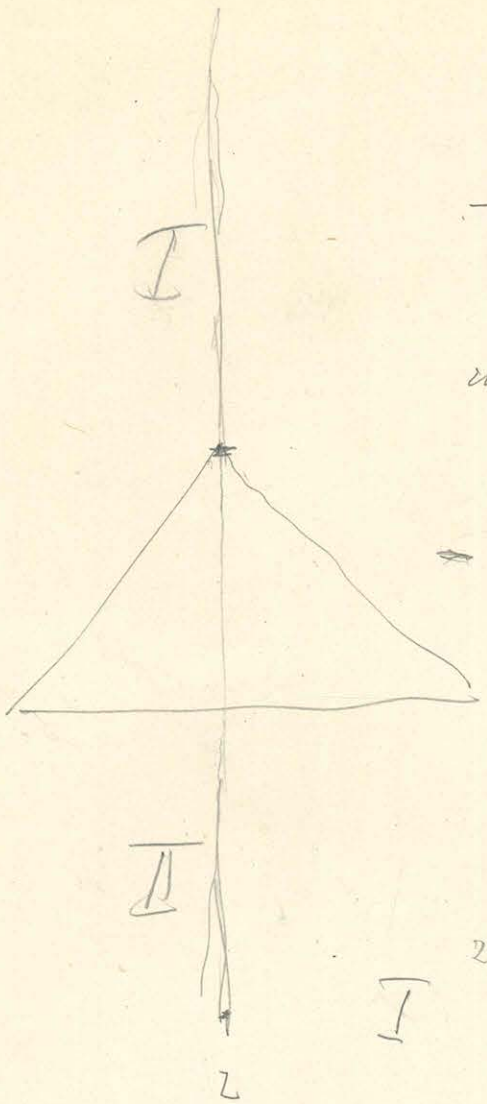
$z - 2z + 2C$

$(2(-z)$



$\frac{m}{z^2}$

$-\frac{m}{z^3}$



Kirchhoff

$$-\varrho\int\left\{d\alpha - \frac{(z-c)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right.$$

$$\varrho\int \frac{c-z}{\sqrt{(c-z)^2+r^2}^3}\, r\,dr\,d\alpha$$

$$= 2\pi\varrho\int (c-z)\,d\alpha\left(-\frac{1}{\sqrt{(c-z)^2+r^2}}\right.$$

$$2\pi\varrho\int\left(d\alpha - \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right)$$

z variable

$z<c$

$$\text{I}\qquad 2\pi\varrho\int\left(d\alpha - \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right.$$

$z>c$

$$\text{II}\qquad 2\pi\varrho\int\left(-d\alpha - \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right)$$

$$+\ c-z$$

$$-\ (c-z)$$

$$c^2(1+\zeta^2\alpha) - 2cz + z^2$$

$$c^2$$

$$+2(H-h)h\cos^2\alpha + h^2\cos^2\alpha.$$

$$\frac{\partial \rho}{\partial z} = \frac{\partial \rho}{\partial \varepsilon} \left\{ + \cos^2\alpha \mp \cos\alpha \frac{H\cos^2\alpha}{\sqrt{\quad}} \right.$$

$$\left. + \sin^2\alpha \cos\alpha \log \frac{\quad}{\quad} \right\}$$

$$- h \sin^2\alpha \cos\alpha \frac{-h\cos^2\alpha + h\cos\alpha}{(h-H) - h\cos^2\alpha + \sqrt{\quad}} \left\{ \frac{+\cos^2\alpha - \frac{H\cos^2\alpha}{\sqrt{\quad}}}{-h\cos^2\alpha + h\cos\alpha} + \frac{-\cos^2\alpha + \cos\alpha}{h^2(-\cos^2\alpha + \cos\alpha)^2} \times \right.$$

$$\left. \times \left[\left((h-H) - h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha} \right) \right] \right\}$$

$$- \sin^2\alpha \cos\alpha + h \sin^2\alpha \cos\alpha \frac{H\cos^2\alpha - \cos^2\alpha \sqrt{\quad}}{\sqrt{\quad}} \frac{1}{(h-H) - h\cos^2\alpha + \sqrt{\quad}}$$

$$\mp - \cos\alpha \frac{H\cos^2\alpha}{\sqrt{\quad}}$$

$$\left((h-H) - h\cos^2\alpha + \sqrt{\quad} \right)$$

$$\frac{-\sin^2\alpha\cos\alpha\sqrt{\quad}.(\quad) - H\cos^2\alpha(\quad) + h\sin^2\alpha\cos\alpha(H\cos^2\alpha - \cos^2\alpha\sqrt{\quad})}{\sqrt{\quad}(\quad)}$$

$$\frac{-\sin^2\alpha\cos\alpha(h-H)\sqrt{\quad} + h\sin^2\alpha\cos^3\alpha\sqrt{\quad} - \sin^2\alpha\cos\alpha\left((H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha\right) +}{\sqrt{\quad}(\quad)}$$

$$\frac{+Hh\sin^2\alpha\cos^2\alpha - h\sin^2\alpha\cos^2\alpha\sqrt{\quad} - H\cos^2\alpha(\quad)}{\sqrt{\quad}(\quad)}$$

$$\frac{-\sin^2\alpha\cos\alpha\left\{(h-H)\sqrt{\quad} + (h-H)^2 - h(h-H)\cos^2\alpha\right\} - H\cos^2\alpha(\quad)}{\sqrt{\quad}(\quad)}$$

$$\frac{-(h-H)\sin^2\alpha\cos\alpha\left\{(h-H) - h\cos^2\alpha + \sqrt{\quad}\right\} - H\cos^2\{\quad\}}{\sqrt{\quad}\{\quad\}}$$

$$\frac{-\cos\alpha}{\sqrt{\quad}} \left\{ \begin{array}{l} \left\{(h-H)\sin^2\alpha + H\cos^2\alpha\right\} \\ (h-H) - h\cos^2\alpha + H\cos^2\alpha + H\cos^2\alpha \\ \quad - (h-2H)\cos^2\alpha \end{array} \right\}$$

$$\frac{\partial P}{\partial z} = 2\pi f \sigma \left\{ +\cos^2\alpha - \cos\alpha \frac{(h-H) - (h-2H)\cos^2\alpha}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} \right.$$

$$\left. + \sin^2\alpha \cos\alpha \log \frac{(h-H) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{= h\cos^2\alpha + h\cos\alpha} \right\}$$

$$= C - C\cos\alpha$$

hlogh

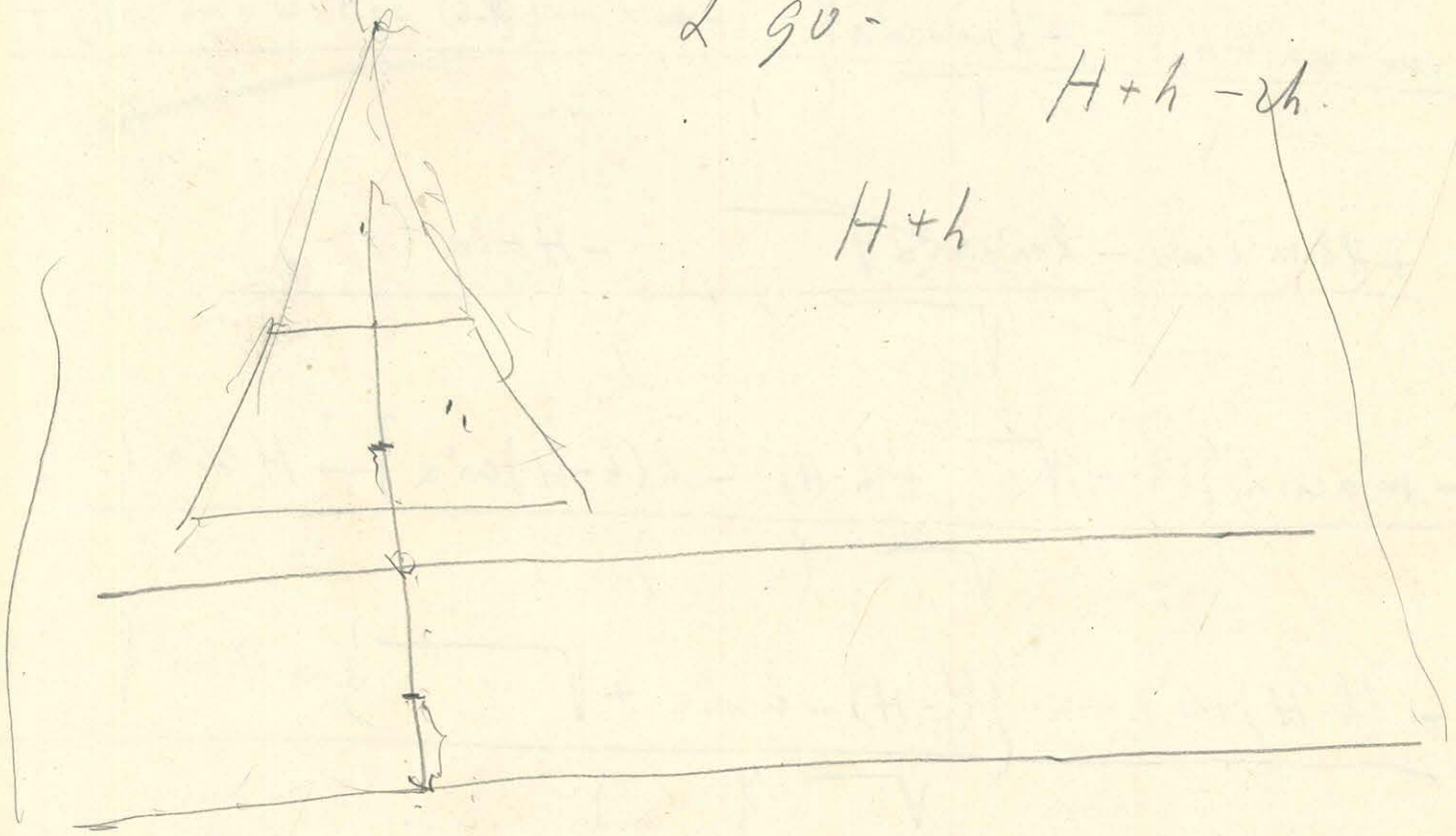
$$-C + C\cos^2\alpha - C\sin\alpha\cos\alpha + C\sin^2\alpha\cos\alpha \log \frac{C\sin^2\alpha + C\sin\alpha}{C\cos\alpha - C\cos^2\alpha}.$$

$$C + C\sin\alpha + C\sin\alpha\cos\alpha - C\sin^2\cos\alpha \log$$

α 90°

$H+h-2h$.

$H+h$



$2h - h$ tanh

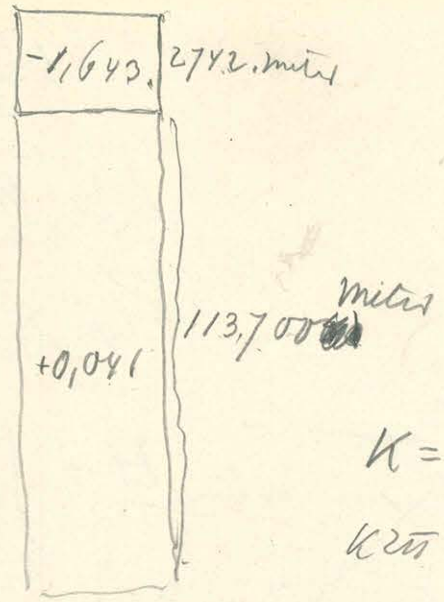
$-(h-2)$ +

mélység

$$\begin{array}{r} 1828 \\ 914 \\ \hline 2742 \end{array}$$

magy 2742 méter

$$\begin{array}{r} 2,711 \\ 2,67 \\ \hline 0,041 \end{array}$$



$K = 66,73$

$K 2\pi = 419,28\ 10^{-9}.$

~~$\sqrt{2742^2 + 58800^2}$~~

$$- 419,28 . 1,643 . 10^{-7} \left\{ 30000 - \sqrt{58800^2 + 2742^2} + \sqrt{28800^2 + 2742^2} \right\} \text{ Tganyg.}$$

(66 above; 19439 above)

$$+ 419,28 . 0,041 . 10^{-7} \left\{ \sqrt{58800^2 + 2742^2} - \sqrt{28800^2 + 2742^2} - \sqrt{58800^2 + 116442^2} + \sqrt{28800^2 + 116442^2} \right\}$$

3457440000	829440000	3457440000	829440000
7518564	7518564	13558739264	13558739264
3464,958564	836,958564	17016,179264	14388,179264
9,539698	8,922705	10,230862	10,158006
4,769849	~~4,41~~ 4,461352	5,115431	5,079003
58864	28930	130446	119951
		28920	58864

$$\begin{array}{r} 178815 \\ 159376 \\ \hline 19439 \end{array}$$

$- 45466 . 10^{-7}$ $- 3,247 . 10^{-7}$

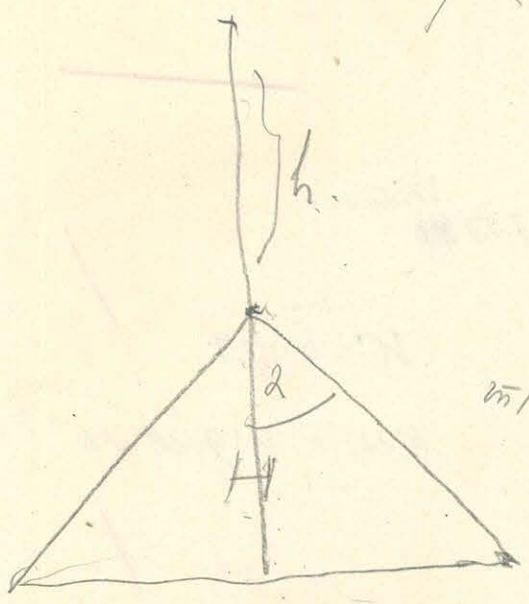
$+ 324176 . 10^{-7}$ $+ 23869 . 10^{-7}$

~~100~~ 58
~~58~~ 100
167

$h^2\cos^2\alpha + 2Hh\cos^2\alpha + H^2$

$h^2\sin^2\alpha - 2hH\sin^2\alpha - 2h^2\sin^2\alpha + H^2 + h^2 + 2Hh$

八



$$2\pi\rho\left\{dz - \frac{z\,dz}{\sqrt{r^2+z^2}}\right\}$$

$$r = (z-h)\operatorname{tg}\alpha$$

$$2\pi\rho\left\{H - \int_h^H \frac{z\,dz\cos\alpha}{\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2}}\right.$$

$$\int \frac{z\,dz}{\sqrt{\quad}} = \sqrt{\quad} - h\sin^2\alpha \log\{z - h\sin^2\alpha + \sqrt{\quad}\}$$

$$2\pi\rho\left\{H - \cos\alpha\left(\sqrt{H^2 + 2Hh\cos^2\alpha + h^2\cos^2\alpha} - h\cos\alpha\right) + \right.$$

$$+ h\sin^2\alpha\cos\alpha \log \frac{H + h\cos^2\alpha + \sqrt{H^2 + 2Hh\cos^2\alpha + h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha}$$

$$2\pi\rho\left\{H + \cos^2\alpha\, h - \cos\alpha\sqrt{H^2 + 2Hh\cos^2\alpha + h^2\cos^2\alpha}\right.$$

$$\left. + h\sin^2\alpha\cos\alpha \log \frac{H + h\cos^2\alpha + \sqrt{H^2 + 2Hh\cos^2\alpha + h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha}\right\}$$

$$2\pi\rho\left\{(h-H) - \cos^2\alpha' h + \cos\alpha'\sqrt{(h-H)^2 + 2Hh\cos^2\alpha' - h^2\cos^2\alpha'}\right.$$

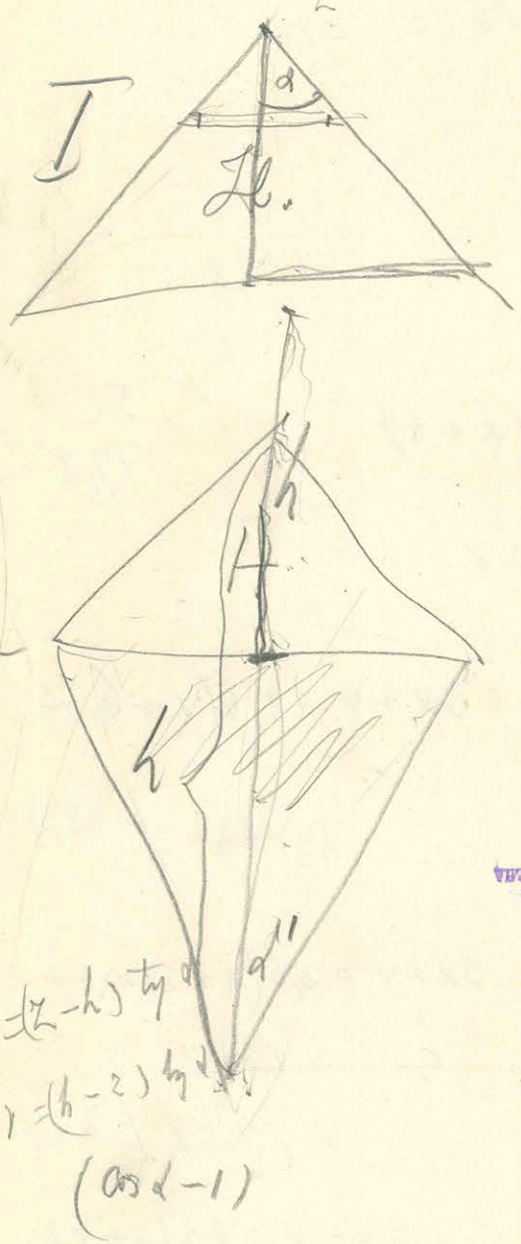
$$- h\sin^2\alpha'\cos\alpha' \log \frac{(H-h) + h\cos^2\alpha' + \sqrt{(h-H)^2 + 2Hh\cos^2\alpha' - h^2\cos^2\alpha'}}{h\cos^2\alpha' + h\cos\alpha'}$$

$$2\pi\rho\left\{(H-h) - \cos\alpha\left(\sqrt{H^2 + h^2\sin^2\alpha - 2hH\sin^2\alpha} - h\cos\alpha\right)\right.$$

$$+ h\sin^2\alpha\cos\alpha \log \frac{H - h + h\cos^2\alpha + \sqrt{H^2 + h^2\sin^2\alpha - 2hH\sin^2\alpha}}{h\cos^2\alpha + h\cos\alpha}.$$

$$2\pi\rho\left\{(H-h) + \cos^2\alpha\, h - \cos\alpha\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}\right.$$

$$+ h\sin^2\alpha\cos\alpha \log \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha}.$$



$$\int_0^{z_1}\int_0^{r} \frac{2\pi r\, dr\, dz\, z}{(r^2+z^2)^{\frac{3}{2}}}$$

$$\left(-\frac{2\pi}{\sqrt{(r^2+z^2)^{\frac{1}{2}}}} z\, dz + \pi\, dz\right)$$

$$\pi\rho\sigma\left\{\frac{2dz}{\sqrt{(r^2+z^2)}} + dz\right\}$$

1) $r = tg\,\alpha\, z$.

2) $r = (h-z)\, tg\,\alpha'$

$$2\pi\rho\sigma\left\{\frac{dz}{\sqrt{(1+tg^2\alpha)}} - dz\right\} \qquad I = 2\pi\rho\sigma h\left(\frac{1-\cos\alpha}{\cos\alpha}\right)$$

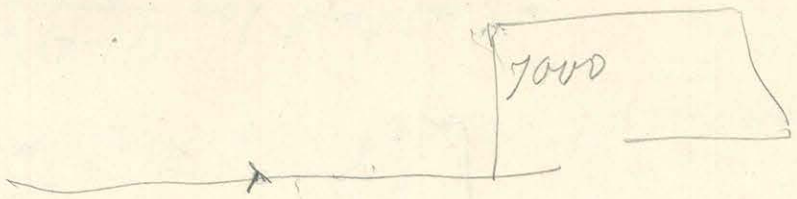
$$\frac{z\,dz}{\sqrt{h^2 tg^2\alpha' - 2hz\, tg^2\alpha' + (1+tg^2\alpha')z^2}} + dz$$

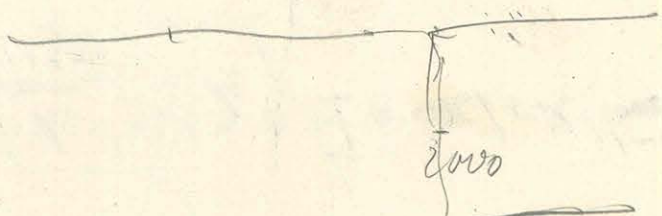
$$-\frac{1}{(1+tg^2\alpha')}\sqrt{\quad} + \frac{h\, tg^2\alpha'}{1+tg^2\alpha'}\cdot\frac{1}{\sqrt{1+tg^2\alpha'}} \log\left(z(1+tg^2\alpha')z - 2h\, tg^2\alpha' + 2\sqrt{1+tg^2\alpha'}\right.$$

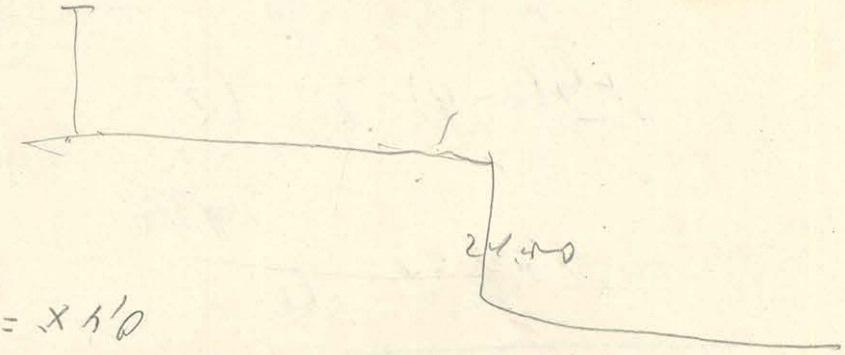
$$\left.\cdot\sqrt{\quad}\right) + z$$

$$II = 2\pi\rho\sigma\left\{(h-dl) - \cos^2\alpha' h + \cos^2\alpha'\sqrt{(h^2-2hH)\sin^2\alpha' + H^2}\right.$$

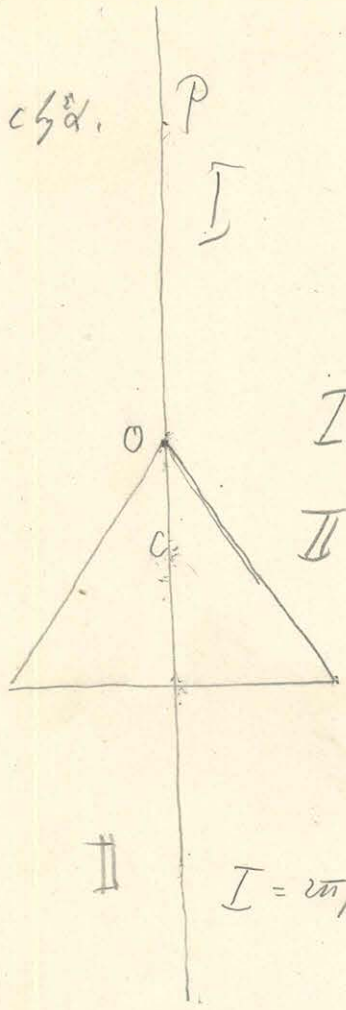
$$+ h\sin^2\alpha'\cos\alpha' \log \frac{2h\left(1+\frac{1}{\cos\alpha'}\right)\cos^2\alpha'}{2H - 2h\sin^2\alpha' + 2\sqrt{(h^2-2hH)\sin^2\alpha' + H^2}}$$







$r = c\,\mathrm{tg}\,\alpha$.



$$\frac{2\pi\int\sigma\, r\, d\alpha\,(c-z)\,dr}{\left((c-z)^2+r^2\right)^{\frac{3}{2}}}$$

$$2\pi\int\sigma(c-z)\,d\alpha\int\frac{r\,dr}{\left((c-z)^2+r^2\right)^{\frac{3}{2}}} = 2\pi\int\sigma(c-z)\,d\alpha\left|-\frac{1}{\sqrt{(c-z)^2+r^2}}\right.$$

I deluje ka $c-z$ pozitivi $= 2\pi\int\sigma\left\{d\alpha - \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right\}$

II deluje ka $(c-z)$ negativi $= 2\pi\int\sigma\left\{-d\alpha - \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right\}$

$$\left. = -2\pi\int\sigma\left\{d\alpha + \frac{(c-z)\,d\alpha}{\sqrt{(c-z)^2+r^2}}\right\}\right.$$

II

$$I = 2\pi\int\sigma\left\{c - \int_0^c \frac{c\,d\alpha}{\sqrt{(c-z)^2+c^2\,\mathrm{tg}^2\alpha}} + z\int_0^c \frac{d\alpha}{r}\right\}$$

$$II = -2\pi\int\sigma\left\{c + \int_0^c \frac{c\,d\alpha}{\sqrt{(c-z)^2+c^2\,\mathrm{tg}^2\alpha}} - z\int_0^c \frac{d\alpha}{r}\right.$$

$$\int_0^c \frac{c\,d\alpha}{\sqrt{(c-z)^2+c^2\,\mathrm{tg}^2\alpha}} = \cos\alpha\int\frac{c\,d\alpha}{\sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2}} = \cos\alpha\left|\left\{\sqrt{\quad}\right.\right. + z\cos^2\alpha\,\ln\left(2c - 2z\cos^2\alpha + 2\sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2}\right)$$

$$\left. = \cos\alpha\left\{\sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2} + z\cos\alpha + z\cos^2\alpha\,\ln\frac{c - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2}}{-z\cos^2\alpha - z\cos\alpha.}\right\}\right.$$

$$z\int_0^c \frac{d\alpha}{r} = z^{\cos^2\alpha}(\ln$$

$$I = 2\pi\int\sigma\left\{c - z\cos^2\alpha - \cos\alpha\sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2} + z\cos\alpha\sin^2\alpha\,\ln\frac{c - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2cz\cos^2\alpha + c^2}}{\quad}\right.$$

$$2\pi f\sigma \sin^2\alpha\cos\alpha \left\{ \frac{h^3(\sin^2\alpha\cos^2\alpha) + 2h^2\sin^2\alpha\cos^2\alpha\, z}{h^2\sin^2\alpha\cos^2\alpha} \frac{1}{\sqrt{\quad}} \right.$$

$$\left. 2\pi f\sigma \sin^2\alpha\cos\alpha \left\{ (h-2z)\frac{1}{\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2}} + \log\!\left(z - h\sin^2\alpha + \sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2}\right) \right\} \right.$$

$$+ 2\pi f\sigma \sin^2\alpha\cos\alpha \left\{ \frac{h-2H}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} + \frac{1}{\cos\alpha} + \log \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h(\cos^2\alpha + \cos\alpha)} \right.$$

$$+ 2\pi f\sigma \left\{ \underbrace{(-1+\sin^2\alpha)}_{-\cos^2\alpha} + \frac{1}{\sqrt{\quad}} \left(h\sin^2\alpha\cos\alpha - 2H\sin^2\alpha\cos\alpha + H\cos\alpha \right) \right.$$

$$- \frac{\cos\alpha}{\sqrt{\quad}} \left(-h + h\cos^2\alpha + H - 2H\cos^2\alpha \right)$$

$$2\pi f\sigma \left\{ -\cos^2\alpha - \cos\alpha \frac{(H-h) + h\cos^2\alpha}{\sqrt{\quad}} + \frac{2H\cos^3\alpha}{\sqrt{\quad}} + \sin^2\alpha\cos\alpha \log\cdots \right\}$$

$$-\cos\alpha \left(-\cos\alpha \frac{(H-h) + (2H-h)\cos^2\alpha}{\sqrt{\quad}} \right.$$

$$-(H+h)$$

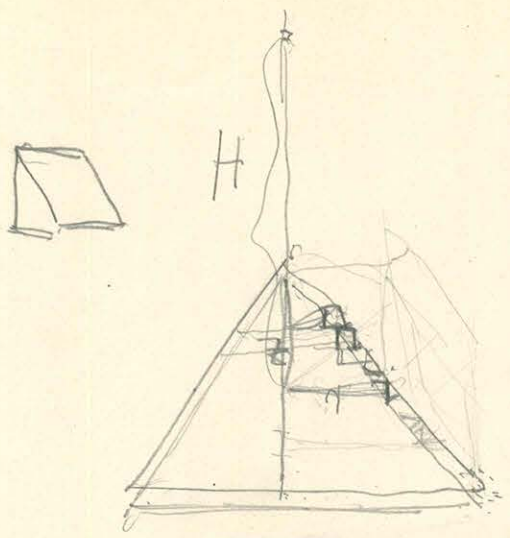
$$2(H-z)(h-z)\cos^2\alpha - (h-z)^2\cos^2\alpha$$

$$-2(H+h)\cos^2\alpha + 2h\cos^2\alpha$$

$$-2H\cos^2\alpha$$

$$-Hh\sin^2\alpha\cos^2\alpha + h^2$$

$$+(h-H)\cos^2\alpha\cos\alpha$$



$$\frac{1}{\sqrt{(H-h)^2 \operatorname{tg}^2\alpha + H^2}}$$

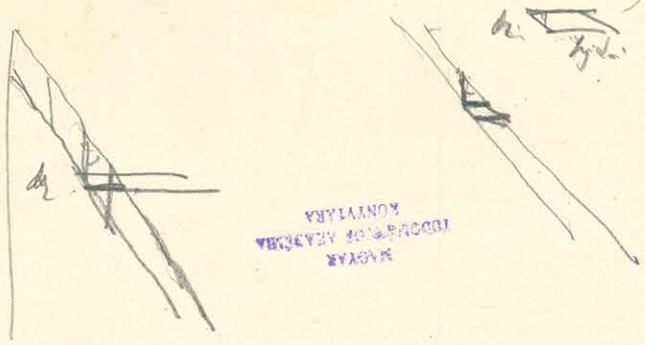
$$H^2 - 2Hh\sin^2\alpha + h^2\sin^2\alpha.$$

$$(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha$$

$$-2\pi\rho\sigma\left(1 - \frac{H\cos\alpha}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}\right)$$

$$\frac{r\,dr}{r+z}$$

$$(1-H)\,H\,\alpha$$



$$\frac{2\pi\rho\sigma \int dr\, r \operatorname{tg}\alpha \cdot z}{(z^2+r^2)^{\frac{3}{2}}}$$

$$r = (z-h)\operatorname{tg}\alpha.$$

$$2\pi\rho\sigma \frac{(z^2 - zh)\sin^2\alpha\cos\alpha\, dz}{\left\{(z-h)^2 + 2hz\cos^2\alpha - h^2\cos^2\alpha\right\}^{\frac{3}{2}}}$$

$$\frac{z^2(1+\operatorname{tg}^2\alpha) - 2hz\operatorname{tg}^2\alpha + h^2\operatorname{tg}^2\alpha.}{\frac{(z-h)^2 + 2hz\cos^2\alpha - h^2\cos^2\alpha}{\cos^2\alpha}}$$

$$2\pi\rho\sigma \int \sin^2\alpha\cos\alpha \left\{ \frac{z^2\,dz}{(h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2)^{\frac{3}{2}}} - h\frac{z\,dz}{(\quad)^{\frac{3}{2}}} \right\}$$

$$K = 4h^2\sin^2\alpha - 4h^2\sin^2\gamma$$
$$= 4h^2\sin^2\alpha\cos^2\alpha$$

$$2\pi\rho\sigma\sin^2\alpha\cos\alpha \left\{ -\frac{(4h^2\sin^2\alpha - 8h^2\sin^4\alpha)z + 4h^2\sin^4\alpha}{4h^2\sin^2\alpha\cos^2\alpha}\frac{1}{\sqrt{\quad}} + \log\left(2z - 2h\sin^2\alpha + 2\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2}\right) \right.$$

$$\left. + h\frac{2(2h^2\sin^2\alpha - 2h\sin^2\alpha\, z)}{4h^2\sin^2\alpha\cos^2\alpha}\frac{1}{\sqrt{\quad}} \right\}$$

$$-8h^2\sin^2\alpha\, z$$
$$+8h^2\sin^4 z$$

$$\int \frac{2\pi r z\, dr\, dz}{(r^2+z^2)^{\frac{3}{2}}} \qquad -2\pi z \sigma dz \left| \frac{1}{\sqrt{r^2+z^2}} \right.$$

$$\left\{ \frac{1}{\sqrt{r^2+z^2}} - \frac{1}{z} \right\}$$

$$2\pi\sigma \left(dz - \frac{z\, dz}{\sqrt{r^2+z^2}} \right) \qquad r^2 = (z-h)^2 \operatorname{tg}^2 \alpha .$$

$$z^2 \operatorname{tg}^2\alpha + h^2 \operatorname{tg}^2\alpha - 2hz \operatorname{tg}^2\alpha + z^2$$

$$\frac{1}{\cos^2\alpha} \left(z^2 + h^2 \sin^2\alpha - 2hz \sin^2\alpha \right.$$

$$2\pi\sigma \left(dz - \frac{\cos\alpha\, z\, dz}{\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2}} \right)$$

$$2\pi\sigma \left\{ (H-h) - \cos\alpha \left(\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2} + h\sin^2\alpha \log \left(z - h\sin^2\alpha \right. \right. \right.$$

$$\left. \left. \left. + 2\sqrt{h^2\sin^2\alpha - 2hz\sin^2\alpha + z^2} \right) \right) \right\}$$

$$2\pi\sigma \left\{ (H-h) - \cos\alpha \left[\sqrt{H^2 - 2hH\sin^2\alpha + h^2\sin^2\alpha} - h\cos\alpha \right] \right.$$

$$\left. - h\sin^2\alpha \cos\alpha \log \frac{(H-h) + h\cos^2\alpha + \sqrt{H^2 - 2hH\sin^2\alpha + h^2\sin^2\alpha}}{h\cos^2\alpha + h\cos\alpha} \right\}.$$

5,02495

$1 - 5,5 + 0,707107 . \sqrt{50,5} - 3,88909 \log \frac{-4,5 + \sqrt{50,5}}{2,27818}$

~~-4,5 + 0,707107~~

0,849485 − 1
0,851646
0,701131

log 50,5 = 1,703291

$\sqrt{50,5}$ = 7,10633
45

502495
45

$0,52495 - 3,88909 \log \frac{2,60633}{2,27818}$
52335

0,00160

0,00320

0,416029
0,357587
0,058442

0,766725 −2
0,589848
0,362216
0,718789 −1

523346

$\frac{1}{3 . 10,3}$

106,09

$\frac{1}{318,27}$

0,003142

2,502796
0,497204 −3

$$2\pi f\sigma \frac{(hz - z^2)\sin^2\alpha \cos\alpha \, dz}{\{(z-h)^2 + 2hz\cos^2\alpha - h^2\cos^2\alpha\}^{3/2}}$$

$$2\pi f\sigma \sin^2\alpha\cos\alpha \int_h \frac{z\,dz}{(\quad)^{3/2}} - \frac{z^2 dz}{(\quad)^{3/2}}$$

$$2\pi f\sigma \sin^2\alpha\cos\alpha \Big| -h \quad \cdots$$

$$2\pi f\sigma \sin^2\alpha\cos\alpha \Big| \frac{zz - h}{\sqrt{h^2\sin^2\alpha - 2hz\cos\alpha + z^2}}$$

$$+ 4h^2z\sin^2\alpha - 8h^2z\sin^4\alpha + 4h^3\sin^4\alpha - 4h^3\sin^2\alpha + 4h^2z\sin^2\alpha$$

$$+ 8h^2z\sin^2\alpha \qquad + 8h^2z\sin^2\alpha\cos^2\alpha$$
$$- 8h^2z\sin^4\alpha \qquad - 4h^3\sin^2\alpha\cos^2\alpha$$
$$\cancel{- 8h^2z\sin^4\alpha}$$

$$\Big| \left(2z - h\right)\frac{1}{\sqrt{\quad}} - \log$$

$$\sin^2\alpha$$
$$- (2H-h)\sin^2\alpha\cos\alpha - (h-H)\sin^2\alpha\cos\alpha$$
$$- (2H-h)\cos\alpha + (2H-h)\cos^2\alpha\cos\alpha$$
$$- H\cos\alpha$$
$$(2H-h)\cos\alpha - H\cos\alpha$$
$$- (2H-h)\cos^2\alpha\cos\alpha$$
$$- \cos\alpha \quad (h-H) - h(-2H)$$

$$H \Big| \frac{2H-h}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} - \frac{1}{\cos\alpha}$$

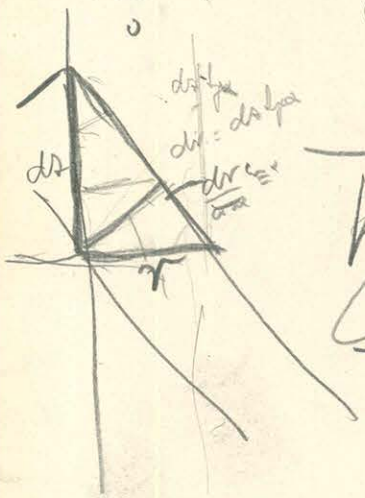
$$\hookrightarrow \frac{1}{\cos\alpha} + \frac{(2H-h)}{\sqrt{(H-h)^2 \cdots}} - \log \frac{2h - 2h\sin^2\alpha + 2h\cos\alpha}{+ (\cancel{2H-h)\sin^2\alpha\cos\alpha - H\cos\alpha}}$$

$$\{\sin^2\alpha \qquad - H\cos\alpha - h(\cos\alpha + h\cos^2\alpha$$
$$+ 2H\sin^2\alpha\cos\alpha + h\sin^2\alpha\cos\alpha - H\cos\alpha$$
$$2H \quad - H\cos\alpha\cos\alpha \qquad - \cos\alpha ($$

$$\frac{\partial P}{\partial z} = 2\pi f\sigma \left\{ +\cos^2\alpha - \cos\alpha \frac{(h-H) - (h-2H)\cos^2\alpha}{\sqrt{\quad}} \right.$$

$$\left. + \sin^2\alpha \cos\alpha \ln g \right\}$$

$$\int_0^{(h-H)\operatorname{tg}\alpha} \frac{2\pi r\, dr}{(r^2 + (h-H)^2)^{3/2}} =$$



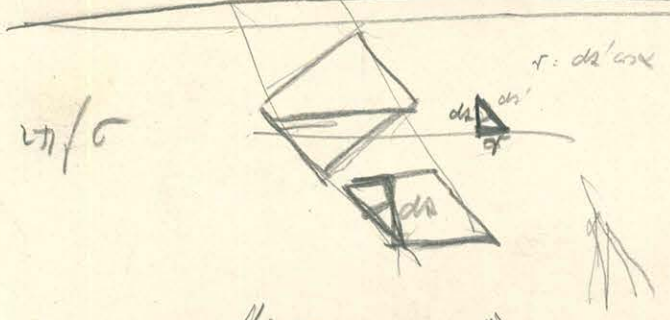
$$\frac{\frac{1}{2} r}{\sqrt{r^2 + (h-H)^2}}$$

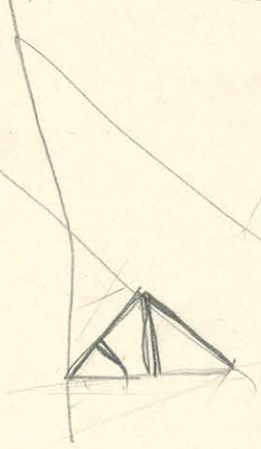
$$- 2\pi f\sigma \left\{ \frac{H\cos\alpha}{\sqrt{(H-h)^2 + \dots}} - 1 \right\}$$

$$\frac{1}{\sqrt{r^2 + (h-H)^2}} \Bigg|_0^{(h-H)\operatorname{tg}\alpha}$$

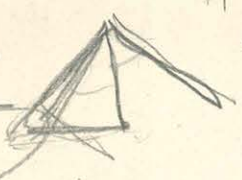
$$\frac{r\,dr}{(r^2 + H^2)^{\frac{3}{2}}} = -2\pi f\sigma \left(\frac{1}{\sqrt{r^2 + H^2}} \right)_0^{\infty}$$

$\frac{ds}{\cos\alpha}$





$$\frac{2\pi f\sigma \frac{dz\, r}{\cos\alpha}\, z}{(r^2 + z^2)^{3/2}}$$

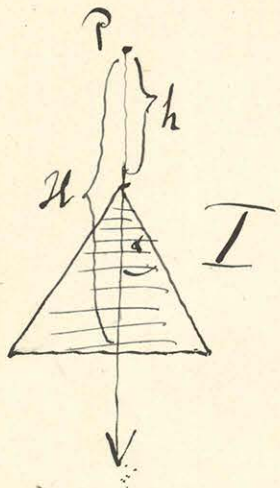


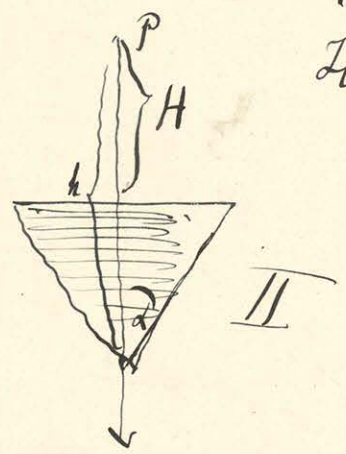
$r = (h-z)\operatorname{tg}\alpha$

$$2\pi f\sigma \left(\frac{(h^2 - z^2)\sin\alpha\cos\alpha}{\{(h-z)^2 + 2hz\cos^2\alpha - h^2\cos^2\alpha\}^{3/2}} \right.$$

Kör-Kúp vonóra tengelyében.

h a kúp csúcsának távolsága
H a kúp alapjának távolsága





$$P = \pm 2\pi f\sigma \left\{ (H-h) + h\cos^2\alpha - \cos\alpha \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha} + \right.$$
$$\left. - h\sin^2\alpha\cos\alpha \log \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha} \right\} = \pm 2\pi f\sigma E$$

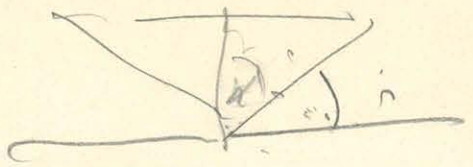
\+ jel I esetben

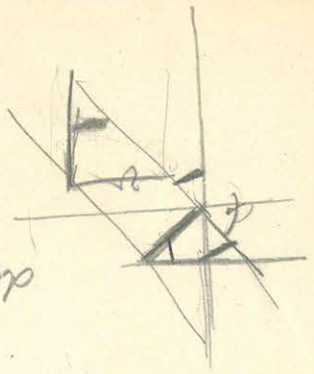
\- jel II esetben

Kipróbálva $\frac{\partial P}{\partial z}$ kiszámítása által

$$\frac{\partial P}{\partial z} = \pm 2\pi f\sigma \left\{ -\cos^2\alpha - \cos\alpha \frac{(H-h) - (2H-h)\cos^2\alpha}{\sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}} + \right.$$
$$\left. + \sin^2\alpha\cos\alpha \log \frac{(H-h) + h\cos^2\alpha + \sqrt{(H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha}}{h\cos^2\alpha + h\cos\alpha} \right\}$$

Сим.





$2\pi f\sigma \left\{ H - H\cos\alpha \right.$

$2\pi f\sigma H(1-\cos\alpha)$

$\alpha + \beta = 2\rho$

Было ~~$2\pi f\sigma \left\{ h - h\sin^2\alpha' + \cos\alpha' \ln \frac{-h\sin^2\alpha'}{\quad} \right.$~~

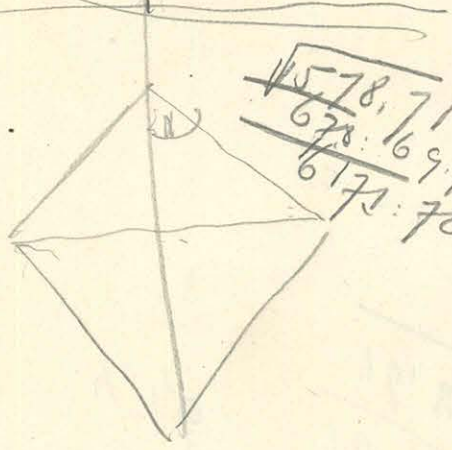
$2\pi f\sigma \left\{ h\sin^2\alpha' + h\cos\alpha' \sqrt{h(1+\cos^2\alpha')} - h\sin^2\alpha' \cos\alpha' \ln \frac{-h\sin^2\alpha' + h\sqrt{1+\cos^2\alpha'}}{h\cos^2\alpha' + h\cos\alpha'} \right.$

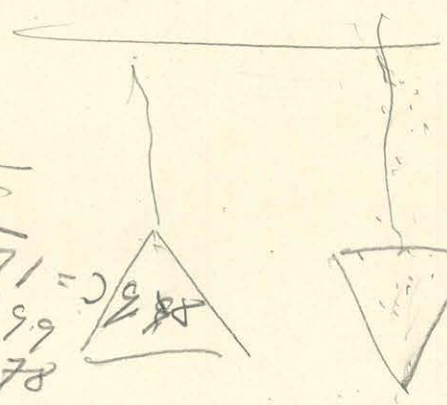
$2\pi f\sigma \left\{ h + h(\cos\alpha' \sqrt{1+\cos^2\alpha'} - \cos^2\alpha' - \sin^2\alpha' \cos\alpha' \ln \frac{\sqrt{1+\cos^2\alpha'} - \sin^2\alpha'}{\cos^2\alpha' + \cos\alpha'} \right) \right\}$

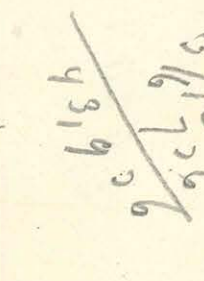
Было $2\pi f\sigma \left\{ h\sin^2\alpha' + h\sin\alpha'\cos\alpha' - h\sin^2\alpha'\cos\alpha' \ln \frac{-h\sin^2\alpha' + \sin\alpha'}{\cos^2\alpha' + \cos^2\alpha'} \right\}$

$13\,87,0 = 37,2$
$484 : 67,7$
$1550 : 742$

$578,71 = 23,88$
$670 : 699$
$671 : 78$





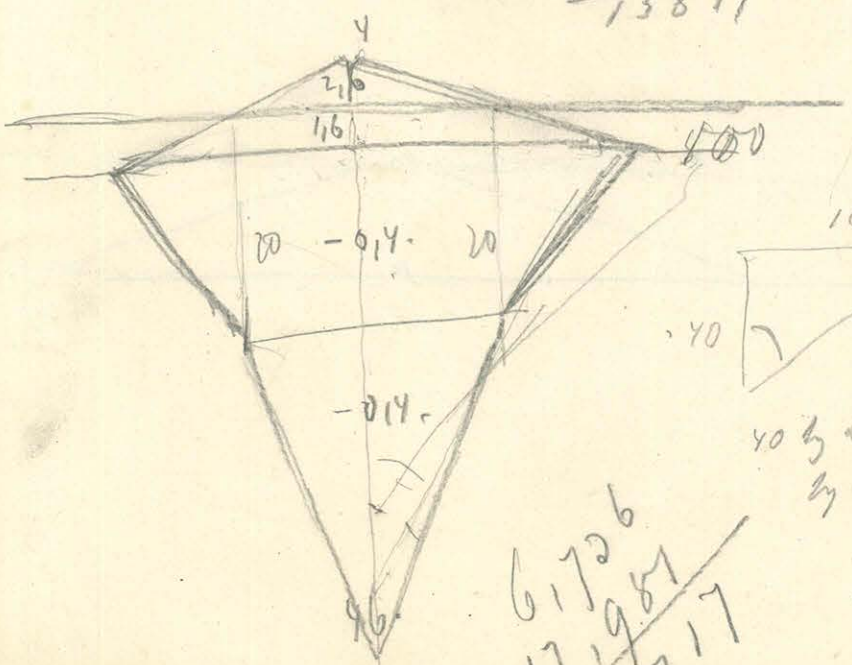


$2\pi f\sigma H(1-\cos\alpha)$

$1707,770$
$2221,209$
$1384,461$

$400 \cdot 1,6$
$360 \cdot 1,6 \cdot 800000$
$360 \cdot 1400000$
$1280000 \cdot 360$
4
1680000
$604,800000$

96
768

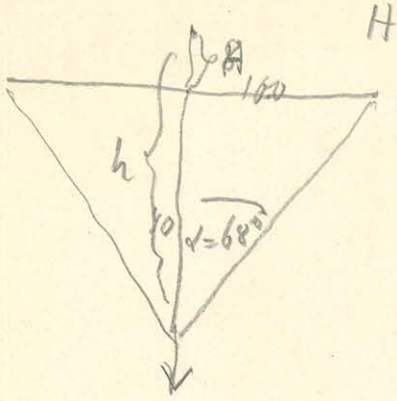


$40 \operatorname{tg}\alpha = 100$
$\operatorname{tg}\alpha = 2,5$
$\alpha = 68°$

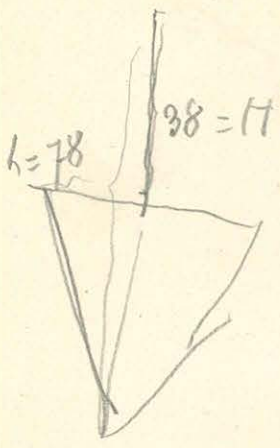
$0,605$

$\cos^2\alpha = 0,140325$
$\cos\alpha = 0,3746$
$\sin\alpha = 0,9272$
$h = 4800000$
$H = 8000000$

$6,736$
$17,981$
$24,717$



$T_1 = 2\pi\sqrt{6\,10^{-4}} \cdot 18,831$



33,294
13,925
47219
28706
18,853
1

40 − 6,726 +

33,294 +
072
7015

$\log \frac{70,5}{11,25}$

1,848789
1,051153
9797036

0,2043

1,8353 .

28,366

$$P = \{ 40 - 10{,}95 + 0{,}3746 \sqrt{1600 + 831{,}85 - 853{,}74} \quad (1578{,}71)$$
$$+ (0{,}3746 \cdot 39{,}8)$$
$$- 78 \cdot 0{,}3220 \log \frac{40{,}17}{14{,}14}$$

$\delta = 2\pi f \delta \cdot 17{,}74$

29,05
39,8

$\log = \frac{68{,}85}{18{,}28}$

29,05
14,91
43,96
33,28
10,68

$(h-H)^2$

1,837620
1,261976
0,575644

$h^2 + H^2 - 2hH$

1,325

$h^2 \cos^2\alpha - 2h^2\cos^2\alpha + 2Hh\cos^2\alpha$

$H^2\cos^2\alpha + 2HC\cos^2\alpha -$

$C^2 + 2H^2\cos^2\alpha + 2HC\cos^2\alpha - H^2\cos^2\alpha - C^2\cos^2\alpha + 2HC\cos^2\alpha$

$\sqrt{\quad} = H\cos\alpha$

$C - C\cos^2\alpha.$

$2/3 \frac{\pi C^3}{3} \frac{tg^2\alpha}{H^2}.$

$\sqrt{H^2\cos^2\alpha + C^2\sin^2\alpha}.$

$H\cos\alpha\left(1 + \frac{1}{2}\frac{C^2}{H^2}tg^2\alpha\right) + C\sin^2\alpha + H\cos^2\alpha$

$1 + 50 - 0{,}707107\sqrt{5101} \quad - 35{,}3554 \log \frac{51 + \sqrt{5101}}{120{,}7107}$

$\log 5101 = 3{,}707655$

~~$\log \sqrt{5101}$~~ $\sqrt{5101}$

$\log \sqrt{5101} = 1{,}853828$

$0{,}849486 - 1$

$1{,}703314$

$\sqrt{5101} = 71{,}4213$

$0{,}707107\sqrt{5101} = 50{,}5026$

71
$49\;7$
$50\;41$

$0{,}4974$
4974

$\log \frac{122{,}4213}{120{,}7107}$

$2{,}087856$
$2{,}081746$
$0{,}006110$

$0{,}786041 - 3$

$\log 2{,}5026 \quad 0{,}362216$

$\log 35{,}3554 \quad 1{,}548456$

$0{,}696713 - 1$

$c^2\cos^2\alpha + 2(h-H)h\cos^2\alpha + C^2$

$(h-H)^2 + (H^2 + h^2 + 2Hh + 2h^2 - 2Hh)\cos^2\alpha$

$(H-h)^2 + (H^2 + 3h^2)\cos^2\alpha$

~~$h^2\cos^2\alpha$~~

$(h^2 - 2(h-H)h)\cos^2\alpha + (h-H)^2$

$+2Hh - h^2$

353554
2535
1085

707107

3535

57,5 − 50,0024 − 35,7089 lg $\frac{57,5 + 70,714}{121,918}$

1,4976 −

122,214
121,918

0,087121
0,086067
0,001054

0,001054
2,0026
35,7089

10001
1001
5401

0,022841 − 3
0,362219
1,552777
0,937837 − 2

57 −

$$-2\pi\{\sigma\cdot 10^{-4}\{-40+6{,}736-0{,}3746\sqrt{1600+107{,}770-323{,}309}$$

$$+8{,}0{,}3220\ \log\frac{-40+6{,}736+\sqrt{1384{,}1}}{24{,}717}.$$

$$-48\ 0{,}322$$

$$2\pi\{\sigma\cdot 10^{-4}\{33{,}294+0{,}3746\cdot 37{,}2-2{,}576\log\frac{3{,}936}{24{,}717}.\}\}$$

$$13{,}925 \qquad +4{,}733.$$

$$13{,}925$$

$$33{,}294$$

$$51.962$$

$$54{,}91$$

$$27{,}17$$

$$17{,}74$$

$$-4\omega^2\alpha$$

$$-(H+h)\omega^2\alpha+h\omega^2\alpha$$

$$47{,}229$$

$$2839$$

$$18{,}831$$

$$2964$$

$$60\,29\,02$$

$$15\,04\,49$$

$$45\,34\,53$$

$$1{,}0441.$$

$$\frac{40\cdot 25\cdot 2\alpha}{17{,}74}$$

$$10{,}95$$

$$29{,}22$$

$$41\,17$$

$$29{,}05$$

$$14{,}91$$

$$26{,}22$$

$$10{,}95$$

$$-27{,}17$$

$$-40+10{,}95+14{,}91$$

$$40{,}17$$

$$-40{,}17$$

$$-\sin^2\alpha\cos\alpha(H-h)\sqrt{\quad} - h\sin^2\alpha\cos^2\alpha\sqrt{\quad} - \sin^2\alpha\cos\alpha(\sqrt{\quad})^2$$

$$+Hh\sin^2\alpha\cos^2\alpha + H\cos^2\alpha(\quad)$$

$$h(H-h)\cos^2\alpha$$

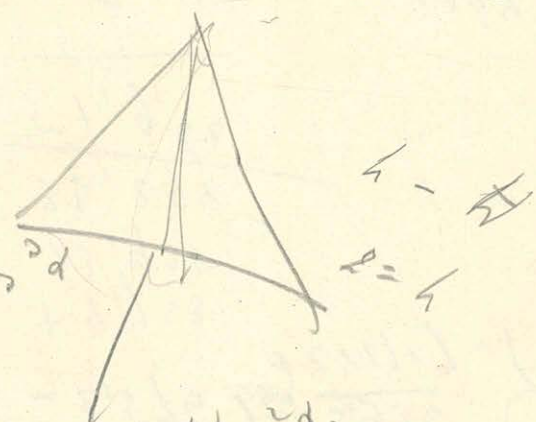
Sum

$$-\sin^2\alpha\cos\alpha\left\{(H-h)\sqrt{\quad} + (H-h)^2 + 2Hh\cos^2\alpha - h^2\cos^2\alpha - Hh\cos^2\alpha\right\}$$

$$+H\cos^2\alpha(\quad)$$

$$-\sin^2\alpha\cos\alpha(H-h)\left\{(H-h) + h\cos^2\alpha + \sqrt{\quad}\right\}$$

$$+H\cos^2\alpha(\quad)$$



$$-\frac{\sin^2\alpha\cos\alpha(H-h) + Hl\cos^2\alpha}{\sqrt{\quad}}$$

$$h\cos^2\alpha - 2(h+H)\cos^2\alpha(H-h) + (H-h)\cos^2\alpha + H\cos^2\alpha$$

$$-\cos\alpha\frac{\sqrt{\quad}}{\quad}$$

$$-\cos\alpha\frac{(H-h) + h\cos^2\alpha - 2H\cos^2\alpha}{\sqrt{\quad}}$$

$\cos^2\alpha = \frac{1}{2}$ $\cos\alpha = 0{,}707107$ 7071 $H = 100$ $h = 101$.

10201
5100,5
10101
49000,5

$1 - 50{,}5 + 0{,}707107\sqrt{5000{,}5}$

$-35{,}3554 \log \frac{1-50{,}5+\sqrt{5000{,}5}}{71{,}4178 - 50{,}5}$

$-49{,}5 + \underbrace{0{,}707107\sqrt{5000{,}5}}_{50{,}0024} + 35{,}3554 \log \frac{20{,}9178}{-49{,}5+\sqrt{5000{,}5}}$

10101
5000

49,5

70,714
49,5

4949
49490
50949

0,849485 −1
1,849507
1,698992

707142

3 699013

−49,5

$+0{,}5024 - 35{,}3554 \log \frac{21{,}214}{20{,}918}$

0,4968
0,0056

5018 5018 0,0112

3535
7089
4968

4,2143
20,9178

1,326629
1,32052015
0,006103
~~0,006114~~

0, 707107

0,014
35
70
4,2
4900

207107
2091
20

0,5024
5018

0,0012

$\frac{c^3}{3H^2 \log}$

3

c^3 $\frac{1}{60000}$ $\frac{1}{20000}$

12

2/6(...

51,05

+0,5024

101
101
10201
51005

1 10101
51005
5000,5

1,207107
12071
1219178

0,006103
2,3026
35,355

0,4976

0,785540 −3
0,362212
1,548451
0,700604 −1
1696213
50188

+0,5024
501884
0,0005

351
3,53554
3,53535
5889009

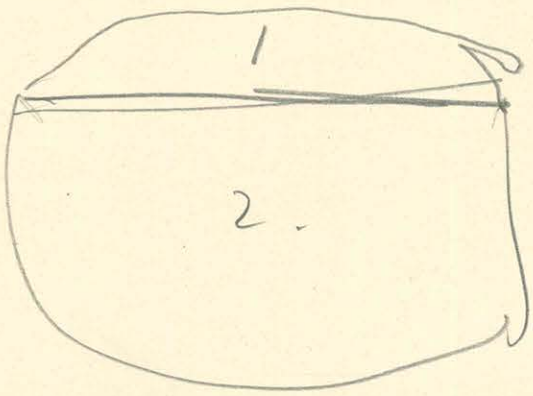
121

49672
497
50,169

$-49{,}5 + 1{,}4976 - 35{,}3554 \log$

1 + 110
111
+60,5
50,5

207107
20710
2,27818



$\Delta g = \sigma_1 V_1 + \sigma_2 V_2$

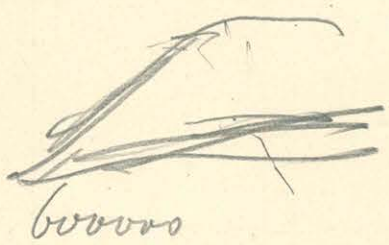
$\Delta h = K V_1 + K V_2$

$\Delta g' = \sigma_2 V_1$

$\Delta h' = K V_1$

50.120

500000.120



60 m.
100000

600

24.

3,50,000

70.500

350

350.

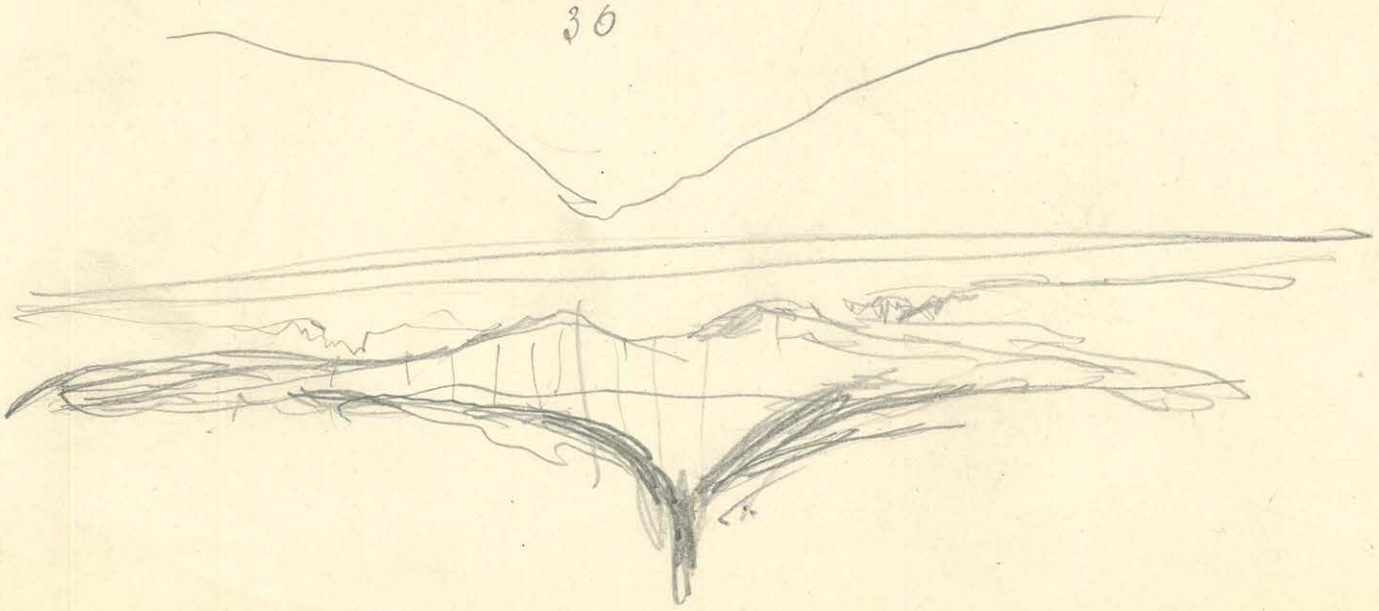
30

4800

180

111 dm.

53.



5,1,5	7,5
10,5,0	50
10 6,0	60
10, 5,0	50
10, 4,5	45
10, 2,0	20
	238,5

V - V = 233

f - f' 0,0049

10, 2,0	20
10, 4,0	40
10, 5,0	50
10, 5 0	50
10, 7,5	35
2, 1,5	3
	198.

V - V' = 198

f - f' = 35

560 m.m

3163
233

540 m.m.

3163 | 13,5
233
833
699
1340

198 | 3163 | 16,0
198 | 35
1183
1188
5

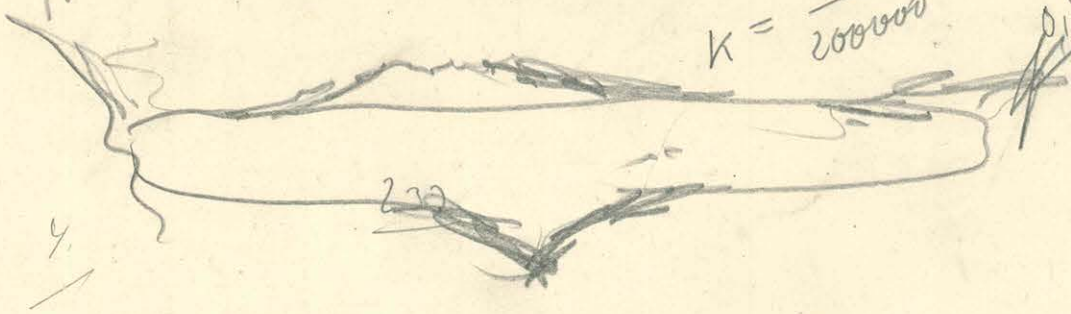
V' - V = K F.

g - g' = 20.10⁻⁹ F. = 0,004 ϕ

F = 200000

K = 233 / 200000 = 0,0011 F.

0,0029



400. 4,0 = 6

0,160 6 0,0016

38° −150

Tabela 58° −55 0,9703

7° +60 0,94
658

Colombo és Tschesztanbi

$g = 978{,}099(1 - 0{,}00469\sin^2\varphi)$

978,000 (

0,085894 − 1
0,171788 − 2
0,724440 − 3
0,896228 − 5

0,000078 75
0000 0658
0,000072 17
27

978,00 (1,00007848)
+67 107

7° --- 978,167
979,989 979,839
38°

0,783242 − 1
0,578684 − 1
0,724440 − 8
0,303124 − 3

0,00200966
00000027
0,00200939

0,00200308

$\sin^2 7 = 0{,}0148521$
$\sin^2 38 = 0{,}3790390$

$978{,}167 = g_0 - g_0\alpha\sin^2 7$ | 25,520903
$979{,}839 = g_0 - g_0\alpha\sin^2 38$

978,0988
− 0,0847794
307
978,167

$979{,}839 = g_0 - g_0\alpha\, 0{,}3790390$
$24963{,}7051 = 25{,}520903\, g_0 - g_0\alpha\, 0{,}3790390$
979,839

$g_0 = 978{,}0988$

$23983{,}866 = 24{,}520903\, g_0$

$g_0\alpha = -4{,}590556$

979,839
371,081
608,758

1,740

$\operatorname{tg}\alpha = +0{,}9993$

$\sin\alpha = -0{,}03490$

$\cos\alpha = +0{,}9993$

$\alpha = 92°$

VI

$0{,}87655$
$0{,}87870$

$\alpha = 49° 3'$ $\quad 49° 57'$

$\operatorname{tg}\alpha = +0{,}17552$

$\sin\alpha = +0{,}17552$

$\cos\alpha = +0{,}98457$

$1{,}99287$
$2{,}17609$
$0{,}81719$

$49° 12''$
$49° 41' 10''$

$2{,}99491$
$2{,}62512$
$0{,}81719$

$\frac{98{,}6}{150{,}0}$

$\frac{275{,}1}{422{,}0}$

IV $98{,}6$

$0{,}97799$
$0{,}97730$

$\alpha = 72° 32'$

$\operatorname{tg}\alpha = +0{,}95329$

$\sin\alpha = +0{,}30075$

$\cos\alpha = +0{,}30075$

$1{,}87390$
$2{,}39261$
$0{,}98120$

$72° 22' 20''$
$72° 41' 40''$

$2{,}01117$
$2{,}53769$
$0{,}97345$

$\frac{79{,}8}{270{,}0}$

$\frac{102{,}6}{394{,}9}$

$\frac{207{,}2}{98{,}6}$
$108{,}6$

$\frac{27{,}8}{79{,}8}$

$0{,}95979$
$0{,}95737$
$0{,}99979$

$\frac{91{,}5}{75{,}8}$

$\frac{91{,}5}{75{,}8}$

$\frac{8{,}20}{6{,}60}$

$\frac{8{,}20}{6{,}60}$

$\frac{10}{5}$

$\frac{6{,}0}{8{,}0}$

$\frac{10}{5}$

$\frac{4{,}80}{4{,}80}$

$\frac{92{,}5}{91{,}6}$

$\frac{19{,}19}{4{,}79}$

$\zeta = 5000000 \quad \zeta' = 5000000 \quad z = 0$

$$\frac{1}{f_0} z_k = 10^6 \left(+4{,}5 - \sqrt{\zeta^2 + 25} + \sqrt{\zeta^2 + 0{,}25} \right)$$

ϱ						
0	0					
1	+4,5	− 5,0990	+ 1,1180	+4,5	− 3,8810	+0,6190 . 3,0415
2	+4,5	− 5,3852	+ 2,0616		− 3,3236	+0,5574 . 2,8401
3	+4,5	− 5,8310	+ 3,0414		− 2,7896	+0,5340 . 2,6256
4	+4,5	− 6,4031	+ 4,0311		− 2,3720	+0,4176 . 2,4254
5	+4,5	− 7,0711	+ 5,0250		− 2,0461	+0,3259 . 2,2065
6	+4,5	− 7,8102	+ 6,0208		− 1,7894	+0,2567 . 1,9745
7	+4,5	− 8,6023	+ 7,0178		− 1,5845	+0,2049 . 1,7727
8	+4,5	− 9,4346	+ 8,0156		− 1,4190	+0,1655 . 1,4389
9	+4,5	− 10,2956	+ 9,0139		− 1,2817	+0,1373 . 1,0945
10	+4,5	− 11,1803	+ 10,0124		− 1,1679	+0,1138 . 0,4516
15	+4,5 −					

	$\sqrt{250} - \sqrt{225{,}25}$
1	1,8827
2	1,5831
3	1,4074
4	1,0128
5	0,7193
6	0,5069
7	0,3502
8	0,2387
9	0,1503
10	0,0573
	7,1907

15,8

1581,02

$\frac{1}{f_0} = 7{,}9051 \; 10^6$.

$z_k = 5 . 0{,}527$

$z_k = 0{,}0143$

$0{,}5 . 2{,}7 = 50 . 5$

$0{,}027$.

Éves hyzuj 500 méter.

a Közepes $\Delta g = + 0{,}0278$ 0,431

a tábla + 0,0143

1,210853 1,402261 1,559308 1,692406 1,807873 1,909823 2,001080

0,605427 0,701132 0,779654 0,846203 0,903937 0,954912 1,000540

27

29413
21416
608

11

125 10025

10012

$2\pi \int$

$2\pi\, 10^6 / 4{,}5 - \sqrt{50} + \sqrt{25{,}25}$

$+2{,}4539$

31416

3,5

0,0278

7,7092
15,41184
20,83168
10,27859
1,02785

III $\operatorname{tg}\alpha = \frac{50}{22,6667}$

1,6989770
1135520 88
0,343582

$\log \operatorname{tg}\alpha = 0,343582$ $\alpha = 65^\circ 26' 49''$

$\log \sin\alpha = 0,959414 - 1$

$\log \cos\alpha = 0,615833 - 1$ $\cos\alpha = 0,412889$

$\log \sin^2\alpha = 0,818828 - 1$ $\cos^2\alpha = 0,170477$

$\log \cos^2\alpha = 0,231666 - 1$

4,533333
58
$Z = -103,3333$

$C - C' = 22,6667$

$C = 45,3333$ $C' = 22,6667$

$C + Z = -58$ $C' + Z = 80,6667$.

$(C+Z)^2 = 3364$ $\sqrt{58^2} = \sqrt{13364} = 115,603$

$\sqrt{80,6667^2} = \sqrt{9007,12} = 94,906$

20,697

6507,12
4,125936 3,954586
2,062968 1,977293

$P = -418.0,3.10^{-4}\left(22,6667 + 3,5284 - 103,333 \sin^2\alpha \cos^2\alpha \log \frac{75,4486}{44,2364}\right.$

47,7312
45,3333
93,0645
17,6159
75486

39,1856
22,6667
61,8523
17,6159
44264

1254
14027

26,1951
15,0094
11,1857

~~0,362216~~

1,877651
1,645786
0,231871

0,362216
0,365247 − 1
0,818828 − 1
0,615833 − 1
2,014239
1,176363

$\operatorname{tg}\alpha = \frac{50}{44}$

1,6989770
1,6424553
0,0555517

$\log \operatorname{tg}\alpha = 0,055517$ $\alpha = 48^\circ 39' 8''$

$\log \sin\alpha = 0,875474 - 1$

$\log \cos\alpha = 0,819957 - 1$ $\cos\alpha = 0,660629$

$\log \sin^2\alpha = 0,750948 - 1$ $\cos^2\alpha = 0,436429$

$\log \cos^2\alpha = 0,639914 - 1$ 0,224200

$Z = -124,6667$ $C = 44$

$-(C+Z) = 80,6667$

$\sqrt{9007,12} = 94,906$

6507
25
29,7607

$P = -418.0,3.10^{4}\left(44 - 12,9884 - 124,667 \sin^2\alpha \cos\alpha \log \frac{52,2895}{27,9503}\right.$

62,6977
106,6977
54,4082
52895

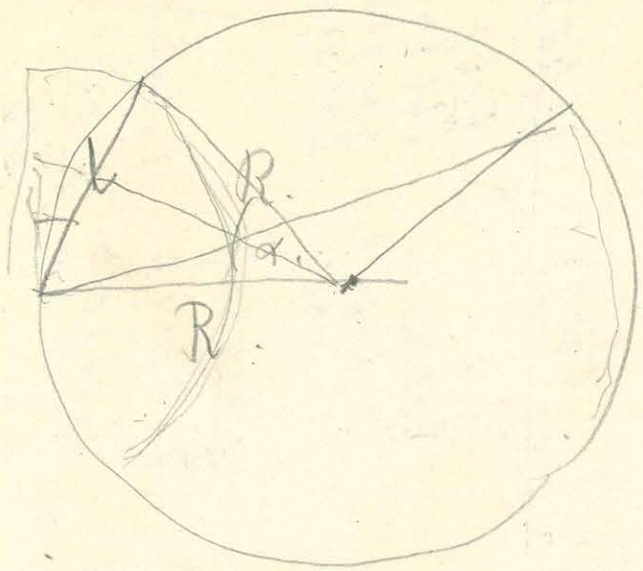
31,0116
~~27,1764~~
~~3,248~~
29,073
1,939

40?

1,718415
1,446387
0,272028

0,362216
0,434614 − 1
0,819957 − 1
0,750948 − 1
2,095751
1,463486

7693
1646
6047

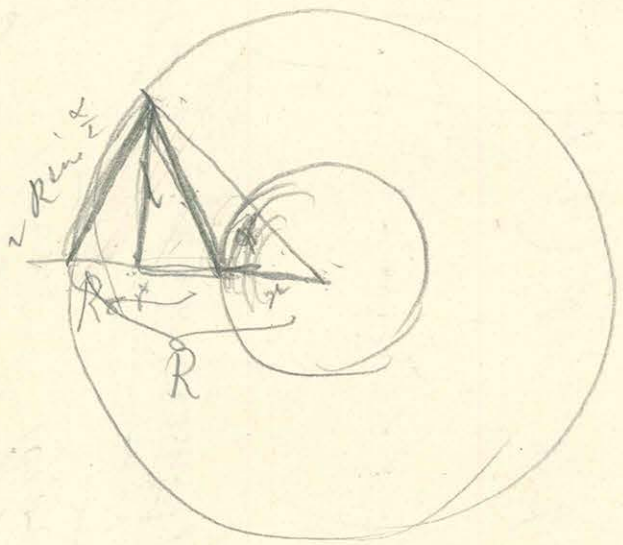


$R \sin \frac{\alpha}{2} = \frac{l}{2}$

$\alpha = \alpha$

$\sin \frac{\alpha}{2} = \frac{l}{2R}$

$\sin \frac{\alpha}{2} = \frac{l}{10}$



$2R \sin \frac{\alpha}{2}$

$l^2 = R^2 \sin^2 \alpha + (R \cos \alpha - r)^2$

$l^2 = R^2 + r^2 - 2Rr \cos \alpha$

$\frac{R^2 + r^2 - l^2}{2Rr} = \cos \alpha$

$\frac{1}{2} \frac{c^3}{2^2} \varphi^2 \alpha \left(\frac{\sin^2 \alpha}{1 + \cos \alpha} + \cos \alpha \right)$

$\frac{\sin^2 \alpha + \cos \alpha + \cos^2 \alpha}{1 + \cos \alpha}$

$\cancel{l \sin\beta} =$

$R\cos\alpha - \rho = l\cos\beta$

$R^2\sin^2\alpha + (R\cos\alpha - \rho)^2 = l^2$

$R^2 + \rho^2 - 2R\rho\cos\alpha = l^2$

$z = 0$ $\quad \zeta = 1$ $\quad \zeta' = 10$

$\frac{1}{10} Z_k = 10^6$ $\quad \zeta' = 5$ $\quad \zeta = 0{,}5$

$\rho = 1 - 10$

$\frac{1}{10} Z_k = +0{,}6\left(+4{,}5 - \sqrt{\rho^2 + 25} + \sqrt{\rho^2 + 0{,}25}\right)$

$\cos\alpha = \frac{R^2 + \rho^2 - l^2}{2R\rho}$

$\cos\beta = \frac{R^2 - \rho^2}{2\rho l} - \frac{1}{2\rho}$

$z = 0$ $\quad \cos\alpha =$

$2R\sin\frac{\alpha}{2} = l$ $\quad \sin\frac{\alpha}{2} = \frac{l}{2R}$

$\frac{R^2 + \rho^2 - l^2}{2\rho} - \rho = l\cos\beta$

$= \frac{R^2 - l^2 - \rho^2}{2\rho} = l\cos\beta$ $\quad \sin\frac{\alpha}{2}$

Oldalszög

1	168° 31′ 20″	2,9913		5	8 cm		6,28332	
2	156° 57′ 40	1,7329		6	305° 44′ 40″		5,336π	
3	145° 3′ 6″	2,5322		7	278° 57′ 40″		4,8682	
4	132° 52′ 40″	2,3186		8	255° 10′ 40″		4,4577	
5	120°	2,0944		9	232 12′ 20		4,0572	
6	106° 15′ 20″	1,8546		10	208° 57′ 20″		3,6470	
7	91° 8′ 40″	1,5908		11	184° 35′ 0		3,2216	
8	73° 44′ 20″	1,2870		12	158° 2′ 40″		2,7563	
9	57° 41′ 0	0,9020		13	127°47′ 20″		2,2304	
10	0			14	89° 31′ 40″		1,5566	
				15	0		0	

0,1	2° 44′ 20″	11° 28′ 40″	0	0				
0,2	11° 32′ 10″	23° 4′ 20″	1	0,017				
0,3	17° 17′ 30	34° 52′ 0	2	0,034				
0,4	23° 34′ 40″	47° 9′ 20″	3	0,052				
0,5	30°	60°	4	0,069				
0,6	36° 52′ 10″	73° 44′ 20″	5	0,087				
0,7	44° 26′ 50″	88° 53′ 20″	6	0,104				
0,8	53° 7′ 50″	106° 15′ 40″	7	0,122				
0,9	63° 52′ 30″	127° 45′ 0	8	0,139				
1	90°	180°	9	0,157				
			10	0,174				
			11	0,191				
			12	0,209				
			13	0,226				
			14	0,244				
			15	0,261				
			16	0,278				
			17	0,296				
			18	0,313				
			19	0,331				
			20	0,348				
			21	0,365				
			22	0,383				
			23	0,400				
			24	0,418				
			25	0,435				
			26	0,452				
			27	0,470				
			28	0,487				
			29	0,505				
			30	0,522				
			31	0,540				
			32	0,557				
			33	0,574				
			34	0,592				
			35	0,609				
			36	0,627				
			37	0,644				
			38	0,661				
			39	0,679				
			40	0,696				
			41	0,714				
			42	0,731				
			43	0,748				
			44	0,766				
			45	0,783				
			46	0,801				
			47	0,818				
			48	0,835				
			49	0,853				
			50	0,870				
			51	0,888				
			52	0,905				
			53	0,923				
			54	0,940				
			55	0,958				
			56	0,975				
			57	0,992				
			58	1,010				
			59	1,027				
			60	1,045				
			61	1,062				
			62	1,080				
			63	1,097				
			64	1,114				
			65	1,132				
			66	1,149				
			67	1,167				
			68	1,184				
			69	1,202				
			70	1,219				
			71	1,236				
			72	1,254				
			73	1,271				
			74	1,289				
			75	1,306				
			76	1,323				
			77	1,341				
			78	1,358				
			79	1,376				
			80	1,393				
			81	1,411				
			82	1,428				
			83	1,445				
			84	1,463				
			85	1,480				
			86	1,498				
			87	1,515				
			88	1,533				
			89	1,550				
			90	1,567				

$$\frac{\partial z}{\partial z} = \frac{-4\pi}{2\pi}\left\{-1 - \frac{1}{3z}\sqrt{R^2+z^2-2z^2-2z\xi} + \frac{1}{3z}\frac{R^2-2z^2+z^2+z\xi}{\sqrt{R^2+z^2-2z^2-2z\xi}}\right.$$

$$\left. +1 - \frac{1}{3z}\sqrt{R^2+z^2-2z^2+2z\xi} + \frac{1}{3z}\frac{R^2-2z^2+z^2-z\xi}{\sqrt{R^2+z^2-2z^2+2z\xi}}\right.$$

$$-\frac{2}{3z}\sqrt{R^2-z^2} + \frac{2}{3z}$$

$$\frac{\partial z}{\partial z} = 2\pi\left\{-1 - \frac{2}{3z^3}\right.$$

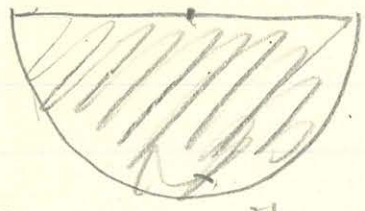
$$z = 2\pi$$

$$-\frac{2R^2+Rz}{3z^3}(R-z) + \frac{1}{3z^2}\frac{(z-R)(R^2-2z^2+zR)}{(R-z)}$$

$$+\frac{2R^2-Rz}{3z^3}(R+z) - \frac{1}{3z^2}\frac{(z+R)(R^2-2z^2-zR)}{(R+z)}$$

$$\frac{1}{3z^3}\left\{-2R^3+R^2z+Rz^2-zR^2+2z^3-z^2R\right.$$
$$\left.+2R^3+R^2z-Rz^2-2R^2+2z^3+z^2R\right\}$$

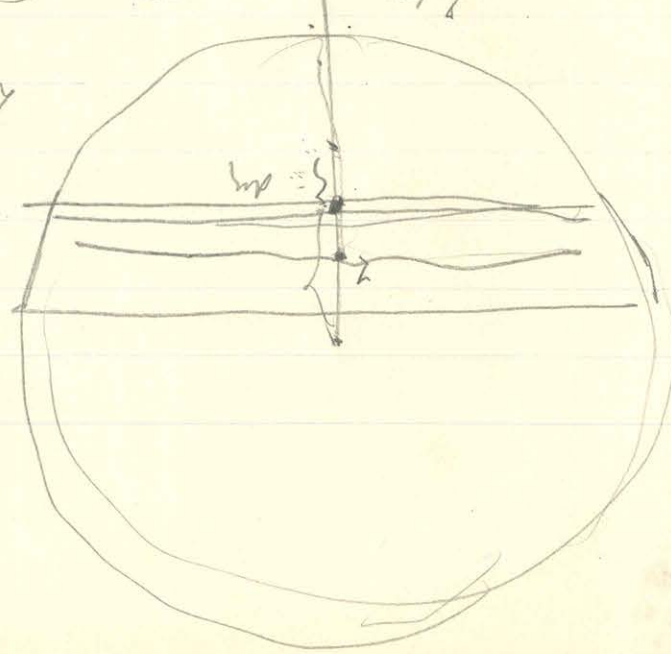
$$\frac{4z^3}{3z^3} \quad \frac{8}{3}\pi - 4\pi \quad \frac{12}{3}\pi \quad -\frac{4}{3}\pi$$



$z=0 \quad \xi=0 \quad \xi'=R$

$Z=\frac{5}{3}\pi R$

$-3ac+2c^2+(a-c)$



~~a~~ $2\pi R + \frac{2\pi R^2\sqrt{2}}{3R^2}$ $2\pi R\left(1+\frac{\sqrt{2}}{3}\right)$

~~$2\pi R - 2\pi$~~

$c = R \quad a = R \quad H = R$.

$$2\pi R - \frac{(-3ac+c^2)c + (3ac-2c^2)c - (a-c)c^2}{3(a-c)^2}$$

$$2\pi H_1 - 2\pi \frac{+(3ac-2c^2)\frac{(a-c)H}{c} - (a-c)Hc - (a-c)H\frac{(a-c)H}{c}}{3(a-c)^2}$$

$$\frac{\left[(3a-2c)H - cH\right](a-c) - \frac{H^2}{c}(a-c)^2}{3(a-c)^2}$$

$2\pi R\left(1-\frac{2}{3}\right)$

$Z_1 = 2\pi R - \frac{2\pi}{3}R^3\sqrt{2}$ $\left(2\pi R\left(1-\frac{\sqrt{2}}{3}\right)\right.$

$\xi' = R \quad \xi = 0 \quad z = R$.

$$Z = 2\pi\left(-2R + R + \frac{1}{3R^2}\right\{+R^3\sqrt{2}$$

$$-R + \frac{\sqrt{2}}{3}R. \qquad 2\pi R\left(1-\frac{\sqrt{2}}{3}\right)$$

$$\xi' = +R \qquad \xi = -R$$

$$2\pi \left\{ -2z - 2R + \frac{1}{3z^2} \left\{ (R^2 - 2z^2 + zR)(R - z) \right. \right.$$
$$\left. \left. - (R^2 - 2z^2 - zR)(R + z) \right\} \right\}$$

$$R^3 - 2z^2 R + zR^2 - zR^2 + 2z^3 - z^2 R$$
$$- R^3 + 2z^2 R + zR^2 - zR^2 + 2z^3 + z^2 R$$
$$- 4z^3$$

ε

$$\frac{\partial z}{\partial z} = \frac{\partial}{\partial \varepsilon} 2\pi \Big|_{z+\varepsilon}^{\xi'}$$

$$\frac{\partial z}{\partial z} = \frac{\partial}{\partial z} 2\pi \left\{ \xi' - z - \varepsilon + \frac{1}{3z^2} \left(R^2 - 2z^2 + z\xi' \right) \sqrt{R^2 + z^2 - 2z\xi'} \right.$$
$$\left. - \frac{1}{3z^2} \left(R^2 - 2z^2 + z^2 + z\varepsilon \right) \sqrt{R^2 + z^2 - 2z^2 - 2z\varepsilon} \right\}$$

$$- 4\pi$$

$$\frac{\partial}{\partial z} 2\pi \left\{ -z + \varepsilon + \xi + \frac{1}{3z^2} \left(R^2 - 2z^2 + z \right) \sqrt{R^2 + z^2 - 2z^2 + 2z\varepsilon} \right.$$
$$\left. + \frac{1}{3z^2} \left(R^2 - 2z^2 + z\xi \right) \sqrt{R^2 + z^2 - 2z\xi} \right\}$$

$$-\frac{1}{5}R^5\left(\frac{4}{3R^2}+\frac{c^2}{R^4}\right)\frac{1}{N^{\frac{3}{2}}}-\frac{R^5}{R^4}\int\frac{dc}{cN^{\frac{1}{2}}}$$

$$+\frac{1}{3}R^3\frac{1}{3}\frac{1}{N^{\frac{3}{2}}}$$

$$-\frac{1}{3}\left(R^3+c^2R\right)\frac{1}{(c^2+R^2)^{3/2}}-R^3\int\frac{dc}{c(c^2+R^2)^{\frac{1}{2}}}$$

$$-R^7\frac{1}{24}\frac{1}{R^4c^2}\frac{1}{N^{\frac{1}{2}}}-\frac{3}{8}R^7\left[\frac{176}{105}\frac{1}{R^2}+\frac{58}{15}\frac{c^2}{R^4}+\frac{10}{3}\frac{c^4}{R^6}+\frac{c^6}{R^8}\right]\frac{1}{N^{\frac{1}{2}}}-\frac{3}{8}R\int\frac{dc}{c(c^2+R^2)^{\frac{1}{2}}}$$

$$+\frac{3}{8}R^7\left[\quad\right]\frac{1}{N^{\frac{1}{2}}}+\frac{3}{8}\frac{1}{R}\int\frac{}{c(c^2+R^2)}$$

$$-\frac{2}{56}R^5\frac{1}{N^{\frac{1}{2}}}-\frac{1}{6}R^3c^2\frac{1}{N^{\frac{1}{2}}}-\frac{1}{21}R^5\frac{1}{N^{\frac{1}{2}}}$$

$$-\frac{R^3}{N^{\frac{1}{2}}}\left(\frac{1}{24}\frac{R^4}{c^2}+\frac{1}{6}\frac{c^2}{}+\frac{5}{24}R^2\right)$$

$$-\frac{R^3}{N^{\frac{1}{2}}}\frac{1}{24}\left(\frac{R^4}{c^2}+\frac{4c^4}{c^2}+\frac{5R^2c^2}{c^2}\right)$$

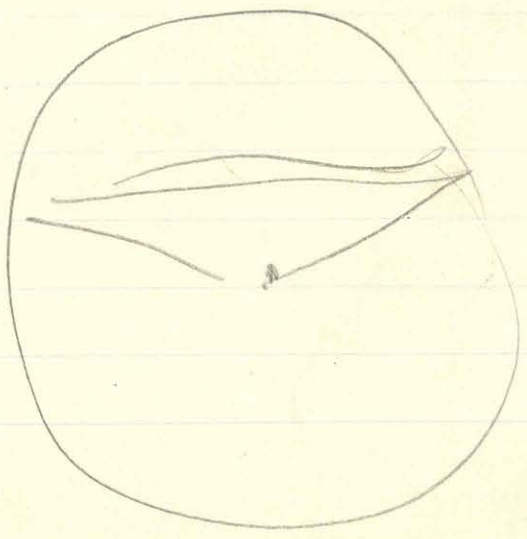
$$\frac{\partial\varphi}{\partial x}=3\pi i\left\{-\frac{1}{3}\frac{R}{\sqrt{a^2+R^2}}-\frac{1}{2}\log\frac{\sqrt{R^2+c^2}-R}{\sqrt{R^2+c^2}+R}-\frac{1}{24}(3\xi^2+\eta^2)\frac{R^3}{c^2}\frac{(R^2+4c^2)}{N^{\frac{5}{2}}}\right\}$$

$$\frac{3\xi^2+\eta^2}{24}\frac{R^2}{c^2}\frac{R^2+4c^2}{(R^2+c^2)^2}$$

$\frac{75}{168}$

$\frac{185}{336}$ $\frac{245}{1176}$ $\frac{5}{24}$

$\frac{1964}{1176}$

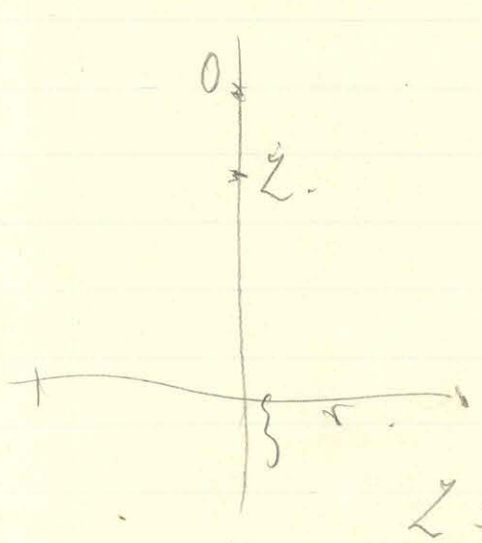


$R^2 + (a-H)^2 = a^2$

$(R^2+z^2-2R\xi)(R^2+z^2)$ $\quad 2R^2 z^2$

$-2R^4 + 2R^2 z^2 + 4R^2\xi$

$-R^2 z^2$



$$Z = \pi r \frac{\xi - z}{\sqrt{(r^2+(\xi-z)^2)^3}}\, dr.$$

$$Z = 2\pi \left| -\frac{\xi - z}{\sqrt{r^2+(\xi-z)^2}} \right|_0^r$$

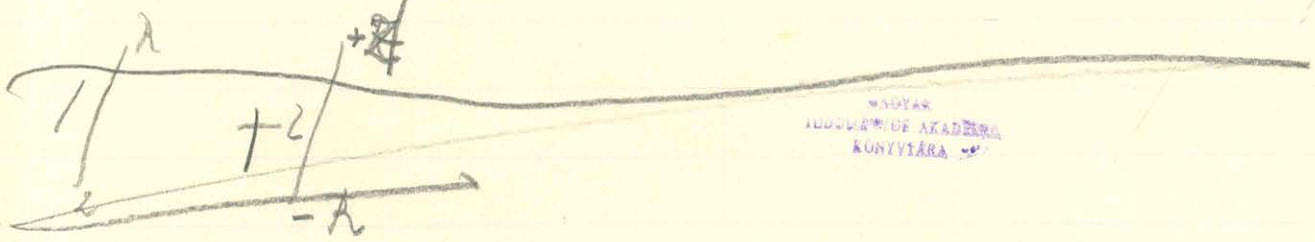
$(R-\xi)^2 -$

$+ h_a \xi - z +$
$- h \quad -$

$$Z = -2\pi \frac{\xi - z}{\sqrt{r^2+(\xi-z)^2}} \pm 2\pi$$

$\xi - z$ pozitív: 1) $Z = 2\pi \left\{ \xi - \frac{1}{6}\frac{1}{z^2}\left(R^2+z^2-2z\xi\right)^{\frac{3}{2}} + \frac{R^2-z^2}{2z^2}\sqrt{R^2+z^2-2z\xi} \right\}$

ha $\xi - z$ negatív 2) $Z = 2\pi \left\{ -\xi - \frac{1}{6}\frac{1}{z^2}\left(R^2+z^2-2z\xi\right)^{\frac{3}{2}} + \frac{R^2-z^2}{2z^2}\sqrt{R^2+z^2-2z\xi} \right\}$



$$Z = 2\pi \left| \left\{ \pm\xi + \frac{1}{3z^2}\left(R^2-2z^2+z\xi\right)\sqrt{R^2+z^2-2z\xi} \right\} \right.$$

ha $\xi - z$ pozitív a plusz

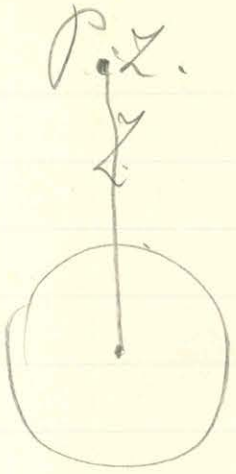
$\xi - z$ negatív a mínusz

ξ'

Belső pontban

$$Z = 2\pi \left\{ -2z + (\xi+\xi') + \frac{1}{3z^2} \left| \left(R^2-2z^2+z\xi\right)\sqrt{R^2+z^2-2z\xi} \right\} \right.$$

ξ



z negatív.

$\zeta = -R \qquad +R$

alsó felső

$z < -R$.

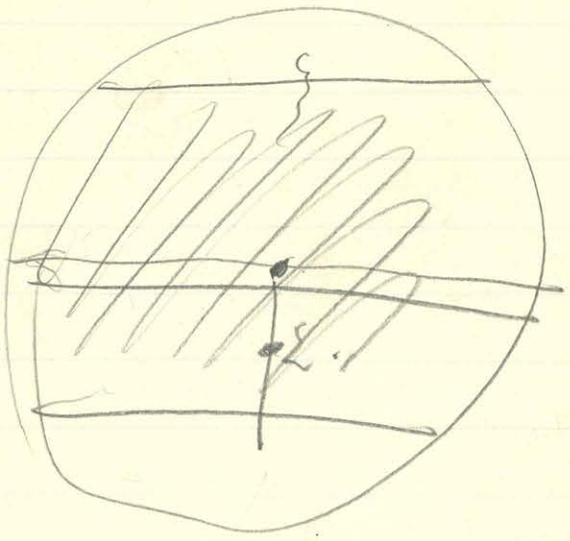
$$Z = m\left\{2R + \frac{1}{2z^2}\left(R^2 - 2z^2 + zR\right)(R+z) + \frac{1}{2z^2}\left(R^2 - 2z^2 - zR\right)(R+z)\right\}$$

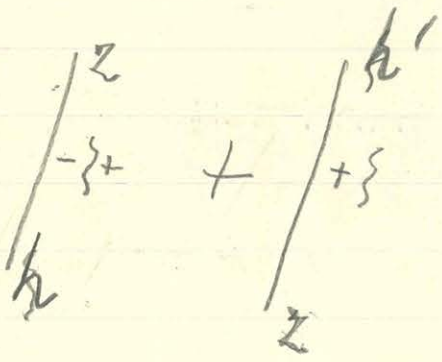
$\frac{4}{3}\pi \frac{R^3}{z^2}$

$2m\left\{2R + \frac{2}{3}R^2\right.$

$$2m\left(2R + \frac{1}{2z^2}\left\{R^3 - 2z^2R + z\left(R^2 - zR^2 + 2z^3 - z^2R\right.\right.\right.$$
$$\left.\left.\left.R^3 - 2z^2R - z\left(R^2 + zR^2 - 2z^3 - z^2R\right)\right\}\right.\right.$$

$2R + \frac{2}{3}\frac{R^3}{z^2}2\pi \qquad \frac{4}{3}\pi R^3$





$$Z = 2\pi\left\{-2z + (\zeta+\zeta') + \frac{1}{3z^2}\left(\frac{\zeta}{\zeta'}\right)\left(R^2-2z^2+z\{\sqrt{R^2+z^2-2z}\}\right)\right\}$$

$\zeta = -R \qquad \zeta' = +R$

$$2\pi\left(-2z + \frac{1}{3z^2}\{(R^2-2z^2+zR)(R-z) - (R^2-2z^2-zR)(R+z)\right.$$

$$R^3 - 2Rz^2 + zR^2 + 2z^3$$
$$- Rz^2 - zR^2$$
$$-R^3 + 2Rz^2 + zR^2 + 2z^3$$
$$+ z^2R - zR^2$$

$$-2z\left|R^2 + \underline{4z^3}\right.$$
$$-\frac{2}{3}\left|\frac{R^2}{z}\right. + \frac{4}{2}z$$

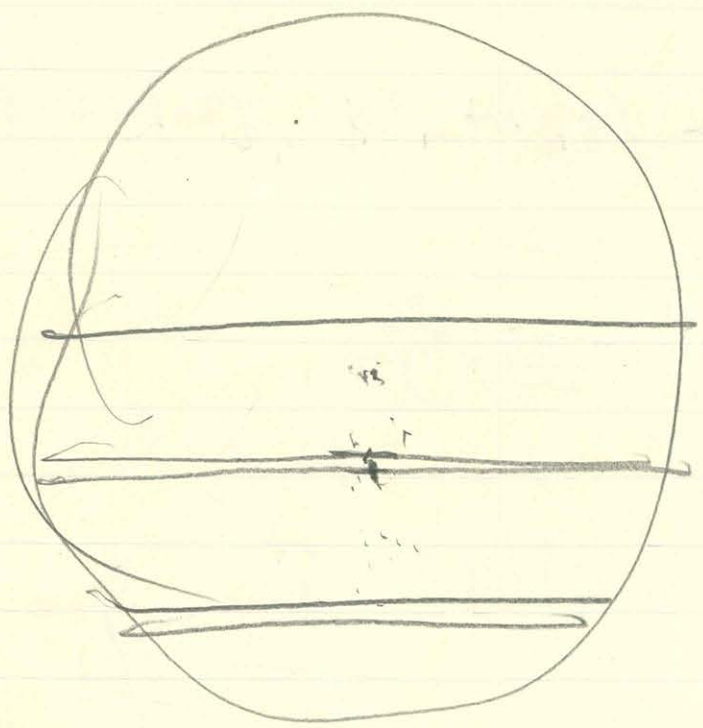
$$R - \frac{1}{6R^2}(R-z)^3 + \frac{R^2-z^2}{2z^2}(R-z) + \frac{1}{6z^2}(R^2-z^2)^{3/2} - \frac{R^2-z^2}{2z^2}\sqrt{R^2-z^2}$$

$$+ \frac{1}{6z^2}(R^2-z^2)^{3/2} - \frac{R^2-z^2}{2z^2}\sqrt{R^2-z^2} + R + \frac{1}{6z^2}(R+z)^3 + \frac{R^2-z^2}{2z^2}(R+z)$$

$$-2z - \frac{R^2-z^2}{z} + \frac{1}{6z^2}(+2z^3 + 6R^2z)$$

$$-2z - \frac{R^2}{4} + z + \frac{1}{3}z + \frac{R^2}{2}$$

$$-\frac{2}{3}z$$



$$-\frac{1}{6}\frac{1}{z^2}(R^2+z^2-2z\xi) + \frac{R^2-z^2}{2z^2}$$

$$\frac{1}{6z^2}(+2R^2 - 4z^2 + 2z\xi) \qquad \frac{1}{2z^2}(R^2-2z^2-z\xi)$$

$$\frac{\partial \Omega}{\partial z} = \left| -\frac{2}{3z^3}(R^2 - 2z^2 + 2\zeta)\sqrt{R^2+z^2-2z\zeta} - \frac{1}{3z^2}(z-\zeta)\sqrt{} \right.$$

$$\left. + \frac{1}{3z^2}\cdot\frac{(z-\zeta)(R^2-2z^2+2\zeta)}{\sqrt{}} \right|$$

$$zR^2 - 2z^3 + z^2\zeta$$
$$-\zeta R^2 \qquad +2z^2\zeta - z\zeta^2$$

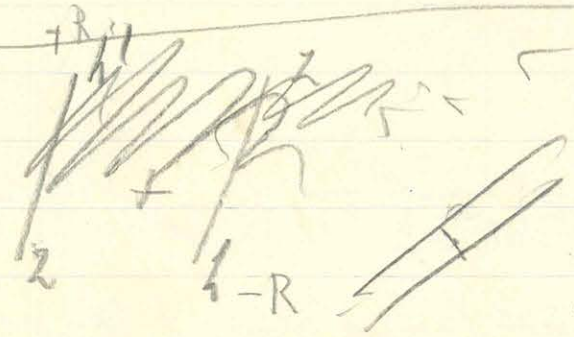
$$-\frac{\sqrt{}}{3z^3}\left(+2R^2 + 2z\zeta - z\zeta\right.$$

$$-\frac{\sqrt{}}{3z^3}(2R^2+z\zeta) + \frac{1}{3z^2}\cdot\frac{zR^2-\zeta R^2-2z^3-3z^2\zeta-z\zeta^2}{\sqrt{}}$$

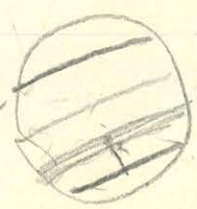
$$\frac{1}{3z^3\sqrt{}}\left(-2R^4 - R^2z^2 + 2R^2z\zeta - 4z^3\zeta + 2z\zeta^2 - 2z^4\right)$$

$$\frac{-2R^4 - 2R^2z^2 + 4R^2z\zeta - R^2z\zeta - 2z^3\zeta + 2z^2\zeta^2}{+R^2z^2 \qquad -R^2z\zeta - 3z^3\zeta - z\zeta^2 - 2z^4}$$

$$\frac{\partial \Omega}{\partial n} = \frac{-4\pi}{+4\pi}\left\{ -\frac{2R^2+z\zeta}{3z^3}\sqrt{R^2+z^2-2z\zeta} + \frac{1}{3z^2}\cdot\frac{(z-\zeta)(R^2-2z^2+z\zeta)}{\sqrt{R^2+z^2-2z\zeta}} \right\}$$



$$-\frac{2R^2}{3z^3} - \frac{1}{3}\frac{R^2\zeta}{z^2R}$$

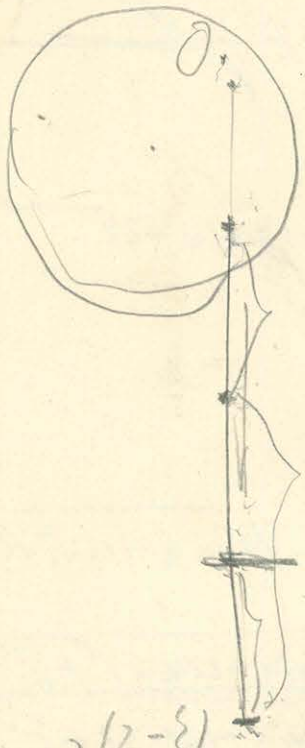


$z+z$

$\cos^2\alpha\,(1+\cos\alpha)/(C-2\cos^2\alpha+\sqrt{5})$

~~$(z^2-2C)\cos^2\alpha(1+\cos\alpha)+z$~~

~~$z(z\cos^2\alpha-C\cos^2\alpha-\cos^2\alpha\sqrt{5}$~~



$\frac{dl\,dy}{l^2}$ $\frac{dq}{l}$ $\pi\rho^2$

$\frac{dy}{\xi}-\frac{dy}{\xi'}$

dy

$z-\xi$

$(\xi'-\xi)-2(z-\xi)$

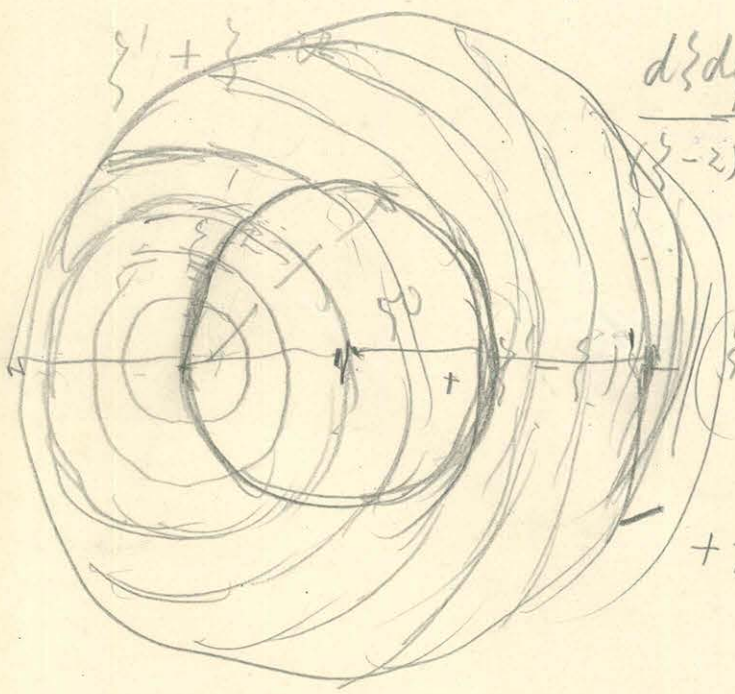
$\xi'-\xi-2$

$\pi\rho^2\left(\frac{1}{\xi}-\frac{1}{\xi'}\right)$

$\pi\rho^2\left(\frac{1}{\xi'+\xi-2z}-\frac{1}{\xi'-z}\right)$

dl

$\xi'+\xi$



$\frac{d\xi dy}{(\xi-z)^2}$ $\frac{dy}{\xi-z}-\frac{dy}{\xi'-z}$

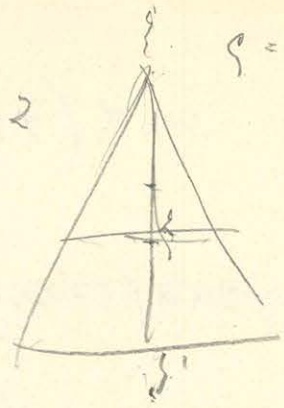
$\left(\xi-z+\frac{1}{2}\frac{\rho^2}{\xi-z}\right)$

$+\frac{1}{2}\frac{\rho^2}{\xi-z}-\frac{1}{2}\frac{\rho^2}{\xi'-z}$

$2\pi(\xi'+\xi-2z)-2\pi(\xi'+\xi-2z)$

$\frac{tg^2\alpha}{\cos^2\alpha}$

$-z+\zeta+\zeta'-z$



$$Z = \pm 2\pi d\zeta - 2\pi \frac{(\zeta - z)h}{\sqrt{\zeta^2 - 2z\zeta + \frac{1}{\cos^2\alpha}\zeta^2}}$$

$$Z = \pm 2\pi d\zeta - 2\pi \cos\alpha \frac{\zeta\, d\zeta}{\sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\zeta + \zeta^2}} + 2\pi\cos\alpha z \frac{d\zeta}{V}$$

$$Z = \pm 2\pi\left(\zeta' - \zeta\right) - 2\pi\cos\alpha\sqrt{\quad} - 2\pi\cos^3\alpha z \log\left(2\zeta - 2z\cos^2\alpha + 2\sqrt{\quad}\right)$$
$$+ 2\pi\cos\alpha z \log(\quad)$$

$$Z_k = \pm 2\pi\left(\zeta' - \zeta\right) - 2\pi\cos\alpha\left(\sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\zeta' + \zeta'^2} - \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\zeta + \zeta^2}\right)$$
$$+ 2\pi\cos\alpha\sin^2\alpha z \log \frac{\zeta' - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\zeta' + \zeta'^2}}{\zeta - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\zeta + \zeta^2}}$$

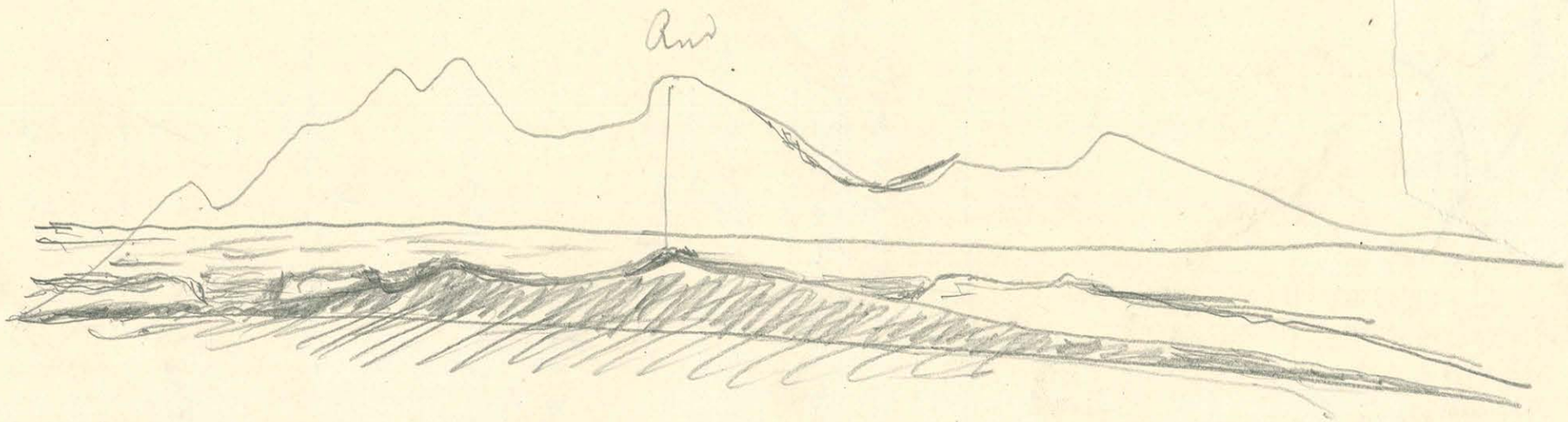
$$Z_6 = 2\pi\left(\zeta' + \zeta - 2z\right) - 2\pi\cos\alpha(\quad - eh$$

$$-2\pi\cos\alpha\left\{\frac{(2z-\xi')\cos^2\alpha}{\sqrt{\xi'}}-\frac{(z-\xi)\cos^2\alpha}{\sqrt{\xi}}\right\}+2\pi\cos\alpha\sin^2\alpha\log(\quad)+2\pi\cos\alpha\sin^2\alpha\,2\frac{N}{N'}\left(\frac{-\cos^2\alpha+\frac{(z-\xi')\cos^2\alpha}{\sqrt{\xi'}}}{N}\right.$$

$$\left.-N'\frac{-\cos^2\alpha+\frac{(z-\xi)\cos^2\alpha}{\sqrt{\xi}}}{N^2}\right)$$

$$-C\left(1-\cos^2\alpha\right)\frac{\frac{-C+2C\cos^2\alpha-2\cos^2\alpha}{-C+C\cos^2\alpha+\cos^2\alpha(C-2)}}{\sqrt{\quad}}-\frac{C\sin^2\alpha}{\sqrt{\quad}\log}$$

$$-2\pi\cos^3\alpha\left\{\frac{z-\xi'}{\sqrt{\xi'}}-2\sin^2\alpha\frac{(z-\xi')}{\sqrt{\xi'}}\frac{1}{N'}+2\sin^2\alpha\frac{1}{N'}-\frac{z-\xi}{\sqrt{\xi}}+2\sin^2\alpha\frac{z-\xi}{\sqrt{\xi}}\frac{1}{N}-2\sin^2\alpha\frac{1}{N}\right\}+2\pi\cos\alpha\sin^2\alpha\log.$$



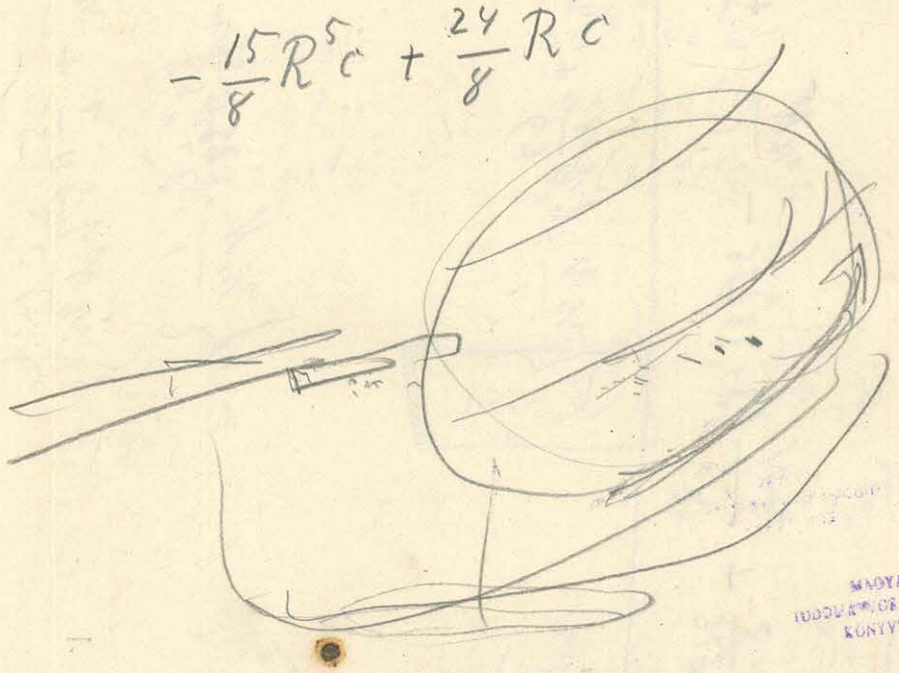
$$-\frac{2\varrho^2 d\varrho}{N^{\frac{5}{2}}} + 5\frac{\varrho^4 d\varrho}{N^{\frac{7}{2}}} + 5(3\xi^2+\eta^2)\frac{\varrho^2 d\varrho}{N^{\frac{7}{2}}} - 35(3\xi^2+\eta^2)\frac{\varrho^4 d\varrho}{N^{\frac{9}{2}}} + \frac{315}{8}(3\xi^2+\eta^2)^2\frac{\varrho^6}{N^{\frac{11}{2}}}$$

$$-\frac{2}{3}\frac{\varrho^3}{c^2}\frac{1}{N^{\frac{3}{2}}} + \frac{\varrho^5}{c^2}\frac{1}{N^{\frac{5}{2}}} \pm \left(+\frac{\varrho^5}{3c^2} - \frac{2}{3}\varrho^3\right)\frac{1}{N^{\frac{5}{2}}}$$

$$-R^3 c - \frac{R^5}{3c} + \frac{2}{3}R^3 c$$

$$+\frac{5}{2}R^3 c^3 - \frac{5}{3}R^3 c^3$$

$$-\frac{15}{8}R^5 c + \frac{24}{8}R^5 c$$



MAGYAR TUDOMÁNYOS AKADÉMIA KÖNYVTÁRA

$$\frac{2\pi i R^2 c}{(R^2+c^2)^{\frac{3}{2}}}$$

$$\frac{6\pi i R^2 c}{(R^2+c^2)^{\frac{5}{2}}}$$

$$\frac{3\pi i R^2 c}{(R^2+c^2)^{\frac{5}{2}}}$$

$\frac{1}{4000}$ l ayn

9,000250.

2500 0,1.

$\frac{3\pi i}{625}$

$\frac{\pi i}{1200}$

$\frac{6}{40}$

$\frac{1}{2400}$ 2400

1000. $\frac{1}{400}$ cur

93
16

27.

0,201030
0,147721
0,823909 -1
0,911455

0,8755

$$-30M_2\left\{\frac{2\pi}{N^{5/2}}-5\pi\xi^2\frac{1}{N^{7/2}}-5\pi\eta^2\frac{1}{N^{7/2}}+\frac{35}{2}\pi\rho^2\xi^2\frac{1}{N^{9/2}}+\frac{35}{2}\pi\rho^2\eta^2\frac{1}{N^{9/2}}\right\}$$

$$+150M_2\left\{2\pi\xi^2\frac{1}{N^{7/2}}-7\pi\xi^4\frac{1}{N^{9/2}}-7\pi\xi^2\eta^2\frac{1}{N^{9/2}}+\frac{63}{2}\pi\rho^2\xi^4\frac{1}{N^{11/2}}+\frac{63}{2}\pi\rho^2\eta^2\xi^2\frac{1}{N^{11/2}}\right\}$$

$$+90CM_2\left\{-7\pi\xi^2\rho^2\frac{1}{N^{9/2}}\right\}$$

$$+15CM_2\left\{\pi\rho^2\frac{1}{N^{7/2}}-\frac{7}{2}\pi\frac{\xi^2\rho^2}{N^{9/2}}-\frac{7}{2}\pi\frac{\eta^2\rho^2}{N^{9/2}}+\frac{189}{8}\rho^4\xi^2\frac{1}{N^{11/2}}+\frac{63}{8}\rho^4\eta^2\frac{1}{N^{11/2}}\right\}$$

$$+3CM_2\pi\left\{-\frac{2}{N^{5/2}}+5(3\xi^2+\eta^2)\frac{1}{N^{7/2}}+5\frac{\rho^2}{N^{7/2}}-35\xi^2(3\xi^2+\eta^2)\frac{1}{N^{9/2}}-35(3\xi^2+\eta^2)\frac{\rho^2}{N^{9/2}}+\frac{315}{2}\xi^2(3\xi^2+\eta^2)\frac{\rho^2}{N^{11/2}}+\frac{315}{8}(3\xi^2+\eta^2)\frac{\rho^4}{N^{11/2}}\right\}$$

$\frac{3}{2\pi}i_e\,dv\,c.$

$M_2=i_c\,\rho\,d\rho\,dc$ 2)

$$R = 2\,\text{[illegible]}$$

$$\frac{3}{\text{[illegible]}}$$

$$\frac{30}{\text{[illegible]}} - \frac{20}{(\text{[illegible]})^{\frac{5}{2}}}$$

$$\begin{array}{ll} 1.3010300 & 1.477121 \\ 7.1076075^{-} & 7.624910 \\ 1.477121 & 1.3010300 \end{array}$$

$$0.\text{[illegible]}$$

$$0.1969315^{-6} \quad 0.1789211^{-7}$$

$$0.0000001573^{7}$$

$$0.0000000963^{3}$$

$$0.000$$

$$\begin{array}{lll} 3.5301779 & & 3.4624298 \\ 1.7657760 & & 1.7301199 \\ 8.8287700 & & 8.6557995^{-} \\ 1.4771213 & & 1.3010300 \end{array}$$

$$0.6498721^{-8} \qquad 0.6458031^{-8}$$

$$0.0000000045\text{[illegible]}$$

$$9.0000000000316^{-6}$$

$$\frac{\text{[illegible]}}{\text{[illegible]}} = 0.0000001790 \cdot \lambda_{\text{[illegible]}} = 2C_{\text{[illegible]}} = 5\text{[illegible]}$$

$$0.0000002$$

$$-\frac{3\alpha'}{(R^2+\alpha'^2)^{\frac{5}{2}}} + \frac{3\alpha}{(\quad)^{\quad}}$$

$$3\pi i_0 R^2 \left(\frac{c'}{(R^2+c'^2)^{\frac{5}{2}}} - \frac{c}{(R^2+c^2)^{\frac{5}{2}}} \right.$$

$$\frac{-(c-\frac{h}{2})}{(R^2+(c-\frac{h}{2})^2)^{\frac{5}{2}}} + \frac{c+\frac{h}{2}}{R^2+(c+\frac{h}{2})^2)^{\frac{5}{2}}}$$

$$\frac{30}{(3\,\text{[illegible]})^{\frac{5}{2}}} - \frac{20}{(290)^{\frac{5}{2}}}$$

$$-(c-\tfrac{h}{2})\left(1+\tfrac{5}{2}\frac{hc}{R^2+c^2}\right) + (c+\tfrac{h}{2})\left(1-5\frac{hc}{R^2+c^2}\right) = 0$$

$$-(c-\tfrac{h}{2})(R^2+c^2+\tfrac{5}{2}hc) + (c+\tfrac{h}{2})(R^2+c^2-\tfrac{5}{2}hc) = 0$$

$$-5hc^2 + h(R^2+c^2) = 0 \cdot$$

$$-4c^2 + R^2 = 0$$

$$\boxed{R = 2c}$$

$$c = \frac{R}{2}$$

$\xi = 0 \qquad \xi' = c \qquad \sqrt{\xi} = -z\cos\alpha \qquad \sqrt{\xi'} = \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\xi' + \xi'^2}$

$N = \xi - z(\cos\alpha + \cos^2\alpha) \qquad N' = \xi' - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\xi' + \xi'^2}$

$\sqrt{\quad} = \frac{1}{\cos\alpha}\sqrt{\quad}$

$+ 2\pi\cos^2\alpha$

$$-2\pi\cos^2\alpha\left(\frac{z-c}{\sqrt{\xi_1}} + \frac{1}{\cos\alpha}\left(-2\sin^2\alpha\left(\frac{z-c}{\sqrt{\xi_1}}\cdot\frac{1}{c-2z\cos^2\alpha+\sqrt{\xi_1}} + \frac{1}{\cos\alpha}\,\frac{1}{z(\cos\alpha+\cos^2\alpha}\right) - \frac{1}{c-2z\cos^2\alpha+\sqrt{\xi_1}} - \frac{1}{z(\cos\alpha+\cos^2\alpha)}\right)\right)$$

$$-\frac{c\sin^2\alpha\cos\alpha}{\sqrt{\xi_1}} \qquad \frac{c\sin^2\alpha}{\cos^2\alpha\,\sqrt{\xi_1}}$$

$$\frac{\partial\Gamma}{\partial z} = -2\pi\cos^2\alpha\left(\frac{1}{\cos\alpha} + \frac{c\cos^2\alpha}{\cos^2\alpha\sqrt{\quad}} - \frac{(2c-z)}{\sqrt{\quad}}\right)$$

$$\frac{c}{\cos^2\alpha\sqrt{\quad}} - \frac{c}{\sqrt{\quad}}$$

$$+\frac{c\sin^2\alpha}{\cos^2\alpha\,\sqrt{\xi_1}}$$

$$\zeta_K = +2\pi\xi' - 2\pi\cos\alpha\left(\sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\xi' + \xi'^2} + z\cos\alpha\right)$$
$$+ 2\pi\cos\alpha\sin^2\alpha\,\log\frac{\xi' - z\cos^2\alpha + \sqrt{z^2\cos^2\alpha - 2z\cos^2\alpha\,\xi' + \xi'^2}}{+2z\cos^2\alpha - z\cos\alpha}$$

$c = \xi' - \xi$ $\qquad$ z mm

$$\left(\frac{2}{3}\frac{\rho^5}{c^4}+\frac{5}{3}\frac{\rho^3}{c^2}\right)\frac{1}{N^{5/2}}$$

$$\left(-2\frac{\rho^7}{c^4}-7\frac{\rho^5}{c^2}\right)\frac{1}{N^{7/2}}$$

$$\left(+\frac{45}{8}\frac{\rho^7}{c^2}+\frac{5}{4}\frac{\rho^9}{c^4}\right)\frac{1}{N^{9/2}}$$

$$\left(\frac{2}{3}\frac{\rho^5}{c^4}+\frac{5}{3}\frac{\rho^3}{c^2}\right)\left(\rho^4+2\rho^2c^2+c^4\right)$$

$$\left(-2\frac{\rho^7}{c^4}-7\frac{\rho^5}{c^2}\right)\left(\rho^2+c^2\right)$$

$$+\frac{2}{3}\frac{\rho^9}{c^4}+\frac{5}{3}\frac{\rho^7}{c^2}$$

$$+\frac{4}{3}\frac{\rho^7}{c^2}+\frac{10}{3}\rho^5+\frac{2}{3}\rho^5+\frac{5}{3}\rho^3c^2$$

$$-2\frac{\rho^9}{c^4}-7\frac{\rho^7}{c^2}$$

$$-2\frac{\rho^7}{c^2}-7\rho^5$$

$$+\frac{5}{4}\frac{\rho^9}{c^4}+\frac{45}{8}\frac{\rho^7}{c^2}$$

$$-\frac{1}{12}\frac{\rho^9}{c^4}-\frac{3}{8}\frac{\rho^7}{c^2}+3\rho^5+\frac{5}{3}\rho^3c^2$$

$$3\pi i\left\{\left(+\frac{1}{3}\rho^5-\frac{2}{3}\rho^3c\right)\frac{1}{(\rho^2+c^2)^{5/2}}-\frac{1}{12}\frac{\rho^9}{c^3}\frac{(3\xi^2+\eta^2)}{(c^2+\rho^2)^{9/2}}-\frac{3}{8}\frac{\rho^7}{c}\frac{(3\xi^2+\eta^2)}{(c^2+\rho^2)^{9/2}}\right.$$
$$\left.-3\rho^5c\frac{(3\xi^2+\eta^2)}{(c^2+\rho^2)^{9/2}}+\frac{5}{5}\rho^3c^3\frac{(3\xi^2+\eta^2)}{(c^2+\rho^2)^{9/2}}\right\}$$

$$\left(\frac{2}{315}\frac{x^9}{a^2}+\frac{x^7}{7a}\right)\frac{1}{x^{9/2}}$$

$$\frac{1}{3}\rho^5-\frac{2}{3}\rho^3c^2+\rho^5$$

$$\frac{1}{3}\rho^3c^2+\frac{1}{3}\rho^5$$

$$\frac{x^7}{9a}\frac{1}{x^{9/2}}+\frac{2}{9a}\int\frac{x^6}{(\ )^{5/2}}$$

$$\frac{x^7}{7a}\frac{1}{x^{7/2}}$$

$$\rho^5-2\rho^3c^2$$

$$\frac{x^7}{9a}\frac{1}{x^{9/2}}+\frac{2}{63}\frac{x^7(a+x^2)}{a^2x^{9/2}}$$

$$\frac{x^7}{9a}+\frac{2x^7}{63a}+\frac{2x^9}{63a^2}$$

$$\left(\frac{x^7}{7a}+\frac{2}{63}\frac{x^7}{a^2}\right)\frac{1}{x^{9/2}}$$

$$+\frac{8}{12}+\frac{15}{12}-\frac{24}{12}$$

+72
135
207
−216

+40
+32
+135
+207

168
486
216

3/16

$$\int \frac{\rho^3 d\rho}{N^{11/2}} = -\frac{1}{7}\rho^2 + \frac{2c^2}{9}\frac{1}{N^{7/2}}$$

$$\int \frac{\rho^5}{N^{11/2}} d\rho = -$$

$$\int \frac{x^3 dx}{X^{11/2}} = \frac{x^4}{9a}\frac{1}{X^{9/2}} + \frac{5}{9a}\int \frac{x^3 dx}{X^{7/2}} \quad \left| \left(-\frac{x^2}{9ab} - \frac{2}{63b^2}\right)\frac{1}{X^{7/2}}\right.$$

$$\int \frac{x^5 dx}{X^{11/2}} = \frac{x^6}{9a}\frac{1}{X^{9/2}} + \frac{7}{3a}\int \frac{x^5 dx}{X^{9/2}} \quad \left| \left(-\frac{x^4}{9ab} - \frac{4}{45}\frac{x^2}{b^2} - \frac{8a}{315b^3}\right)\frac{1}{X^{7/2}}\right.$$

$$\int \frac{\rho^3 d\rho}{N^{11/2}} = \frac{\rho^4}{9c^2}\frac{1}{N^{9/2}} - \frac{\rho^2}{9c^2}\frac{1}{N^{7/2}} - \frac{2}{63}\frac{1}{N^{7/2}} = -\frac{1}{9}\frac{\rho^2}{N^{7/2}} - \frac{2(c^2+\rho^2)}{63 N^{9/2}} \quad \left| -\frac{9\rho^2+2c^2}{63 N^{9/2}}\right.$$

$$\int \frac{\rho^5 d\rho}{N^{11/2}} = \frac{\rho^6}{9c^2}\frac{1}{N^{9/2}} - \frac{\rho^4}{9c^2}\frac{1}{N^{7/2}} - \frac{4}{45}\rho^2\frac{1}{N^{7/2}} - \frac{8c^2}{315}\frac{1}{N^{7/2}} = -\frac{1}{9}\frac{\rho^4}{N^{9/2}} - \frac{(28\rho^2+8c^2)(c^2+\rho^2)}{315 N^{9/2}}$$

$$-\frac{35\rho^4+28\rho^4+36\rho^2c^2+8c^4}{315 N^{9/2}}$$

$$\int \frac{\rho^2 d\rho}{N^{11/2}} = \left(-\frac{1}{7}\rho^2 - \frac{2}{63}c^2\right)\frac{1}{N^{9/2}}$$

$$\int \frac{\rho^5 d\rho}{N^{11/2}} = \left(-\frac{\rho^4}{5} - \frac{4}{35}\rho^2c^2 - \frac{8c^4}{315}\right)\frac{1}{N^{9/2}}$$

$$\frac{2R}{(\ )^{\frac{5}{2}}} - \frac{5R^3}{(\ )^{7/2}}$$

$$2C^2 + 2R^2 - 5R^2 = 0$$

$$3R^2 = 2C^2$$

$$R = \sqrt{\tfrac{2}{3}}\,C$$

$$\frac{cR^2}{(R^2+c^2)^{\frac{5}{2}}}$$

$$\frac{2cR}{(\ )^{\frac{5}{2}}} - \frac{5cR^3}{(\ )^{\frac{7}{2}}}$$

~~$2c^3R + 2cR^3 - 5cR^3$~~

~~$2c^3R - 3cR^3 = 0$~~

~~$2c^2 = 3R^2$~~

~~$R = \sqrt{\tfrac{2}{3}}\,C$~~

$$3c^3R + 3cR^3 - 5cR^3 = 0$$

$$3c^2 = 2R^2$$

$$R = \sqrt{\tfrac{3}{2}}\,C = 1{,}22474$$

24,5

0,00017889	$c = 20$	$R = 10$	$\frac{1}{(500)^{\frac{5}{2}}}$	$= 0{,}0000001 7889$
0,00022096	$c = 20$	$R = 20$	$\frac{1}{(800)^{\frac{5}{2}}}$	$= 0{,}0000000 5524$
0,00018704	$c = 20$	$R = 24{,}5$	$\frac{1}{(1000{,}25)^{\frac{5}{2}}}$	$= 0{,}0000000 3116$

2,698970	2,903090	3,000109
1,349485	1,451545	1,500055
6,747425	7,257725	7,500275
0,252575 −7	0,742275 −8	0,499725 −8

$$\frac{\pi i^2 R^2}{C^4}$$

$$12\pi^2\left(\frac{1}{(10\pi)^2} - \frac{1}{(12\pi)^2}\right)^{\frac{1}{2}}$$

$$\frac{R^2}{R^2\left(1+\left(\frac{C}{R}\right)^2\right)^{\frac{1}{2}}}$$

$$\frac{R}{\frac{R^2}{\left(1+\left(\frac{C}{R}\right)^2\right)^{\frac{1}{2}}}}$$

$$\frac{1}{\frac{1}{(1+x^2)^{\frac{1}{2}}}} - \frac{1}{(1+x^2)^{\frac{1}{2}}}$$

$$\frac{x}{(1+x^2)^{\frac{1}{2}}}$$

$$\frac{2x}{(1+x^2)^{\frac{1}{2}}} - \frac{3x^2}{2(1+x^2)^{\frac{3}{2}}}$$

$$2x + 2x^3 - \frac{3x^2}{2}$$

$$\frac{\pi i^2 R^2}{C^3}$$

$$\frac{\pi i^2 R^2}{C^4}$$

$$12\pi^2\left(\frac{1}{(10\pi)^2} - \frac{1}{(12\pi)^2}\right)^{\frac{1}{2}}$$

$$\frac{\pi i^2 R^2}{C^4}$$

$$\frac{12\pi^2 R^2}{6C^4}$$

$$12\pi^2\left(\frac{1}{(6\pi)^2} - \frac{1}{(12\pi)^2}\right)^{\frac{1}{2}}$$

$$\frac{\pi i^2 R^2}{C^3}$$

$$\frac{\pi i^2 R^2}{C^4}$$

$$\frac{12\pi^2 R^2}{6C^4}$$

$$12\pi^2\left(\frac{1}{(6\pi)^2} - \frac{1}{(12\pi)^2}\right)^{\frac{1}{2}}$$

$$\frac{\pi i^2 R^2}{C^3}$$

$$\frac{\pi i^2 R^2}{C^4}$$

$$\frac{12\pi^2 R^2}{6C^4}$$

$$12\pi^2\left(\frac{1}{(6\pi)^2} - \frac{1}{(12\pi)^2}\right)^{\frac{1}{2}}$$

$m=7 \quad n=11$

$\frac{2}{9} \quad \frac{4}{7} \quad \frac{6}{5} \quad -\frac{1}{3}$

$\frac{6}{945} \quad -\frac{201}{84} \quad -\frac{81}{15}$

$-\frac{1}{3} \quad \frac{5}{9} \cdot -\frac{1}{3} = Q$

$\frac{4}{7} \quad \frac{6}{2} \quad \frac{sm}{n} \quad -\frac{81}{9}$

$-\frac{189}{7}$

$\frac{189}{2} \quad \frac{105}{12} \quad \frac{12}{117} \quad \frac{42}{3} \quad \frac{36}{2}$

$\frac{210}{27} \quad \frac{27}{237} \quad \frac{189}{y^3} \quad + \frac{sm}{n}$

$\frac{63.3}{13}$

$+\frac{720}{8} - \frac{315}{8} - \frac{120}{8}$

$-\frac{15}{8}$

$-15s^4 - 6c^2 s^2$

$-15c^2 s^2 - 6c^4$

$+\frac{105}{4} s^3 + 35c^2 s + 6c^4$

$\left(+\frac{105}{4} s^4 + 20c^2 s^2 + 18c^4\right)\left(c^4 + s^2\right)$

$\left(-\frac{315}{8} s^4 - \frac{378}{4} c^2 s^2 - 27 c^4 s^2 - 6c^6\right)$

$\frac{63.6}{378}$

$\frac{12}{2} + \frac{105}{2} = \frac{378}{4}$

$-189 \quad \frac{189}{2}$

$+117$

$-15s^6 - 6c^2 s^4$

$-30c^2 s^4 - 12c^4 s^2$

$-16c^4 s^2 - 6c^6$

$+\frac{105}{2} s^6 + 30c^2 s^4 + 18c^4 s^2 + 18c^6$

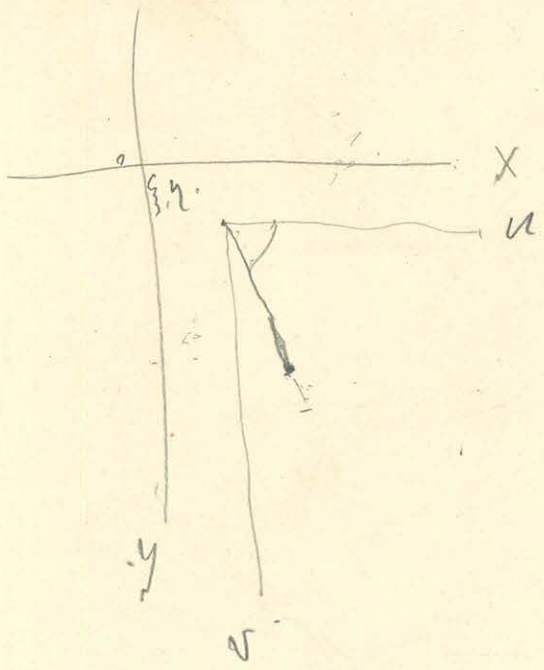
$+\frac{105}{2} c^2 s^4 + 30c^4 s^2 + 18c^6$

$-\frac{315}{8} s^6 - \frac{378}{4} c^2 s^4 - 27 c^4 s^2 - 6c^6$

$-\frac{315}{8} s^6 - \frac{378}{4} c^2 s^4 - 27 c^4 s^2 - 6c^6$

$\frac{315}{210} \quad \frac{378}{27} \quad \frac{4}{14} \quad \frac{6}{36}$

$\frac{105}{210} \quad \frac{27}{237}$



$du\,dv\,do$

$\rho = \sqrt{u^2+v^2}$

$\kappa\sqrt{u^2+v^2}\,du\,dv\,d\alpha = \mu$

$\mu_x = \mu \cdot \cos(\alpha+\omega t)$

$\mu_y = \mu \cdot \sin(\alpha+\omega t)$

$a = \xi + \sqrt{u^2+v^2}\cos(\alpha+\omega t)$

$b = \eta + \sqrt{u^2+v^2}\sin(\alpha+\omega t)$

$\frac{N}{T}$ ωT.

$\omega t = x$

$dt = \frac{x}{\omega}$

T.

$r^2 = c^2 + \xi^2 + \eta^2 + 2\xi\sqrt{u^2+v^2}\cos(\alpha+\omega t) + 2\eta\sqrt{u^2+v^2}\sin(\alpha+\omega t) + u^2+v^2$

$A = c^2+\xi^2+\eta^2+u^2+v^2$

$$\frac{1}{T}\int_0^T -g\,\frac{\mu\xi\cos(\alpha+\omega t) + \mu\sqrt{u^2+v^2}\cos^2(\alpha+\omega t)\,dt}{\left(A + 2\xi\sqrt{u^2+v^2}\cos(\alpha+\omega t) + 2\eta\sqrt{u^2+v^2}\sin(\alpha+\omega t)\right)^{\frac{3}{2}}}$$

2π.

$$\frac{1}{2\pi}\int_0^{2\pi} -g\,\frac{\mu\xi\cos(\alpha+x) + \mu\sqrt{u^2+v^2}\cos^2(\alpha+x)\,dx}{\left(A + 2\xi\sqrt{u^2+v^2}\cos(\alpha+x) + 2\eta\sqrt{u^2+v^2}\sin(\alpha+x)\right)^{\frac{3}{2}}}$$

$$V = \int \rho^2 d\rho \frac{8C}{(\xi+\rho)^2\sqrt{C^2+(\xi+\rho)^2}} \left\{ \left((\xi+\rho) + 2\frac{(\xi+2\rho)}{\lambda} - 4\frac{\rho}{\lambda^2}\right) \int_0^{\frac{\pi}{2}} \frac{d\varphi}{(1+\lambda\sin^2\varphi)\sqrt{1-k^2\sin^2\varphi}} \right.$$

$$- \left(\frac{2}{\lambda}(\xi+2\rho) + \frac{4\rho}{\lambda^2}\right) \int_0^{\frac{\pi}{2}} \frac{d\varphi}{\sqrt{1-k^2\sin^2\varphi}} + \frac{4\rho}{\lambda^2} \int \frac{(1+\lambda\sin^2\varphi)\,d\varphi}{\sqrt{1-k^2\sin^2\varphi}}$$

$$+ \frac{4\rho}{\lambda k^2} \int_0^{\frac{\pi}{2}} \frac{d\varphi}{\sqrt{1-k^2\sin^2\varphi}} - \frac{4\rho}{\lambda k^2} \int_0^{\frac{\pi}{2}} d\varphi \sqrt{1-k^2\sin^2\varphi}$$

$$\lambda = -\frac{4\rho\xi}{(\xi+\rho)^2} \qquad k^2 = \frac{4\rho\xi}{C^2+(\xi+\rho)^2}$$

$\frac{2}{9} \cdot \frac{3}{4} \cdot 4 \qquad \frac{2}{5}$

$\frac{14}{81} \cdot \frac{3}{4} \cdot 8 \qquad \frac{14,2}{27} \cdot \frac{28}{27} \qquad \frac{4.7}{3.9}$

$\frac{728}{6561} \cdot 35$

$\frac{35}{243} \cdot \frac{5}{8} \cdot 10 \qquad \frac{350}{243}$

$\frac{91}{729} \cdot \frac{5}{8} \cdot 32 \quad 4 \quad 20 \qquad \frac{1820}{729}$

$$V = \iint \kappa \rho^2 d\rho \left(\xi \cos\alpha + \rho \cos^2\alpha\right) d\alpha \int_C^{C'} \frac{dr}{\left(c^2 + \xi^2 + \rho^2 + 2\rho\xi\cos\alpha\right)^{\frac{3}{2}}}$$

$$\int_C^{C'} \frac{dr}{(\,\cdot\,)^{\frac{3}{2}}} = \frac{C'}{\left(\xi^2 + \rho^2 + 2\rho\xi\cos\alpha\right)\sqrt{c^2 + \xi^2 + \rho^2 + 2\rho\xi\cos\alpha}}$$

$$= \frac{2C}{(\xi+\rho)^2\sqrt{c^2+(\xi+\rho)^2}\left(1 - \frac{4\rho\xi}{(\xi+\rho)^2}\sin^2\frac{\alpha}{2}\right)\sqrt{1 - \frac{4\rho\xi}{c^2+(\xi+\rho)^2}\sin^2\frac{\alpha}{2}}}$$

$$\left(\xi\cos\alpha + \rho\cos^2\alpha\right) = (\xi+\rho) - 2(\xi+2\rho)\sin^2\frac{\alpha}{2} + 4\rho\sin^4\frac{\alpha}{2},$$

$$-\frac{4\rho\xi}{(\xi+\rho)^2} = \lambda \qquad \frac{4\rho\xi}{c^2+(\xi+\rho)^2} = k^2$$

$$V = \int \kappa\rho^2 d\rho \frac{8C}{(\xi+\rho)^2\sqrt{c^2+(\xi+\rho)^2}}\left\{(\xi+\rho)\int_0^{\frac{\pi}{2}} \frac{d\varphi}{(1+\lambda\sin^2\varphi)\sqrt{1-k^2\sin^2\varphi}}\right.$$

$$- 2(\xi+2\rho)\int_0^{\frac{\pi}{2}} \frac{\frac{1}{\lambda}\left(-1+(1+\lambda\sin^2\varphi)\right)d\varphi}{(1+\lambda\sin^2\varphi)\sqrt{1-k^2\sin^2\varphi}}$$

$$\left. + 4\rho\int_0^{\frac{\pi}{2}} \frac{\frac{1}{\lambda}\left(-1+(1+\lambda\sin^2\varphi)\right)\left(\frac{1}{\lambda}\left(-1+(1+\lambda\sin^2\varphi)\right)\right)d\varphi}{(1+\lambda\sin^2\varphi)\sqrt{1-k^2\sin^2\varphi}}\right.$$

$$\text{cos}^{6d}.$$

Polarkoord.

$$V = \iint \kappa \, do \, \varphi^2 d\varphi \int_0^{2\pi} \frac{(\xi \cos\alpha + \varphi \cos^2\alpha)\, d\alpha}{(c^2 + \xi^2 + \varphi^2 + 2\varphi\xi\cos\alpha)^{\frac{3}{2}}}$$

$\xi = \xi_0 - x \qquad c = c_0 - z$

$$K^2 = \frac{4\varphi\xi}{c^2+\xi^2+\varphi^2+2\varphi\xi} \qquad \frac{1}{c^2+\xi^2+\varphi^2+2\varphi\xi} = \frac{K^2}{4\varphi\xi}$$

$$J = \int_0^{2\pi} \frac{(\xi\cos\alpha + \varphi\cos^2\alpha)\, d\alpha}{(c^2+\xi^2+\varphi^2+2\varphi\xi\cos\alpha)^{\frac{3}{2}}} = \frac{2(\xi+\varphi)}{(c^2+\xi^2+\varphi^2+2\varphi\xi)^{\frac{3}{2}}} \int_0^{\pi} \frac{d\psi}{(1-K^2\sin^2\psi)^{\frac{3}{2}}} - \frac{4(\xi+2\varphi)}{(\quad)^{\frac{3}{2}}} \int_0^{\pi} \frac{\sin^2\psi\, d\psi}{(1-K^2\sin^2\psi)^{\frac{3}{2}}}$$

$$+ \frac{8\varphi}{(\quad)^{\frac{3}{2}}} \int_0^{\pi} \frac{\sin^4\psi\, d\psi}{(1-K^2\sin^2\psi)^{\frac{3}{2}}}$$

$$\int \frac{\sin^4\psi\, d\psi}{\Delta\psi^{\frac{3}{2}}} = \frac{1}{K^2} \int \frac{\sin^2\psi\, d\psi}{\Delta\psi^{\frac{3}{2}}} - \frac{1}{K^2} \int \frac{\sin^2\psi\, d\psi}{\Delta\psi^{\frac{1}{2}}}$$

$$J = \frac{1}{4} \frac{(\xi+\varphi)K^3}{(\varphi\xi)^{\frac{3}{2}}} \int_0^{\pi} \frac{d\psi}{\Delta\psi^3} + \left(\frac{K}{\varphi^{\frac{1}{2}}\xi^{\frac{3}{2}}} - \frac{1}{2} \frac{(\xi+2\varphi)K^3}{(\varphi\xi)^{\frac{3}{2}}} \right) \int_0^{\pi} \frac{\sin^2\psi\, d\psi}{\Delta\psi^3} - \frac{3K}{\varphi^{\frac{1}{2}}\xi^{\frac{3}{2}}} \int_0^{\pi} \frac{\sin^2\psi\, d\psi}{\Delta\psi}$$

$K'^2 = 1 - K^2$

$$J = \frac{2}{4} \frac{(\xi+\varphi)}{(\varphi\xi)^{\frac{3}{2}}} \frac{K^3}{K'^2} E + \left(\frac{K}{\varphi^{\frac{1}{2}}\xi^{\frac{3}{2}}} - \frac{1}{2} \frac{(\xi+2\varphi)K^3}{(\varphi\xi)^{\frac{3}{2}}} \right) \frac{2}{K^2} \left(\frac{1}{K^2} E - \frac{K'^2}{K^2} F \right)$$

$$- \frac{2}{K\varphi^{\frac{1}{2}}\xi^{\frac{3}{2}}} (F - E)$$

$$\frac{\partial \chi}{\partial x} = K d\alpha \rho^2 d\rho \left\{ \frac{1}{r^5}\left(-3\xi\cos\alpha - 3\rho\cos^2\alpha\right) + \frac{1}{r^5}\left(-3\eta\sin\alpha - 3\rho\sin^2\alpha\right) \right.$$

$$+ \frac{1}{r^7}\left(15\xi^2\cos\alpha + 45\xi\rho\cos^2\alpha + 45\xi\rho^2\cos^3\alpha + 15\rho^3\cos^4\alpha\right)$$

$$+ \frac{1}{r^7}\left(15\xi^2\eta\sin\alpha + 30\rho\xi\eta\sin\alpha\cos\alpha + 15\rho^2\eta\sin\alpha\cos^2\alpha + 15\xi^2\rho\sin^2\alpha + 30\xi\rho^2\cos\alpha\sin^2\alpha \right.$$

$$\left. + 15\rho^3\sin^2\alpha\cos^2\alpha\right)$$

$$\frac{1}{r^5} = \frac{1}{N^{\frac{5}{2}}} - 5\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)}{N^{\frac{7}{2}}} + \frac{35}{2}\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)^2}{N^{9/2}} - \frac{315}{6}\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)^3}{N^{11/2}}$$

$$\frac{1}{r^7} = \frac{1}{N^{7/2}} - 7\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)}{N^{9/2}} + \frac{63}{2}\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)^2}{N^{11/2}} - \frac{693}{6}\frac{(\rho\xi\cos\alpha + \rho\eta\sin\alpha)^3}{N^{13/2}}$$

$$\frac{8\rho}{K^2}\cdot\frac{K^3}{8(\rho(\xi))^{\frac{3}{2}}}$$

$$\frac{K}{\rho^{\frac{1}{2}}\xi^{\frac{3}{2}}} - \frac{1}{2}\frac{(\xi+2\rho)K^3}{(\rho\xi)^{\frac{3}{2}}}$$

$$\frac{\partial X}{\partial x} = \kappa d\alpha \rho^2 d\rho \left\{ -9 \frac{\xi \cos\alpha \, d\alpha}{(c^2+\xi^2+\rho^2+2\rho\xi\cos\alpha)^{\frac{5}{2}}} + 3\rho \frac{\sin^2\alpha}{(\quad)^{\frac{5}{2}}} \right\}$$

$$-9 \frac{\xi\cos\alpha\, d\alpha}{(\quad)^{\frac{5}{2}}} - 3\rho \frac{\sin^2\alpha}{(\quad)^{\frac{5}{2}}} - 9\rho \frac{\cos^2\alpha}{(\quad)^{\frac{5}{2}}} =$$

$$\frac{9}{64} \cdot \frac{1}{16} \quad \frac{9}{1024}$$

$$\kappa^2 = \frac{4\rho\xi}{c^2+\xi^2+\rho^2+2\rho\xi}$$

$$\frac{d\alpha}{(\quad)^{\frac{5}{2}}} \qquad \frac{\frac{284}{64}}{1024}$$

$$\frac{1}{c} = \varphi$$

$$d\alpha = 2\varphi$$

$$-18\frac{(\xi+\rho)}{2} \frac{1}{(c^2+\xi^2+\rho^2+2\rho\xi)^{\frac{5}{2}}} \int_0^{\pi} \frac{d\varphi}{(1-\kappa^2\sin^2\varphi)^{\frac{5}{2}}}$$

$$+12\frac{(3\xi+4\rho)}{2} \frac{1}{(\quad)^{\frac{5}{2}}} \int \frac{\sin^2\varphi\, d\varphi}{(\quad)^{\frac{5}{2}}} \qquad 1 + \frac{1}{16} + \frac{9}{1024}$$

$$-48\rho \frac{1}{(\quad)^{\frac{5}{2}}} \int \frac{\sin^4\varphi\, d\varphi}{(\quad)^{\frac{5}{2}}}$$

$$\cos\alpha = 1 - 2\sin^2\frac{\alpha}{2}$$

$$\left(\xi^2+\rho^2+2\rho\xi\cos\alpha\right)$$

$$\cos\alpha = 1 - 2\sin^2\frac{\alpha}{2}$$

$$\varphi.$$

$$\cos^2\alpha = 1 - 4\sin^2\varphi + 4\sin^4\varphi$$

$$(\xi+\rho)^2\left(1 - \frac{4\rho\xi}{(\xi+\rho)^2}\sin^2\frac{\alpha}{2}\right.$$

$$(\xi+\rho) + 2\frac{(\xi+2\rho)}{\lambda} - 4\frac{\rho}{\lambda^2}$$

$$-\frac{2}{\lambda}(\xi+2\rho) - \frac{8\rho}{\lambda^2}$$

$$+\frac{15\left(\xi^3\cos\alpha+3\xi^2\rho\cos^2\alpha+3\xi\rho^2\cos^3\alpha+\rho^3\cos^4\alpha\right)}{\nu^7}$$

$$-\frac{g\left(\xi+\rho\cos\alpha\right)\cos\alpha}{\nu^5}\cdot\qquad -\frac{3\left(\eta+\rho\sin\alpha\right)\sin\alpha}{\nu^5}=-\frac{3\eta\sin\alpha}{\nu^5}-\frac{3\rho\sin^2\alpha}{\nu^5}$$

$$-g\pi\frac{\rho}{N^{5/2}}+45\frac{\rho\xi^2\pi}{N^{7/2}}+$$

$$-3\pi\frac{\rho}{N^{5/2}}+\qquad +15\frac{\rho\eta^2\pi}{N^{7/2}}$$

$$+45\frac{\rho\xi^2\pi}{N^{7/2}}\qquad +\frac{45\pi}{4}\frac{\rho^2}{N^{7/2}}$$

$$-105\pi\frac{\rho\xi^4}{N^{9/2}}\qquad -\frac{945}{4}\pi\frac{\xi^2\rho}{N^{9/2}}$$

$$+15\pi\frac{\xi^2\rho^2}{N^{7/2}}+\frac{15}{4}\pi\frac{\rho^2}{N^{7/2}}-\frac{210}{4}\pi\frac{\rho^3\xi^2}{N^{9/2}}-105\pi\frac{\xi^2\eta^2\rho}{N^{9/2}}-\frac{105}{4}\pi\frac{\rho^3\eta^2}{N^{9/2}}$$

$$a^2b=\xi^2\eta+2\rho\xi\eta\cos\alpha+\rho^2\eta\cos^2\alpha+\xi^2\rho\sin\alpha+2\xi\rho^2\sin\alpha\cos\alpha+\rho^3\sin\alpha\cos^2\alpha.$$

$$\frac{15a^2b\,\mu_y}{\nu^7}=15\frac{\xi^2\eta\sin\alpha}{\nu^7}+30\rho\xi\eta\sin\alpha\cos\alpha+15\rho^2\eta\cos^2\alpha\sin\alpha$$

$$+15\frac{\xi^2\rho\sin^2\alpha}{\nu^7}+30\rho^2\xi\sin^2\alpha\cos\alpha+15\rho^3\sin^2\alpha\cos^2\alpha.$$

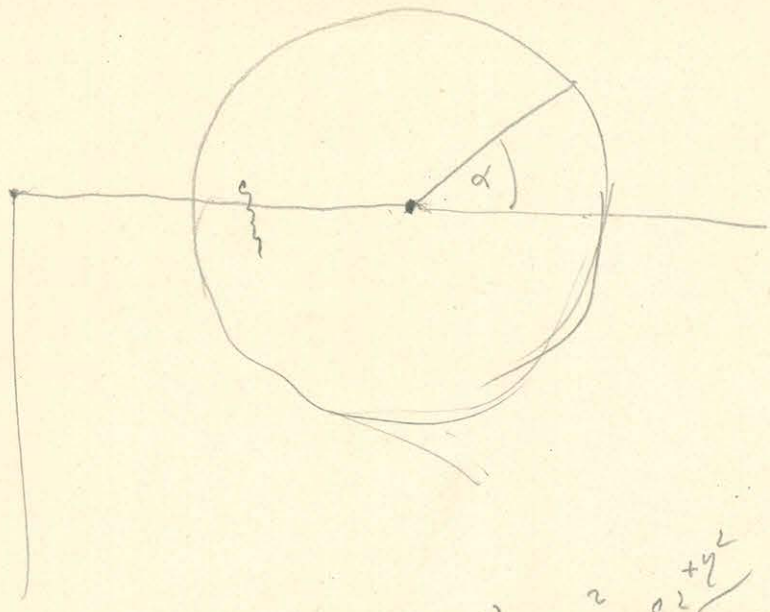
$$-12\pi\frac{\rho}{N^{5/2}}+15\left(7\xi^2+\eta^2\right)\pi\frac{\rho}{N^{7/2}}+15\pi\frac{\rho^3}{N^{7/2}}-105\pi\xi^2\left(\xi^2+\eta^2\right)\frac{\rho}{N^{9/2}}-\frac{105}{4}\pi\left(11\xi^2+\eta^2\right)\frac{\rho^3}{N^{9/2}}$$

$$\frac{1}{\nu^5}=\frac{1}{\left(c^2+\xi^2+\eta^2+\rho^2\right)^{\frac{5}{2}}\left(1+\dfrac{2\rho\xi\cos\alpha+2\rho\eta\sin\alpha}{c^2+\xi^2+\eta^2+\rho^2}\right)^{\frac{5}{2}}}$$

$$\frac{1}{(1+x)^{\frac{5}{2}}}=1-\frac{5}{2}x^2+\frac{35}{8}x^2-\frac{315}{48}x^3$$

$$\frac{1}{(1+x)^{7/2}}=1-\frac{7}{2}x+\frac{63}{8}x^2-\frac{693}{48}x^3$$

$c=0 \quad \eta=0 \quad \xi=3 \quad \rho=1$



$a = \xi + \rho\cos\alpha$

$b = \rho\sin\alpha$

$r^2 = c^2 + \xi^2 + \eta^2 + 2c\xi\cos\alpha + \rho^2 + 2\rho z\sin\alpha$

10 6

$\mu_x = \mu\cos\alpha \qquad \mu_y = \mu\sin\alpha$

$N = c^2 + \xi^2 + \eta^2 + \rho^2$

$\mu = d\alpha\, k\rho^2 d\rho\, dz$

$$\frac{1}{r_5} = \frac{1}{N^{\frac{5}{2}}} - 5\frac{\rho\xi\cos\alpha}{N^{\frac{7}{2}}} - 5\frac{\rho z\sin\alpha}{N^{\frac{7}{2}}}$$

$$\frac{1}{r_7} = \frac{1}{N^{\frac{7}{2}}} - 7\frac{\rho\xi\cos\alpha}{N^{\frac{9}{2}}} - 7\frac{\rho z\sin\alpha}{N^{\frac{9}{2}}}$$

$\frac{5}{2}\,\frac{7}{2}\,\frac{9}{2}\,\frac{1}{6}$

$\frac{315}{48}$

$$\frac{\partial X}{\partial x} = \iint d\alpha\, k\rho^2 d\rho \Big\{ -$$

$\cos^2\alpha = 1 - 2\sin^2\frac{\alpha}{2} + 2\sin^4\frac{\alpha}{2}$

$\frac{7}{2}\,\frac{9}{2}\,\frac{11}{2}\,\frac{1}{6}$ $\quad \frac{63}{63}$ $\quad 6\rho^3$

$-6\cos^2\alpha$

$\cos\alpha = 1 - 2\sin^2\frac{\alpha}{2}$

$$\left(-9\xi - 3\rho\right)\frac{d\alpha}{(\,)^{\frac{5}{2}}} - \frac{6\rho\, d\alpha}{(\,)^{\frac{5}{2}}}$$

$$-9(\xi+\rho)\frac{d\alpha}{(\,)^{\frac{5}{2}}}$$

$$+18\frac{\xi\sin^2\frac{\alpha}{2}}{(\,)^{\frac{5}{2}}} + 24\frac{\rho\sin^2\frac{\alpha}{2}}{(\,)^{\frac{5}{2}}}$$

$$+6(3\xi+4\rho)\frac{\sin^2\frac{\alpha}{2}\,d\alpha}{(\,)^{\frac{5}{2}}}$$

$$-24\rho\frac{\sin^4\frac{\alpha}{2}\,d\alpha}{(\,)^{\frac{5}{2}}}$$

maier 5 4h.0m 147.1

Tellercs a mágnestől 80cm-re

Áram beállás alatt 4h.40m.-kor Ind. 0.494 Amp

4h. 45m " 499

4h. 50 498

498

110cm

495

499

6h. 15 −3.8 0.498

6h. 55m 286.4 494

7h. 40m vües 147.3

130cm

vües 9h.25m 147.0

10h.10 " 72.6

10h.50m 220.1 0.492

Magnes 150cm

12. 10m. −10

1h.5m 301.1

4h.0 147.6

Magnes 160cm

4h.55 263.8

29.1

$$\frac{3\pi}{(\rho^4+c^2)^{5/2}}\rho^4 -$$

$$(12\rho^4+8c^2)(c^2+\rho^2)$$

$$12\rho^4+20c^2\rho^2+8c^4$$

$$-8c^4-12c^2\rho^2-4\rho^4$$

$$\int \frac{\chi^2 d\chi}{(c+\beta\chi)^{11/2}}$$

$$m=7$$

$$-\frac{5}{9}$$

$$\rho^4c^2-\rho^2c^4-c^6$$

$$-2c^3-3c\rho^2$$

$$-\chi\left(\frac{2c^2+3\rho^2}{(c^2+\rho^2)^{5/2}}\right)\chi -$$

$$-\frac{\pi\rho^3}{\nu}\,315^-\left(3\xi_L^2+\gamma_L^2\right)$$

$$-\frac{\pi\rho^3}{N\frac{\nu}{2}}\left(\frac{945^-}{8}\xi^2+\frac{315^-}{8}\gamma^2+\frac{105^-}{8}\xi_L^2+\frac{315^-}{8}\gamma^2+\frac{630}{8}\xi_L^2+\frac{210}{8}\gamma^2+\frac{1680}{8}\xi_L^2\right.$$

$$\left.+720\xi_L^2+720\gamma_L^2\right)$$

$$945^-$$
$$105^-$$
$$630$$
$$1680$$
$$720$$

$$\frac{945^-}{630}$$
$$315^-$$
$$210$$
$$720$$

$$\frac{1260}{}$$

$$-\frac{15}{8}\left(3\xi^2+\eta^2\right)\rho^6$$

$$\left[-\frac{3\rho^4}{(c^2+\rho^2)^{5/2}}-\left(3\xi^2+\eta^2\right)\left(\frac{15}{8}\rho^6+\frac{45}{4}\rho^4c^2\right)\frac{1}{(c^2+\rho^2)^{9/2}}\right]K\Pi\,dc$$

$$=-K\Pi\rho^4\left[\frac{3dc}{(c^2+\rho^2)^{5/2}}+\left(3\xi^2+\eta^2\right)\left(\frac{15}{8}\rho^2+3c^2\right)\frac{1}{(c^2+\rho^2)^{9/2}}\right]$$

$$+\frac{15}{8}\rho^2\int\frac{dc}{(c^2+\rho^2)^{9/2}}=+\frac{15}{8}\rho^2\left(\frac{16}{35}\frac{c^7}{\rho^8}+\frac{8}{5}\frac{c^5}{\rho^6}+2\frac{c^3}{\rho^4}+\frac{c}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$-\frac{45}{4}\int\frac{c^2dc}{(c^2+\rho^2)^{9/2}}=-\frac{45}{4}\left(\frac{8}{105}\frac{c^7}{\rho^6}+\frac{4}{15}\frac{c^5}{\rho^4}+\frac{1}{3}\frac{c^3}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$\frac{15\cdot2}{35}+\frac{30}{35}+\frac{96}{35}\qquad\frac{15}{5}+\frac{48}{5}\qquad\frac{63}{5}$$

$$\frac{15}{4}+\frac{48}{4}$$

$$\left(\frac{126}{35}\frac{c^7}{\rho^6}+\frac{63}{5}\frac{c^5}{\rho^4}+\frac{63}{4}\frac{c^3}{\rho^2}+\frac{15}{8}c\right)\qquad+\frac{15}{5}-\frac{15}{5}$$

$$\frac{15}{4}-\frac{15}{4}$$

$$\frac{15\cdot2}{35}$$

$$-3\rho^4\int\frac{dc}{(c^2+\rho^2)^{9/2}} = -3\rho^4\left(\frac{2c^3}{3\rho^4}+\frac{c}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{3/2}}$$

$$+\frac{225}{8}\rho^6\int\frac{dc}{(c^2+\rho^2)^{9/2}} = +\frac{225}{8}\rho^6\left(\frac{16}{35}\frac{c^7}{\rho^8}+\frac{8}{5}\frac{c^5}{\rho^6}+2\frac{c^3}{\rho^4}+\frac{c}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$+\frac{277}{4}\rho^4\int\frac{c^2dc}{(c^2+\rho^2)^{9/2}} = +\frac{277}{4}\rho^4\left(\frac{8}{105}\frac{c^7}{\rho^6}+\frac{4}{15}\frac{c^5}{\rho^4}+\frac{1}{5}\frac{c^3}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$+13\rho^2\int\frac{c^4dc}{(c^2+\rho^2)^{9/2}} = +13\rho^2\left(\frac{2}{35}\frac{c^7}{\rho^4}+\frac{1}{5}\frac{c^5}{\rho^2}\right)\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$+6\int\frac{c^6dc}{(c^2+\rho^2)^{9/2}} = +6\,\frac{c^7}{7\rho^2}\,\frac{1}{(c^2+\rho^2)^{7/2}}$$

$$+6\int\frac{dc}{c^3} = -\frac{6}{2}\frac{1}{c^2}$$

$$\Sigma = \left(\frac{450}{35}+\frac{554}{105}+\frac{26}{35}+\frac{30}{35}\right)\frac{c^7}{\rho^2}$$

$$\frac{506.3}{1518}\qquad \frac{554}{2072}\qquad \frac{675}{15}+\frac{277}{15}+\frac{29}{15}\qquad 991\qquad \frac{952}{35}\qquad \frac{675}{12}+\frac{277}{12}\qquad 952$$

$$\Sigma = \frac{2072}{105}\frac{c^7}{\rho^2}+\frac{991}{15}\frac{c^5}{\rho^4}+\frac{952}{12}c^3\rho^2+\frac{225}{8}c\rho^4$$

$$\frac{1}{\left(\xi^2+\eta^2+\zeta^2+2\rho\cos\gamma\,\xi+2\rho\sin\alpha\,\eta+2\rho\sin\beta\,\zeta+\rho^2\right)^{\frac{1}{2}}} = \frac{1}{(\zeta^2+\rho^2)^{\frac{1}{2}}} - \rho\frac{\xi\cos\alpha}{(\zeta^2+\rho^2)^{\frac{3}{2}}} - \rho\frac{\eta\sin\alpha}{(\zeta^2+\rho^2)^{\frac{3}{2}}}$$

$$\frac{\partial E}{\partial \xi} = -\rho\frac{\rho\cos\alpha+\xi}{(\quad)^{\frac{3}{2}}} \qquad \frac{\partial E}{\partial \eta} = -\rho\frac{\rho\sin\alpha+\eta}{(\quad)^{\frac{3}{2}}}$$

$$\frac{\partial^2 E}{\partial \xi^2} = +3\rho\frac{(\rho\cos\alpha+\xi)^2}{(\quad)^{\frac{5}{2}}} - \frac{\rho}{(\quad)^{\frac{3}{2}}} = -\frac{\rho}{(\quad)^{\frac{3}{2}}} + 3\rho\frac{\rho^2\cos^2\alpha}{(\quad)^{\frac{5}{2}}}$$

$$\frac{\partial^2 E}{\partial \eta^2} = \qquad\qquad = -\frac{\rho}{(\quad)^{\frac{3}{2}}} + 3\rho\frac{\rho^2\sin^2\alpha}{(\quad)^{\frac{5}{2}}}$$

$$\frac{\partial^2 E}{\partial \xi\,\partial \eta} = +3\rho\frac{\rho^2\sin\alpha\cos\alpha}{(\quad)^{\frac{5}{2}}}$$

$$\frac{1}{r'} = \frac{1}{r_0} + \frac{\partial F}{\partial \xi}\xi + \frac{\partial F}{\partial \eta}\eta + \frac{1}{2}\frac{\partial^2 F}{\partial x^2}\xi^2 + \frac{1}{2}\frac{\partial^2 F}{\partial y^2}\eta^2 + \frac{\partial^2 F}{\partial x\,\partial y}\xi\eta.$$

$$\left(\xi\cos\alpha+\eta\sin\alpha\right)^2$$

$$\frac{\partial X}{\partial x} = -\frac{3k}{(\rho^2+c^2)^{\frac{5}{2}}}\left(3\rho^4 d\rho \cos^2\alpha\, d\alpha + 3\rho^4 d\rho \sin^2\alpha\right)$$

$$\frac{\partial X}{\partial x} = -\frac{9k}{(\rho^2+c^2)^{\frac{5}{2}}}\left(\right)$$

$$\frac{\partial X}{\partial x} = -9k\iint \frac{\rho^4 d\rho\, d\alpha}{(\rho^2+c^2)^{\frac{5}{2}}} + 45k\iint \frac{\rho^6 d\rho \cos^2\alpha}{(\rho^2+c^2)^{\frac{7}{2}}}$$

$$\frac{\partial X}{\partial x} = -18\pi k\int \frac{\rho^4 d\rho}{(\rho^2+c^2)^{\frac{5}{2}}} + 45\pi k\int \frac{\rho^6 d\rho}{(\rho^2+c^2)^{\frac{7}{2}}}$$

$$= -18\pi k\left(-\frac{4\rho^3}{3} - 2c^2\right)\frac{1}{(\rho^2+c^2)^{\frac{3}{2}}}$$

$$\frac{\partial X}{\partial x} = -18\pi k\left(\left(-\frac{4\rho^3}{3} - c^2\rho\right)\frac{1}{(\rho^2+c^2)^{\frac{3}{2}}} + \log\left(\rho+\sqrt{\rho^2+c^2}\right)\right)$$

$$+45\pi k\left(\left(-\frac{23}{15}\rho^5 - \frac{7}{3}c^2\rho^3 - c^4\rho\right)\frac{1}{(\rho^2+c^2)^{\frac{5}{2}}} + \log\left(\rho+\sqrt{\rho^2+c^2}\right)\right)$$

$$\frac{\partial X}{\partial x} = +27\pi k \log\frac{r+\sqrt{r^2+c^2}}{c} - \pi k$$

$$\frac{\partial X}{\partial x} = +63\pi k \log\frac{r+\sqrt{r^2+c^2}}{c} + 18\pi k\, r\,\frac{\frac{4}{3}r^2+c^2}{(r^2+c^2)^{\frac{3}{2}}} - 45\pi k r\,\frac{\frac{23}{15}r^4+\frac{7}{3}r^2c^2+c^4}{(r^2+c^2)^{\frac{5}{2}}}$$

$$+6\pi k r\,\frac{4r^4+7c^2r^2+3c^4}{(r^2+c^2)^{\frac{5}{2}}} - 3\pi k r\,\frac{23r^4+35c^2r^2+15c^4}{(r^2+c^2)^{\frac{5}{2}}}$$

$$+3\pi k r\,\frac{8r^4+14c^2r^2+6c^4-23r^4-35c^2r^2-15c^4}{(r^2+c^2)^{\frac{5}{2}}}$$

$$\frac{\partial X}{\partial x} = 63\pi k \log\frac{r+\sqrt{r^2+c^2}}{c} - 9\pi k r\,\frac{5r^4+10c^2r^2+3c^4}{(r^2+c^2)^{\frac{5}{2}}}$$

$r=c$

$r=c\quad \frac{\partial X}{\partial x} = 63\pi k\cdot 0{,}8801 - 9\pi k r\,15 = \pi k\left(63\cdot 0{,}8801 - 135\right)$

$$\frac{3.450}{150\ m.} = 140\ k.$$

$$\frac{q}{m} = 140\ k$$

$$k = \frac{q}{140}\,\frac{1}{15\ m}$$

$$+45\pi\frac{\rho\xi^2}{N^{7/2}}+315\cdot\frac{3}{2}\frac{\frac{3}{4}\pi\xi\rho^4+3\frac{1}{4}\pi\xi\eta^2\rho^2}{N^{11/2}}-9\pi\frac{\rho}{N^{5/2}}-\frac{315}{2}\cdot\frac{\frac{3}{4}\pi\rho^3\xi^2+\frac{1}{4}\pi\rho^3\eta^2}{N^{9/2}}$$

$$+15\pi\frac{\rho\xi^2}{N^{7/2}}+\frac{315}{2}\frac{3\frac{1}{4}\pi\rho^3\xi^2\eta^2+\frac{3}{4}\pi\rho^3\eta^4}{N^{11/2}}-3\pi\frac{\rho}{N^{5/2}}-\frac{105}{2}\frac{\frac{1}{4}\pi\rho^3\xi^2+\frac{3}{4}\pi\rho^3\eta^2}{N^{9/2}}$$

$$-105\pi\frac{\rho\xi^4}{N^{9/2}}-\frac{3465}{2}\frac{\frac{3}{4}\pi\rho^3\xi^6+\frac{3}{4}\pi\rho^3\eta^2\xi^4}{N^{13/2}}+45\pi\frac{\rho\xi^2}{N^{7/2}}+\frac{2835}{2}\frac{\frac{3}{4}\pi\rho^3\xi^4+\frac{1}{4}\pi\rho^3\xi^2\eta^2}{N^{11/2}}$$

$$-315\frac{3}{4}\pi\frac{\rho^3\xi^2}{N^{9/2}}+15\frac{1}{4}\pi\frac{\rho^3}{N^{7/2}}$$

$$-105\pi\frac{\rho\xi^2\eta^2}{N^{9/2}}-\frac{3465}{2}\frac{\frac{3}{4}\pi\rho^3\xi^4\eta^2+\frac{3}{4}\pi\rho^3\xi^2\eta^4}{N^{13/2}}+1890\cdot\frac{\frac{1}{4}\pi\rho^3\xi^2\eta^2}{N^{11/2}}-105\frac{\frac{1}{4}\pi\rho^3\eta^2}{N^{9/2}}$$

$$+15\pi\frac{\xi^2\rho}{N^{7/2}}+\frac{945}{2}\frac{\frac{1}{4}\pi\rho^3\xi^4+\frac{3}{4}\rho^3\xi^2\eta^2}{N^{11/2}}-210\frac{\frac{1}{4}\pi\rho^3\xi^2}{N^{9/2}}+15\frac{1}{4}\pi\frac{\rho^3}{N^{7/2}}$$

$$-12\pi\frac{\rho}{N^{5/2}}+\frac{15}{2}\pi\frac{\rho^3}{N^{7/2}}+15\pi\left(7\xi^2+\eta^2\right)\frac{\rho}{N^{7/2}}-105\pi\xi^2\left(\xi^2+\eta^2\right)\frac{\rho}{N^{9/2}}$$

$$-105\pi\left(4\xi^2+\eta^2\right)\frac{\rho^3}{N^{9/2}}+\frac{6615}{2}\pi\xi^2\left(\xi^2+\eta^2\right)\frac{\rho^3}{N^{11/2}}-\frac{10395}{8}\pi\xi^2\left(\xi^2+\eta^2\right)^2\frac{\rho^3}{N^{13/2}}$$

$r\,dr\,d\alpha$

$$r = \sqrt{u^2+v^2}$$

$$dr = \frac{u\,du + v\,dv}{\sqrt{u^2+v^2}}$$

$$\cos\alpha = \frac{u}{\sqrt{u^2+v^2}}$$

$$\sin\alpha = \frac{v}{\sqrt{u^2+v^2}}$$

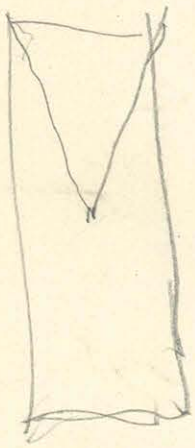
$$d\alpha = \frac{\sqrt{u^2+v^2}}{u}\cdot\left(\frac{1}{\sqrt{u^2+v^2}} - \frac{v^2}{(u^2+v^2)^{\frac{3}{2}}}\right)dv + \frac{\sqrt{u^2+v^2}}{u}\left(\frac{uv}{(u^2+v^2)^{\frac{3}{2}}}\right)du$$

$$d\alpha = \frac{1}{u}\left(1 - \frac{v^2}{u^2+v^2}\right)dv + \frac{v}{(u^2+v^2}\,du$$

$$d\alpha = \frac{u\,dv + v\,du}{(u^2+v^2)}$$

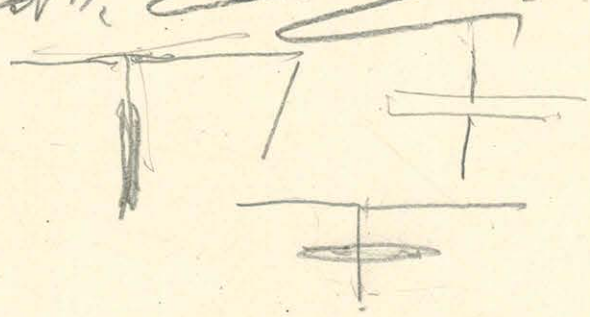
$$\frac{(u\,du + v\,dv)(u\,dv + v\,du)}{u^2+v^2}$$

$$\frac{u^2\,du\,dv + v^2\,du\,dv + uv\,(du^2 + dv^2)}{u^2+v^2}$$



$$-12\pi \frac{\rho^4}{N^{\frac{5}{2}}}$$

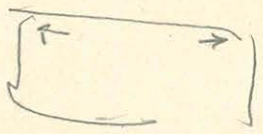
$$+45\pi \frac{(3\xi^2+\eta^2)\rho^4}{N^{\frac{7}{2}}} + 15\frac{\rho^2}{N^{\frac{5}{2}}} - \frac{315}{2}\frac{(3\xi^2+\eta^2)\rho^2}{N^{\frac{9}{2}}} + \frac{945\pi}{8}(3\xi^2+\eta^2)$$



$$\frac{\partial X}{\partial x}$$

$$\frac{\partial X}{\partial x} = K\pi\, d\omega \int \left\{ -\frac{3\rho^4}{(c^2+\rho^2)^{\frac{5}{2}}} - (3\xi^2+\eta^2)\left(\frac{15}{8}\rho^6 - \frac{45}{4}c^2\rho^4\right)\frac{1}{(c^2+\rho^2)^{\frac{9}{2}}} \right\} d\omega$$

$$\frac{\partial X}{\partial x} = -K\pi \int_{c}^{c_1} \left\{ \frac{c(2c^2+3\rho^2)}{(c^2+\rho^2)^{\frac{3}{2}}} + \frac{15}{8}\frac{c\rho^4(3\xi^2+\eta^2)}{(c^2+\rho^2)^{\frac{7}{2}}} \right\}$$



$$-12\pi\int_0^\rho \frac{\rho}{(c^2+\rho^2)^{5/2}} = -12\pi\left[-\frac{1}{3}\frac{1}{(c^2+\rho^2)^{3/2}}\right]_0^\rho = \frac{4\pi}{c^3} - \frac{4\pi}{(c^2+\rho^2)^{3/2}}$$

$$+45\pi(3\xi^2+\eta^2)\frac{\rho}{(c^2+\rho^2)^{3/2}} = +45\pi(3\xi^2+\eta^2)\left[-\frac{\rho^3}{3}-\frac{\rho}{5}c^2\right]_0^\rho$$

$$-12\pi\int_0^\rho \frac{\rho^3 d\rho}{(c^2+\rho^2)^{5/2}} = -12\pi\left(\rho^2-\frac{2c^2}{3}\right)\frac{1}{(c^2+\rho^2)^{3/2}} = +12\pi\left(\rho^2+\frac{2}{3}c^2\right)\frac{1}{(c^2+\rho^2)^{3/2}} - \frac{8\pi}{c^3}$$

$$+45\pi(3\xi^2+\eta^2)\int_0^\rho \frac{\rho^3 d\rho}{(c^2+\rho^2)^{7/2}} = +45\pi(3\xi^2+\eta^2)\left[-\frac{\rho^3}{3}-\frac{2c^2}{15}\right)\frac{1}{(c^2+\rho^2)^{5/2}} =$$

$$= -45\pi(3\xi^2+\eta^2)\left(\rho^2+\frac{2}{5}c^2\right)\frac{1}{(c^2+\rho^2)^{3/2}} + \frac{6\pi(3\xi^2+\eta^2)}{c^3}$$

$$+15\pi\int_0^\rho \frac{\rho^5 d\rho}{(c^2+\rho^2)^{7/2}} = +15\pi\left[-\rho^3-\frac{3}{5}c^2\rho-\frac{8}{15}c^4\right)\frac{1}{(c^2+\rho^2)^{5/2}} =$$

$$= -15\pi\left(\rho^3+\frac{3}{5}c^2\rho+\frac{8}{15}c^3\right)\frac{1}{(c^2+\rho^2)^{5/2}} + \frac{8\pi}{c}$$

$$-\frac{315}{4}\pi(3\xi^2+\eta^2)\int_0^\rho \frac{\rho d\rho}{(c^2+\rho^2)^{9/2}} = -\frac{315}{2\cancel{4}}\pi(3\xi^2+\eta^2)\left[-\frac{\rho^5}{3}-\frac{4}{15}c^2\rho-\frac{8}{105}c^4\right)\frac{1}{(c^2+\rho^2)^{7/2}} =$$

$$\frac{\partial \chi}{\partial x} = -K\pi\left\{-c\left(2c^2+3\rho^2\right)\frac{1}{(c^2+\rho^2)^{3/2}} - (3\xi^2+\eta^2)\left(\frac{2c^2}{105}\frac{c^2}{\rho^2}+\frac{92}{105}c^2+\frac{22\rho^2}{8}c\right)\frac{1}{(c^2+\rho^2)^{7/2}}\right.$$

$$\left. - \frac{6}{2}\frac{1}{c^2}(3\xi^2+\eta^2)\right\}$$

$$\frac{\partial \chi}{\partial x} = K\pi dc\pi\left\{\frac{-3\rho^7}{(c^2+\rho^2)^{5/2}}\right.\left. - (3\xi^2+\eta^2)\left(\frac{22\rho^5}{8}\frac{c^6}{\rho^2}+\frac{23}{4}c^4\rho^2+\frac{13}{4}c^2\rho^4+6c^6\right)\frac{1}{(c^2+\rho^2)^{9/2}}\right.$$

$$\left. + \frac{6(3\xi^2+\eta^2)}{c^2}\right\}$$

$$\frac{\Gamma}{\frac{1}{8}c^7}$$

$$\frac{1}{r^5} = \frac{1}{N^{\frac{5}{2}}} - 5\rho\frac{\xi\cos\alpha+\eta\sin\alpha}{N^{\frac{7}{2}}} - \frac{5}{2}\frac{\xi^2+\eta^2}{N^{\frac{7}{2}}} + \frac{35}{2}\rho^2\frac{(\xi\cos\alpha+\eta\sin\alpha)^2}{N^{\frac{9}{2}}}$$

$$\frac{1}{r7} = \frac{1}{N^{\frac{7}{2}}} - 7\rho\frac{\xi\cos\alpha+\eta\sin\alpha}{N^{\frac{9}{2}}} - \frac{7}{2}\frac{\xi^2+\eta^2}{N^{\frac{9}{2}}} + \frac{63}{2}\rho^2\frac{(\xi\cos\alpha+\eta\sin\alpha)^2}{N^{11/2}}$$

$$\frac{\partial X}{\partial x} = d\sigma\kappa\rho^2 d\rho\left\{-\frac{9}{r^5}(\xi+\rho\cos\alpha)\cos\alpha\,d\alpha - \frac{3}{r^5}(\eta+\rho\sin\alpha)\sin\alpha\,d\alpha + 15\frac{(\xi+\rho\cos\alpha)^2(\xi+\rho\cos\alpha)\cos\alpha}{r7}\right.$$
$$\left. + (\eta+\rho\sin\alpha)\sin\alpha\right\}$$

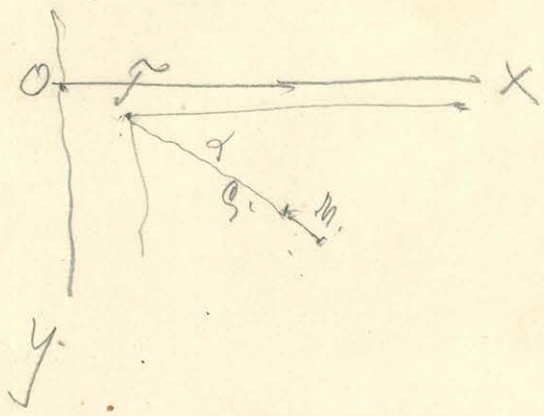
$$\frac{\partial X}{\partial x} = d\sigma\kappa\rho^2 d\rho\left\{-\frac{9\xi\cos\alpha}{r^5} - \frac{9\rho\cos^2\alpha}{r^5} - \frac{3\eta\sin\alpha}{r^5} - \frac{3\rho\sin^2\alpha}{r^5}\right.$$
$$+\frac{15}{r7}\left[\rho^2\cos^2\alpha(\xi\cos\alpha+\eta\sin\alpha) + 2\xi^2\rho\cos^2\alpha + 2\xi\eta\rho\cos\alpha\sin\alpha + \rho\xi^2\right.$$
$$\left.\left. + \rho^2\cos^2\alpha + 2\rho^2\xi\cos\alpha\right]\right\}$$
$$\rho^2\cos^2\alpha\,\xi + \rho^2\cos^2\alpha\sin\alpha\,\eta$$

$$\frac{\partial X}{\partial x} = d\sigma\kappa\rho^2 d\rho\left\{-\frac{9\pi\rho}{N^{\frac{5}{2}}} - \frac{3\pi\rho}{N^{\frac{5}{2}}} + 45\rho\frac{\pi\xi^2}{N^{\frac{7}{2}}} + 15\rho\frac{\pi\eta^2}{N^{\frac{7}{2}}} + \frac{45}{2}\rho\frac{\pi}{N^{\frac{7}{2}}}(\xi^2+\eta^2) + \frac{15}{2}\rho\frac{\pi}{N^{\frac{7}{2}}}(\xi^2+\eta^2)\right.$$
$$-\frac{315}{2}\rho^3\frac{\frac{3}{4}\pi\xi^2+\frac{1}{4}\pi\eta^2}{N^{\frac{9}{2}}} - \frac{105}{2}\rho^3\frac{\frac{1}{4}\pi\xi^2+\frac{3}{4}\pi\eta^2}{N^{\frac{9}{2}}}$$

$$+30\frac{\rho\pi\xi^2}{N^{\frac{7}{2}}} + 30\frac{\pi\rho\xi^2}{N^{\frac{7}{2}}} + \frac{15\pi\rho^3}{N^{\frac{7}{2}}} - \frac{315}{4}\frac{\pi\rho^3\xi^2}{N^{\frac{9}{2}}} - \frac{105}{4}\frac{\pi\rho^3\eta^2}{N^{9/2}} - 210\frac{\pi\rho^3\xi^2}{N^{\frac{9}{2}}}$$
$$\left.-\frac{105}{2}\rho^3\frac{\pi(\xi^2+\eta^2)}{N^{\frac{9}{2}}} + \frac{945}{2}\rho^5\frac{\frac{3}{4}\xi^2+\frac{1}{4}\eta^2}{N^{11/2}}\right\}$$

$$\frac{\partial X}{\partial x} = d\sigma\kappa\rho^2 d\rho\left\{-12\pi\frac{\rho}{N^{\frac{5}{2}}} + 45\pi(3\xi^2+\eta^2)\frac{\rho}{N^{\frac{7}{2}}} + 15\pi\frac{\rho^3}{N^{\frac{7}{2}}} - \frac{315}{\chi 2}\pi(3\xi^2+\eta^2)\frac{\rho^3}{N^{\frac{9}{2}}}\right.$$
$$\left.+\frac{945}{8}\pi(3\xi^2+\eta^2)\frac{\rho^5}{N^{\frac{11}{2}}}\right\}$$

$$\frac{\partial X}{\partial x} = -\frac{9a}{r^5} M_x + \frac{36}{r^5} M_y + \frac{15a^2}{r^7}(aM_x + bM_y)$$



$\S\,\eta.$ $\quad a = \xi + \rho\cos\alpha$

$b = \eta + \rho\sin\alpha.$

$r^2 = c^2 + \xi^2 + \eta^2 + 2\rho\xi\cos\alpha + 2\rho\eta\sin\alpha + \rho^2$

$\mu_x = \mu\cos\alpha \qquad \mu_y = \mu\sin\alpha$

$\mu = dc\,\rho\,d\rho\,d\alpha\, i \qquad i = k\rho$

$\mu = dc\,k\rho^2\,d\rho\,d\alpha$

$$\frac{1}{r^5} = \frac{1}{(c^2+\rho^2)^{\frac{5}{2}}} - 5\frac{\rho\cos\alpha}{(\;)^{\frac{7}{2}}}\xi - 5\frac{\rho\sin\alpha}{(\;)^{\frac{7}{2}}}\eta - \frac{5}{2}\frac{\xi^2}{(\;)^{\frac{7}{2}}} - \frac{5}{2}\frac{\eta^2}{(\;)^{\frac{7}{2}}} + \frac{35}{2}\frac{\rho^2\cos^2\alpha}{(\;)^{\frac{9}{2}}}\xi^2 + \frac{35}{2}\frac{\rho^2\sin^2\alpha}{(\;)^{\frac{9}{2}}}\eta^2$$

$$+ 35\frac{\rho^2\sin\alpha\cos\alpha}{(\;)^{\frac{9}{2}}}\xi\eta$$

$$\frac{1}{r^7} = \frac{1}{(\;)^{\frac{7}{2}}} - 7\frac{\rho\cos\alpha}{(\;)^{\frac{9}{2}}}\xi - 7\frac{\rho\sin\alpha}{(\;)^{\frac{9}{2}}}\eta - \frac{7}{2}\frac{\rho^2}{(\;)^{\frac{9}{2}}} - \frac{7}{2}\frac{\eta^2}{(\;)^{\frac{9}{2}}} + \frac{63}{2}\frac{\rho^2\cos^2\alpha}{(\;)^{\frac{11}{2}}}\xi^2 + \frac{63}{2}\frac{\rho^2\sin^2\alpha}{(\;)^{\frac{11}{2}}}\eta^2$$

$$+ 63\frac{\rho^2\sin\alpha\cos\alpha}{(\;)^{\frac{11}{2}}}\xi\eta$$

$a\mu_x + b\mu_y = \mu\cos\alpha\,\xi + \mu\sin\alpha\,\eta + \mu\rho.$

~~$a^2(a\mu_x + b\mu_y) = \mu\rho^3\cos^2\alpha + \mu\rho^2\cos^3\alpha\,\xi + \mu\rho^2\cos^2\alpha\sin\alpha\,\eta$~~

~~$a^2(a\mu_x + b\mu_y)$~~

$a^2(aM_x + bM_y) = \mu\rho^2\cos^3\alpha\,\xi + \mu\rho^2\cos^2\alpha\sin\alpha\,\eta + \mu\rho^2\cos^2\alpha + 2\mu\rho^2\cos\alpha\,\xi$

$\xi\cos\alpha + \rho\cos^2\alpha$

$\eta\sin\alpha + \rho\sin\alpha$

$(\cos\alpha\,\xi + 2\sin\alpha\,\eta + \rho)(\xi^2 + \rho^2\cos^2\alpha + 2\rho\xi\cos\alpha)$

$\xi^2\cos\alpha + \xi\rho^2\cos^2\alpha + 2\xi^2\rho\cos^2\alpha + \xi\eta^2\sin\alpha + \eta\rho^2\sin\alpha\cos^2\alpha + 2\xi\eta\rho\cos\alpha\sin\alpha$

$+ \rho\xi^2 + \rho^3\cos^2\alpha + 2\rho^2\xi\cos\alpha.$

$-\frac{5}{2}\frac{7}{2}\frac{7}{2} \qquad \frac{7}{2}\cdot\frac{7}{2}.$

$$\frac{\partial X}{\partial x} = -\frac{3C}{r^5} M_2 + \frac{15 a^2 C}{r^7} M_2 .$$

claim $dw i_0 = M_2$. $a = \xi + \rho \cos\alpha$.

$$r^2 = c^2 + \xi^2 + \eta^2 + 2\rho\xi\cos\alpha + 2\rho\eta\sin\alpha + \rho^2$$

$\frac{1}{r^5}$

$$+ 5(\xi^2 + \eta^2) + 10\xi^2 + 5\rho^2$$

$\frac{1}{r^7}$

$$5(3\xi^2 + \eta^2) + 5\rho^2 .$$

$$-\frac{35}{2}\rho^2(\xi^2+\eta^2) - 35\xi^2(\xi^2+\eta^2) - 70\xi^2\rho^2 - \frac{35}{2}\rho^4 - (\xi^2+\eta^2)$$

$$-35\rho^2(3\xi^2+\eta^2) - 35\xi^2(\xi^2+\eta^2) -$$

$C = 20 \quad c' = 27 \quad R = 7{,}5$

$\frac{\partial X}{\partial x} = -i_c \pi . 56{,}25 \; 0{,}000057166 = -i_c \pi . 0{,}0003215758$

$C = 20 \quad c' = 30 \quad r = 50 .$

$\frac{\partial X}{\partial x} = -i_c \pi . 2500 . \left(\frac{1}{2900^{\frac{3}{2}}} - \frac{1}{3400^{\frac{3}{2}}} \right) = -i_c \pi . 0{,}0003398$

$0{,}000000135792$

$C = 20 \quad c' = 20 \quad r = 25 .$

$\frac{\partial X}{\partial x} = -i_c \pi . 0{,}0085506$

$C = 20 \quad c' = 20 \quad r = 25$

$\frac{\partial X}{\partial x} = -i_c \pi . 0{,}0061948$

$C = 20 \quad c' = 20 \quad r = 15$

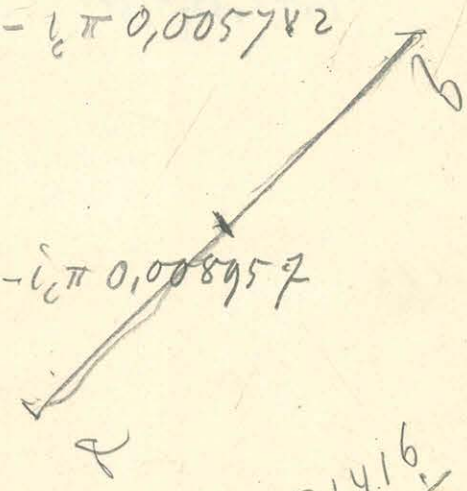
$\frac{\partial X}{\partial x} = -i_c \pi \; 0{,}0084772$

$r = 10$

$\frac{\partial X}{\partial x} = -i_c \pi \; 0{,}0057482$

Maximum $C = 20 \quad c' = 20 \quad h = 10 \quad r = 17{,}159$

$\frac{\partial X}{\partial x} = -i_c \pi \; 0{,}0089572$



$3{,}14.16.$

$\frac{da}{h\gamma}$

$w\,dt = da$

$+\frac{2}{3}\frac{1}{N^{\frac{5}{2}}}$ —

$\left(-\frac{5}{3}\rho^2-\frac{2}{3}c^2\right)\frac{1}{N^{\frac{5}{2}}}$

$+\frac{2}{3}\rho^2+\frac{2}{3}c^2-\frac{5}{3}\rho^2-\frac{4}{3}c^2$

$-\rho^2$

$3\xi^2+\eta^2$

$-\frac{1}{N^{\frac{5}{2}}}$

$\left(+7\rho^2+2c^2\right)\frac{1}{N^{7/2}}$

$\left(-\frac{63}{8}\rho^4-\frac{9}{2}\rho^2c^2-c^4\right)\frac{1}{N^{9/2}}$

$-c^4-\rho^4-2\rho^2c^2$

$+2c^4+7\rho^4+7\rho^2c^2$

$+2\rho^2c^2$

$-c^4-\frac{63}{8}\rho^4-\frac{9}{2}\rho^2c^2$

$-\frac{15}{8}\rho^4+\frac{5}{2}\rho^2c^2$

$\frac{c}{R^{\frac{5}{2}}}$

$\frac{2R}{(\ )^{\frac{5}{2}}}-5\frac{R^3}{(\ )}$

$\frac{\frac{1}{R^2}\frac{c}{R}}{R^2\left(1+\frac{c^2}{R^2}\right)^{\frac{5}{2}}}$ $\frac{1}{(1+x)^{\frac{5}{2}}}-\frac{5x^2}{(\ )^{7/2}}$

$\frac{2RC}{(R^2+C^2)^{\frac{5}{2}}}-\frac{5R^3C}{[\ ]^{7/2}}$ $x^4+1-5x^2=0$

$x^2=\frac{1}{4}$

$\frac{c^2}{R^2}$

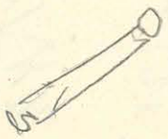
$\frac{R^2c^2}{(R^2+C^2)^{\frac{5}{2}}}$

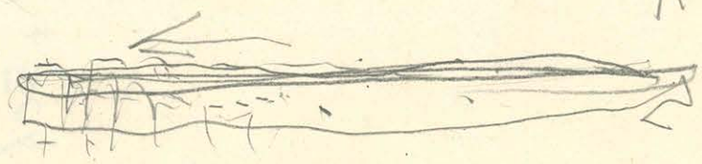
$\frac{R^2}{(\ )^{\frac{5}{2}}}-5\frac{R^2C^2}{(\ )^{7/2}}=0$

$R^4+R^2C^2-5R^2C^2=0$

$R^2(R^2-4C^2)=0$

$R=2C$





$-\rho^2\frac{1}{N^{\frac{5}{2}}}$

$+\frac{5\rho^2c^2}{N^{9/2}}+\frac{15}{8}\frac{\rho^4}{N^{9/2}}$

$\frac{15}{56} - \frac{8}{56}$

$$+\frac{1}{3}\frac{R^2}{N^{\frac{1}{2}}} + (3\xi^2+\eta^2)R^2\left(-2c^2-\frac{1}{7}R^2\right)\frac{1}{N^{\frac{11}{2}}} + \frac{15}{56}R^4(3\xi^2+\eta^2)\frac{1}{N^{\frac{11}{2}}}$$

$$+(3\xi^2+\eta^2)\frac{1}{N^{\frac{11}{2}}}\left(-2c^2R^2+\frac{1}{8}R^4\right)$$

$$\frac{2(c-\frac{h}{2})^2-R^2}{(R^2+c^2)^{\frac{1}{2}}}\left(1+\frac{5}{2}\frac{hc}{R^2+c^2}\right) - \frac{2(c+\frac{h}{2})^2-R^2}{(\quad)^{\frac{5}{2}}}\left(1-\frac{5}{2}\frac{hc}{R^2+c^2}\right)=0$$

$$\left(2(c-\tfrac{h}{2})^2-R^2\right)\left(R^2+c^2+\tfrac{5}{2}hc\right) - \left(2(c+\tfrac{h}{2})^2-R^2\right)\left(R^2+c^2-\tfrac{5}{2}hc\right)=0$$

$2(c-\frac{h}{2})^2 - R^2$

$$2(R^2+c^2)(c-\tfrac{h}{2})^2 - 2(R^2+c^2)(c+\tfrac{h}{2})^2 = -4ch(R^2+c^2)$$

$$5hc(c-\tfrac{h}{2})^2 + 5hc(c+\tfrac{h}{2})^2 = +10hc^3 + \frac{5}{2}ch^3$$

$$-5R^2hc$$

$$-4(R^2+c^2) - 5R^2 + 10c^2 + \frac{5}{2}h^2 = 0$$

$$-9R^2 + 6c^2 + \frac{5}{2}h^2$$

$$\boxed{R^2 = \frac{2}{3}c^2 + \frac{5}{18}h^2}$$

$$0{,}0003 = g\dot{c}_c \cdot 56{,}25 \frac{1}{3}\left[\frac{1}{(785{,}25)^{\frac{3}{2}}} - \frac{1}{(456{,}25)^{\frac{3}{2}}}\right]$$

$$= -0{,}000057166$$

$0{,}000002$

57.

~~0,0000~~

0,04.

0,1

2,895008

1,447504

4,342512

0,657488-5

2,659203

1,229602

3,988806

0,011194-4.

~~0,10~~

0,0000045445

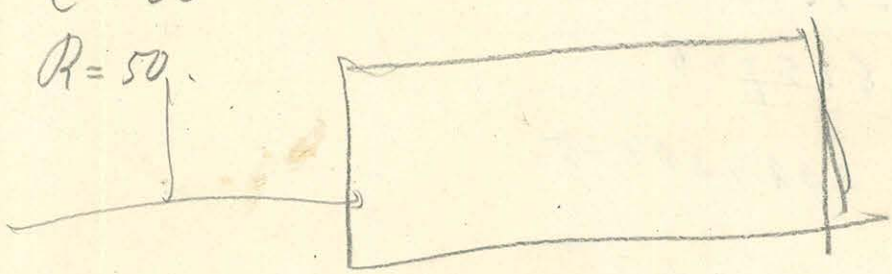
0,0001026611

0,0000571 66

$C = 20$

$C' = 50$

$R = 50$.



$C = 20$.

$C' = 20$.

20

27.

$$\frac{2R}{(\quad)^{\frac{5}{2}}} - \frac{5R^2}{(\quad)^{\frac{7}{2}}}$$

$$2R^3 + 2C'^2R - 5R^2 = 0$$

$$R^2 + (C - \tfrac{1}{2})^2$$

$$R^2\left[\frac{1}{(R^2+C^2)^{\frac{3}{2}}} - \frac{1}{(R^2+C'^2)^{\frac{3}{2}}}\right]$$

$$2R\left[\quad\right] + R^2\left(-3\frac{R}{(R^2+C^2)^{\frac{5}{2}}} + 3\frac{R}{(R^2+C'^2)^{\frac{5}{2}}}\right) = 0$$

$$+\frac{2R^3 + 2RC^2 - 3R^3}{(R^2+C^2)^{\frac{5}{2}}} - \frac{2R^3 + 2RC'^2 - 3R^3}{(R^2+C'^2)^{\frac{5}{2}}} = 0$$

$(R^2 + C^2 - 4C + 4)$

$$+\frac{2C^2 - R^2}{(R^2+C^2)^{\frac{5}{2}}} - \frac{2C'^2 - R^2}{(R^2+C'^2)^{\frac{5}{2}}} = 0$$

$$+\left(2C^2 - R^2\right)^{\frac{5}{2}} \frac{4}{R^2+C^2} \qquad \left(2(C-\tfrac{1}{2})^2 - R^2\right)^{\frac{5}{2}} \frac{4}{R^2+C^2} + \left(2(C+\tfrac{1}{2})^2 - R^2\right)^{\frac{5}{2}} \frac{4}{R^2+C^2} = 0$$

$$4C^2 + 1 - 2R^2 = 0 \qquad R^2 = 2C^2 + \tfrac{1}{2}$$

$R^2 = \frac{2}{3}400 + \frac{500}{18}$

8000

266,667 + 27,778.

27778

$R^2 = 294,445$ $\quad R =$

$\log R^2 = 2,469003$

$\log R = 1,234502$ $\quad R = 17,159$

$\frac{1}{(694,444)^{\frac{3}{2}}} - \frac{1}{(1194,44)^{\frac{3}{2}}}$

2,841627 $\quad$ 3,077164

1,420819 $\quad$ 1,538582

4,262457 $\quad$ 4,615746

0,737543 -5 $\quad$ 0,384254 -5

0,0000054644

24224

0,0000030420

0,008957.

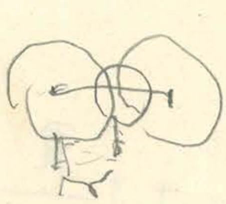
$(425)^2$ $\quad$ 925

2,628389 $\quad$ 2,966142

1,314195 $\quad$ 1,483071

3,942585 $\quad$ 4,449213

0,057415 -4 $\quad$ 0,550787 -5



15

8

0,000114134

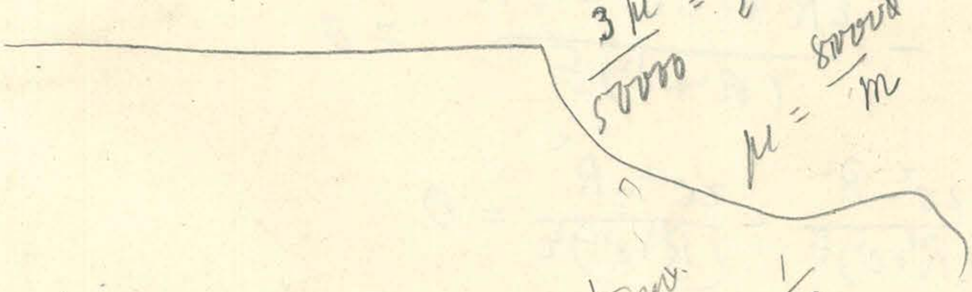
035546

0,000078588

0,0019647.

$\frac{3\mu}{50000} = \frac{1}{2m}.$

$\mu = \frac{80000}{m}$



$\frac{1}{100000}$ $\quad$ $\frac{1}{100}$

= 1

Dec. 6.	vor allem	v. 1h.	173,9	494,1
		1h 45	174,2	489,1
		3h 15	174,2	486,4
		8h 40	174,2	486,5
Dec 7		7h 30	176,7	495,7
		10h 5	173,2	492,1
		12h 45	173,1	486,7
		1h 45	173,2	486,7
		3h 35	173,3	485,1
		6h 30m	173,0	486,0
Dec. 8.		v. 8h 0	176,2	495,2
		9h 0	174,8	500,4
				↓ Tiere fressen alles
		11h	173,2	459,4
		12h	173,8	456,5
		3h	173,6	454,2
		4h 30	173,8	453,2
		8h 0	173,8	456,1
Dec. 9.	v.	7h 30	176,7	468,8
		10h 55	173,6	460,9
		4h 0	173,4	456,4
Dec. 10	v.	7h 45	175,2	468,1
		10h 6	173,3	461,2
		11h 15	173,3	460,2
		4h 45	172,8	454,9
Dec 11.	v.	~~10h 10~~		
		10h 10	173.8	463.8
Dec. 12		12h	173,7	458,8
Abspeisen				
		4h 0m	181.6	445.3

14/15 V.	8 h 0	184,4	463,2
	10 h 15	182,0	450,8
	3 h 20	182,0	446,5
15/16 V.	9 h 20	182,8	450,8

$X' = c^2 \qquad X = c^2 - bH \qquad A = (2ac - c^2) \qquad b = -2(a+c)$

$= c^2 + 2(a-c)H$

$$-\frac{4\pi A}{b}\left(\frac{1}{\sqrt{X'}} - \frac{1}{\sqrt{X}}\right) + \frac{4\pi}{b}\left\{\frac{X'+A}{\sqrt{X'}} - \frac{X+A}{\sqrt{X}}\right\} - \frac{4\pi}{b^3}\left\{\frac{1}{3}X'^{\frac{3}{2}} - \frac{1}{3}X^{\frac{3}{2}}\right.$$

$$\left. -2A\sqrt{X'} + 2A\sqrt{X} - A^2\frac{1}{\sqrt{X'}} + A^2\frac{1}{\sqrt{X}}\right\}$$

$$+\left(\frac{1}{\sqrt{X'}} - \frac{1}{\sqrt{X}}\right)\frac{4\pi A^2}{b^3} + \left(\sqrt{X'} - \sqrt{X}\right)\left(\frac{4\pi}{b} + \frac{8\pi A}{b^3}\right) - \frac{4\pi}{3b^3}\left(X'^{\frac{3}{2}} - X^{\frac{3}{2}}\right)$$

$\frac{\partial \zeta}{\partial a}$ komutní

$$= -\frac{\pi}{2(a-c)^3}\left\{c(2a-c)^2 - \frac{c^2(2a-c)^2}{\sqrt{c^2+2(a-c)H}} + \left((2a-c)^2 + c^2\right)\left(c - \sqrt{c^2+2(a-c)H}\right)\right.$$

$$\left. -\frac{1}{3}\left(c^3 - \left(c^2+2(a-c)H\right)^{\frac{3}{2}}\right)\right\}$$

$X' = c^2 + 2(a+c)H \qquad X = c^2 \qquad A = -(2ac + c^2) \qquad b = +2(a+c)$

$$-\frac{4\pi A}{b}\left(\frac{1}{\sqrt{X'}} - \frac{1}{\sqrt{X}}\right) + \frac{4\pi}{b}\left\{\frac{X'+A}{\sqrt{X'}} - \frac{X+A}{\sqrt{X}}\right\} - \frac{4\pi}{b^3}\left\{\frac{1}{3}X'^{\frac{3}{2}} - \frac{1}{3}X^{\frac{3}{2}}\right.$$

$$\left. -2A\sqrt{X'} + 2A\sqrt{X} - A^2\frac{1}{\sqrt{X'}} + A^2\frac{1}{\sqrt{X}}\right.$$

Derivace

$$\frac{\partial \zeta}{\partial c} = +\frac{\pi}{2(a+c)^3}\left\{\frac{c^2(2a+c)^2}{\sqrt{c^2+2(a+c)H}} - c(2a+c)^2 + \left((2a+c)^2 + c^2\right)\left(\sqrt{c^2+2(a+c)H} - c\right)\right.$$

$$\left. -\frac{1}{3}\left(\left(c^2+2(a+c)H\right)^{\frac{3}{2}} - c^3\right)\right\}$$

$Z = 0$. Szigúr $a = \frac{R^2+H^2}{2H}$

homorú $x^2+\xi^2 = \frac{R^2+H^2}{H}c - c^2 - \xi\left\{\frac{R^2+H^2}{H} + 2c\right\} = -\{(2ac-c^2) - 2(a-c)\xi\}$

domború $x^2+\xi^2 = -\frac{R^2+H^2}{H}c - c^2 + \xi\left\{\frac{R^2+H^2}{H} + 2c\right\} = -\{(2ac+c^2) + 2(a+c)\xi\}$

Első

homorú

$$Z = 2\pi H - 2\pi \int_{c-H}^{c} \frac{\xi\, d\xi}{\sqrt{(2ac-c^2) - 2(a-c)\xi}}$$

domború

$$Z = 2\pi H - 2\pi \int_{c}^{c+H} \frac{\xi\, d\xi}{\sqrt{-(2ac+c^2) + 2(a+c)\xi}}$$

$\frac{\partial Z}{\partial z}$.

$$\frac{\partial Z}{\partial z} = 2\pi(2ac-c^2)\int_{c-H}^{c} \frac{d\xi}{\left((2ac-c^2) - 2(a-c)\xi\right)^{\frac{3}{2}}}$$

$$-4\pi(a-c)\int_{c-H}^{c} \frac{\xi\, d\xi}{\left((2ac-c^2) - 2(a-c)\xi\right)^{\frac{3}{2}}}$$

$$-2\pi\int \frac{\xi^2 d\xi}{\left((2ac-c^2) - 2(a-c)\xi\right)^{\frac{3}{2}}}$$

$$\frac{\partial Z}{\partial z} = -2\pi(2ac+c^2)\int_{c}^{c+H} \frac{d\xi}{\left(-(2ac+c^2) + 2(a+c)\xi\right)^{\frac{3}{2}}}$$

$$+4\pi(a+c)\int_{c}^{c+H} \frac{\xi\, d\xi}{\left(-(2ac+c^2) + 2(a+c)\xi\right)^{\frac{3}{2}}}$$

$$-2\pi\int_{c}^{c+H} \frac{\xi^2 d\xi}{\left(-(2ac+c^2) + 2(a+c)\xi\right)^{\frac{3}{2}}}$$

Első

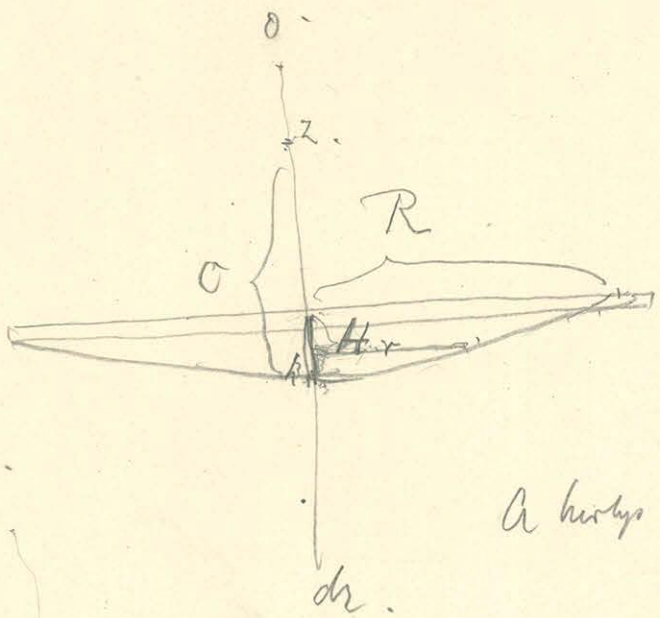
homorú

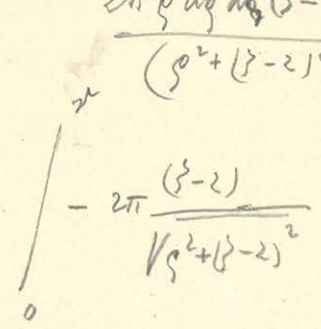
$$Z_h = 2\pi H - 2\pi\left[\frac{1}{3}\left\{(2ac-c^2) - 2(a-c)\xi\right\} - (2ac-c^2)\right]_{c-H}^{c} \frac{2\sqrt{(2ac-c^2) - 2(a-c)\xi}}{4(a-c)^2}$$

domború

$$Z_d = 2\pi H - 2\pi\left[\frac{1}{3}\left\{-(2ac+c^2) + 2(a+c)\xi\right\} + (2ac+c^2)\right]_{c}^{c+H} \frac{2\sqrt{-(2ac+c^2) + 2(a+c)\xi}}{4(a+c)^2}$$

1 kurbyon.





A kurbya urinan $Z = 2\pi d\xi - 2\pi\frac{(\xi-z)\,d\xi}{\sqrt{r^2+(\xi-z)^2}}$

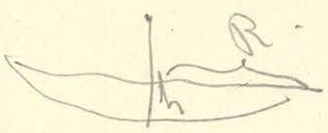
$$\frac{\partial Z}{\partial z} = +2\pi\frac{1\,dz}{\sqrt{r^2+(\xi-z)^2}} - 2\pi\frac{(\xi-z)^2 d\xi}{\left(r^2+(\xi-z)^2\right)^{\frac{3}{2}}}$$

$$\frac{\partial Z}{\partial z} = +2\pi\frac{r^2 d\xi}{\left(r^2+(\xi-z)^2\right)^{\frac{3}{2}}}$$

$r^2+(a-h)^2 = a^2$ $\qquad r^2-2ah+h^2=0$

$R^2+(a-H)^2 = a^2$ $\qquad R^2-2aH+H^2=0$

$$\frac{H}{h} = \frac{R^2+H^2}{r^2+h^2}$$



$$r^2 = \frac{h}{H}(R^2+H^2) - h^2 \qquad h = c-\xi$$

~~$h = c-\xi(AA)$~~

~~$h(c-2)\xi > 1$~~

konuri $\quad r^2 = \frac{R^2+H^2}{H}(c-\xi) - (c-\xi)^2$

Durbuni $\quad r^2 = -\frac{R^2+H^2}{H}(c-\xi) - (c-\xi)^2$

$C-(C-H)$

$$-\frac{\frac{2}{3}(a-c)\}-\frac{2}{3}(2ac-c^2)}{2(a-c)^2}\sqrt{(2ac-c^2)-2(a-c)\}}$$

$$\frac{-2ac+\frac{4}{3}c^2}{2(a-c)^2}c$$

$$\frac{+(a-c)(c-H)+2ac-c^2}{3(a-c)^2}\sqrt{(2ac-c^2)-2(a-c)(c-H)}$$

$$+2ac-c^2-aH+cH+2ac-c^2$$

$$-2ac+2aH+2c^2-2cH$$

$$\sqrt{c^2+2(a-c)H}$$

$$\frac{3ac-2c^2-(a-c)H}{3(a-c)^2}$$

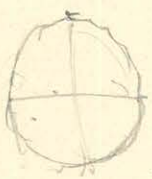
Normir

$$\zeta_h=2\pi H-2\pi\frac{(-3ac+2c^2)c+(3ac-2c^2-(a-c)H)\sqrt{c^2+2(a-c)H}}{3(a-c)^2}$$

$$\frac{+2ac+c^2+(a+c)\}}{3(a+c)^2}\sqrt{-(2ac+c^2)+2(a+c)\}}$$

$$\frac{+3ac+2c^2+(a+c)H}{3(a+c)^2}\sqrt{c^2+2(a+c)H}-\frac{3ac+2c^2}{3(a+c)^2}c$$

$$\zeta_d=2\pi H-2\pi\frac{(-3ac-2c^2)c+[3ac+2c^2+(a+c)H]\sqrt{c^2+2(a+c)H}}{3(a+c)^2}$$



$\frac{4}{3}\pi h$ $\quad H=a \quad c=0. \quad 2\pi a-\frac{2\pi}{3}a\sqrt{2}$

$c=2a \quad H=a. \quad 4a^2$

$$+2\pi a-2\pi\frac{4a^3+(-2a^2+a^2)a\sqrt{2}}{3a^2}=+2\pi a-2\pi\frac{4a^3-a^3\sqrt{2}}{3a^2}$$

$$4\pi a-\frac{8\pi a}{3} \qquad \frac{4}{3}\pi a.$$

	$\frac{(b-y)a}{c}$	$a^2+(b-y)^2+c^2$	$\frac{(b+y)a}{c}$		$\sqrt{a^2+c^2+(b+y)^2}$	$\sqrt{a^2+c^2+(b-y)^2}$
140	-800	11625	+2800	67625	260,05	107,82
150	-1000	12525	+5000	72525	269,31	111,92
160	-1200	13625	+5200	77625	278,67	116,73
170	-1400	14925	+5400	82925	287,97	122,17
180	-1600	16425	+5600	88425	297,36	128,16
190	-1800	18125	+5800	94125	306,80	134,63
200	-2000	20025	+6000	100025	316,27	141,57
210	-2200	22125	+6200	106125	325,77	148,74
220	-2400	24425	+6400	112425	335,30	156,29
230	-2600	26925	+6600	118925	344,86	164,09
240	-2800	29625	+6800	125625	354,44	172,12
250	-3000	32525	+7000	132525	364,04	180,35
140	-40	21600	240	77600	278,57	146,97
150	-50	22500	250	82500	287,23	150,00
60	-60	23600	260	87600	295,97	153,62
70	-70	24900	270	92900	304,80	157,80
80	-80	26400	280	98400	313,68	162,48
90	-90	28100	290	104100	322,65	167,63
200	-100	30000	300	110000	331,66	173,20
10	-110	32100	310	116100	340,73	179,17
20	-120	34400	320	122400	349,86	185,47
30	-130	36900	330	128900	359,03	192,09
40	-140	39600	340	135600	368,24	199,00
50	-150	42500	350	142500	377,49	206,16

0	−0,9246	−0,9766	−1,9532
10	−1,0282	−0,8780	−1,9662
20	−1,2170	−0,7292	−2,0052
30	−1,3547	−0,7149	−2,0696
40	−1,5092	−0,6978	−2,1575
50	−1,6764	−0,5886	−2,2650
60	−1,8478	−0,5369	−2,3847
70	−2,0759	−0,4902	−2,4961
80	−2,1028	−0,4492	−2,5520
90	−1,9376	−0,4128	−2,3504
95	−1,4323	−0,3496	−1,8289
97	−0,9847	−0,3297	−1,3744
99	−0,3670	−0,3237	−0,7507
100	0	−0,3207	−0,3207
101	+0,3670	−0,3773	−0,0703
103	+0,9847	−0,3715	+0,6132
105	+1,4323	−0,3657	+1,0669
110	+1,9376	−0,3573	+1,5863
120	+2,1028	−0,3254	+1,7797
130	+2,0759	−0,2920	+1,7139

140	1/200	1/150	1/100
150	5200	7255	8252
160	5120	7165	8176
170	5040	7085	8096
180	4960	7005	8016
190	4880	6925	7936
200	4800	6845	7856
210	4720	6765	7776
220	4640	6685	7696
230	4560	6605	7616

0,380211 0,449931	0,397940 0,458227	0,414973 0,471252	0,431364 0,484068	0,447158 0,496498	0,462398 0,508726	0,477121 0,520697	0,491362 0,532416	0,505150 0,543891	0,518514 0,555127	0,531479 0,566130	0,543868 0,576908
0,825142 8°30'25"	0,856167 7°55'41"	0,886225 7°24'15"	0,915372 6°55'42"	0,943656 6°29'47"	0,971124 6°6'1"	0,997818 5°44'21"	1,023778 5°24'36"	1,049041 5°6'15"	1,073641 4°49'28"	1,097609 4°34'0"	1,120976 4°19'42"
0,139626 8727 121	0,122173 15999 199	0,122173 6987 70	0,104719 15999 204	0,104719 8436 228	0,104719 1745 5	0,087267 12799 102	0,087267 6987 145	0,087267 1745 73	0,069873 14254 136	0,069873 9890	0,069873 5527 204
0,174474	0,138511	0,129227	0,120922	0,113083	0,106469	0,100018	0,093460	0,089085	0,084201	0,077700	0,073844

2,317687	2,326172	2,335919	2,346685	2,358240	2,370384	2,382935	2,395728	2,408732	2,421752	2,434760	2,447701
2,380306	2,398027	2,415054	2,431438	2,447228	2,464463	2,477182	2,491415	2,505203	2,518564	2,531526	2,544113
4,697993	4,724199	4,750973	4,778123	4,805468	4,834847	4,860117	4,887143	4,913935	4,940316	4,966286	4,991814
2,556363	2,567391	2,578192	2,588798	2,599184	2,609381	2,619375	2,629175	2,638789	2,648223	2,657477	2,666555
1,605427	1,701131	1,779654	1,846203	1,903937	1,954912	2,000542	2,041841	2,079558	2,114265	2,146405	2,176333
4,161790	4,268522	4,357846	4,435601	4,503121	4,564293	4,619917	4,671016	4,718347	4,762488	4,803882	4,842888
0,536203	0,455677	0,393127	0,343122	0,302347	0,270554	0,240200	0,216127	0,195588	0,177828	0,162404	0,148926
2,469322	2,098484	1,870428	1,580145	1,392568	1,245909	1,106169	0,995304	0,900722	0,818934	0,747903	0,685834
2,392644	2,397940	2,404183	2,411283	2,419096	2,427535	2,436481	2,445869	2,455560	2,465517	2,475671	2,485948
2,414974	2,430169	2,444931	2,459278	2,473226	2,486795	2,500000	2,512858	2,525383	2,537591	2,549495	2,561108
4,807618	4,828109	4,849114	4,870561	4,892322	4,914330	4,936481	4,958727	4,980943	5,003108	5,025166	5,047056
2,578146	2,587969	2,597662	2,607241	2,616665	2,625981	2,635742	2,644173	2,653077	2,661841	2,670469	2,678964
2,032229	2,048455	2,066770	2,084593	2,101722	2,128840	2,150815	2,172196	2,193695	2,214876	2,235646	2,255942
4,610375	4,636424	4,664432	4,693834	4,724087	4,754821	4,785657	4,816569	4,846772	4,876717	4,906115	4,934906
0,197243	0,191685	0,184682	0,176727	0,168235	0,159509	0,150824	0,142358	0,134171	0,126391	0,119051	0,112150
0,908343	0,882748	0,850498	0,813863	0,774756	0,734571	0,694575	0,655587	0,617884	0,582056	0,548255	0,516473
0,687241	0,698970	0,716003	0,732394	0,748188	0,763428	0,778151	0,792392	0,806180	0,819544	0,832509	0,845098
1,415054	1,430244	1,445001	1,459343	1,473226	1,486795	1,500055	1,512909	1,525402	1,537637	1,549538	1,561149
2,096295	2,129216	2,161064	2,191737	2,221476	2,250281	2,278206	2,305301	2,331582	2,357181	2,382047	2,406247
7,903705	7,870784	7,838556	7,808263	7,778524	7,749719	7,721794	7,694658	7,668418	7,642819	7,617953	7,593753
0° 27' 22"	0° 25' 22"	0° 23' 44"	0° 22' 09"	0° 20' 46"	0° 19' 29"	0° 18' 7"	0° 17' 1"	0° 16' 1"	0° 15' 6"	0° 14' 16"	0° 13' 29"
0,007854	7272	6690	6479	5818	5595	5236	4945	4654	4363	4072	3782
155	155	213	29	189	216	34	5	5	29	78	141
6008	7117	6903	6450	5629	5379	5202	4940	4659	4334	3994	3923

2,150526 2,172206 2,193704 2,214884 √2,255948 2,275731 2,294987 2,313688 2,331855 2,349738 2,366255 2,382750 2,399490
141,42 148,66 156,21 164,02 180,28 188,68 197,23 205,92 214,71 219,15 220,93 222,72 227,64

2,351224 2,354678 2,358106 2,366603 2,383210 2,399329, √2,235650
224,50 226,30 228,09 232,60 241,66 250,80 17405

4,510022
5,000012
0,490000

2,301052
2,698970

141,421 141,43
134,526 134,54
128,062 128,07
122,066 122,07
116,619 116,63
111,803 111,81
107,703 107,71
104,403 104,41
~~100,179~~
101,980 101,99
100,499 100,50

10000

0,000564 100,13
0,000217 100,05

2,395606	2,408596	2,421637	2,434649	2,447592	2,460417	2,473093	2,485608	2,497911	2,509995
2,128840	2,107422	2,086593	2,066770	2,048455	2,032229	2,018713	2,008517	2,002161	2,000342
4,524446	4,516018	4,508230	4,501419	4,496047	4,492646	4,491806	4,494125	4,500072	4,504537
2,370217	2,358068	2,346490	2,335719	2,325946	2,317457	2,310502	2,305330	2,302114	2,301312
2,172196	2,193695	2,214876	2,235646	2,255942	2,275725	2,294975	2,313683	2,331851	2,340734
4,542413	4,551763	4,561366	4,571365	4,581888	4,593182	4,605477	4,619013	4,633965	4,642046
0,017967	0,035745	0,053196	0,069946	0,085841	0,100536	0,113671	0,124888	0,133893	0,137509
0,082742									
2,506410	2,508826	2,510022	2,511215	2,513617	2,515993	2,521922	2,533594	2,545060	
2,000196	2,000022	2,000000	2,000022	2,000196	2,000542	2,002161	2,008517	2,018713	
4,506606	4,508848	4,510022	4,511237	4,513813	4,516535	4,524083	4,542111	4,563773	
2,301139	2,301052	2,301052	2,301052	2,301139	2,301312	2,302114	2,305330	2,310502	
2,344250	2,347745	2,349485	2,351220	2,353673	2,358106	2,366599	2,382207	2,399326	
4,645389	4,648797	4,650537	4,652272	4,655812	4,659418	4,668713	4,688531	4,709828	
0,138783	0,139949	0,140515	0,141035	0,141999	0,142883	0,144680	0,146426	0,146055	

4,6052

6,3

7,3

5,98

2,99

0,355398

1,63

2,370235 2,041465	2,358087 2,079242	2,346509 2,113995	2,335739 2,146173	2,325967 2,176130	2,317478 2,204154	2,310523 2,230479	2,305351 2,255300	2,302158 2,278778	2,301356 2,290058
4,411700	4,437329	4,460504	4,481912	4,502097	4,521632	4,541002	4,560651	4,580936	4,591414
2,395623 1,954350	2,408613 1,903226	2,421637 1,845275	2,434665 1,778393	2,447608 1,699317	2,460432 1,602602	2,473107 1,478084	2,485608 1,303191	2,497924 1,008517	2,504008 0,731199
4,349973 0,061727	4,311839 0,125490	4,266912 0,193592	4,213058 0,268854	4,146925 0,355172	4,063034 0,458598	3,951191 0,589811	3,788799 0,771852	3,506441 1,074495	3,235207 1,356207
0,284265	0,577907	0,891590	1,238126	1,635638	2,111936	2,716198	3,554533	4,948264	6,245604

2,301182 2,294489	2,301095 2,298875	2,301073 2,301052	2,301095 2,303218	2,301182 2,307517	2,301356 2,311775	2,302158 2,322239	2,305351 2,342441	2,310523 2,361745	
4,595671	4,599970	4,602125	4,604313	4,608699	4,613131	4,624397	4,647792	4,672268	
2,506424 0,556972	2,508826 0,349485	2,510035 0,301030	2,571228 0,349485	2,513617 0,556972	2,516006 0,731199	2,521922 1,008517	2,533607 1,303191	2,545072 1,478084	
3,063396	2,858311	2,811065	2,860713	3,070589	3,247205	3,530439	3,836798	4,023156	
1,532275	1,741659	1,791060	1,743600	1,538110	1,365926	1,093958	0,810994	0,649112	
7,056433	8,020688	8,248190	8,029627	7,083304	6,290362	5,037895	3,734790	2,989291	

0,253253 0,104393	0,268279 0,107918	0,283513 0,113943	0,298848 0,146128	0,314195 0,176091	0,329483 0,204120	0,344655 0,230449	0,359666 0,255273	0,374482 0,278754	0,381808 0,290035
0,294646 26°54'12" 0,453786 15708 58	0,347460 24°11'40" 0,418879 3280 194	0,397456 21°49'25" 0,366579 14254 121	0,444976 19°44'43" 0,331613 12799 209	0,490286 17°55'13" 0,296706 15999 63	0,533603 16°18'50" 0,279253 5236 242	0,575164 14°53'46" 0,244356 15417 223	0,614939 13°38'30" 0,226893 11054 145	0,653236 12°31'41" 0,209440 9078 199	0,671843 12°1'6" 0,209440 291 29
0,469552	0,422273	0,380894	0,344621	0,312768	0,284731	0,259986	0,238092	0,218651	0,209760

0,384722 0,294466	0,387627 0,298853	0,389076 0,301030	0,390522 0,303196	0,393406 0,307496	0,396284 0,311754	0,403429 0,322219	0,417528 0,342423	0,431364 0,361728	
0,679188 11°49'21" 0,191986 14254 102	0,686480 11°37'52" 0,191986 10763 252	0,690106 11°32'13" 0,191986 09308 63	0,693718 11°26'39" 0,191986 7563 189	0,700902 11°15'40" 0,191986 4363 194	0,708038 11°4'55" 0,191986 1164 267	0,725648 10°39'7" 0,174523 11345 34	0,759951 9°51'34" 0,157080 14835 165	0,793092 9°8'52" 0,157080 2327 252	
0,206342	0,205001	0,201357	0,199738	0,196543	0,193417	0,185912	0,172080	0,159651	

0,172442 1,342423	0,193918 1,380211	0,215078 1,414973	0,235829 1,447158	0,256109 1,477121	0,275878 1,505750	0,295115 1,531479	0,313811 1,556303	0,331968 1,579784	0,340847 1,591065
1°51'48,5" 8'48,5135 1°45'1" 0,017453 13090 5	1,574129 8'42,5871 1°31'38" 0,017453 9018 184	1,630051 8'36,9949 1°20'34" 0,017453 5818 165	1,682987 8,317013 1°11'19" 0,017453 3200 92	1,733230 8'26,6770 1°3'32" 0,017453 873 155	1,781028 8'21,8972 0°56'55" 0,015999 267	1,826594 8'17,3406 0°51'15" 0,014835 73	1,870114 8'12,9886 0°46'22" 0,013381 107	1,911752 8'08,8248 0°42'7" 0,012217 34	1,931912 8'06,8088 0°40'13" 0,011636 63
0,030548 ,061096	0,026655 ,053310	0,023436 ,046872	0,020745 ,041490	0,018481 ,036962	0,016266 ,032532	0,014906 ,029816	0,013488 ,026976	0,012251 ,024502	0,011699 ,023398

0,344361 1,595496	0,347855 1,599883	0,349594 1,602060	0,351328 1,604226	0,354779 1,608526	0,358211 1,612784	0,366699 1,623249	0,383300 1,643453	0,399412 1,662758	
1,939857 8'06,0143 0°39'29" 0,011345 141	1,947748 8'05,2252 0°38'46" 0,011054 223	1,951654 8,048346 0°38'25" 0,011054 121	1,955554 8,044446 0°38'5" 0,011054 24	1,963305 8,036695 0°37'24" 0,010763 116	1,970995 8,029005 0°36'45" 0,010472 218	1,989948 8,010052 0°35'11" 0,010181 53	2,026753 7'973247 0°32'19" 0,009308 92	2,062170 7'93783,0 0°29'48" 0,008436 233	
0,011486 ,022972	0,011277 ,022554	0,011175 ,022350	0,011078 ,022156	0,010879 ,021758	0,010690 ,021380	0,010234 ,020468	0,009400 ,018800	0,008669 ,017338	

8,174509

9000	8000	7000	6000	5000	4000	3000	2000	1000	500
18401	16401	14401	13601	12501	11601	10301	10401	10101	10026
3,954243	3,903090	3,845098	3,778151	3,698970	3,602060	3,477121	3,301030	3,000000	2,698970
2,128852	2,107435	2,086608	2,066786	2,048473	2,032248	2,018733	2,008538	2,002182	2,000564
1,825564	1,795655	1,758490	1,711365	1,650497	1,569812	1,458388	1,292492	0,997818	0,698406
1,825491									
89° 8' 38"	89° 4' 58"	89° 0' 3"	88° 53' 11"	88° 43' 8"	88° 26' 48"	88° 0' 24"	87° 41' 57"	84° 15' 39"	78° 40' 3.3
0 47' 20									

11000	12000	13000	14000	15000	16000	17000	18000	19000	19500
22101	24401	26901	29601	32501	35601	38901	42401	46101	48026
4,041393	4,079181	4,113943	4,146128	4,176091	4,204120	4,230449	4,255273	4,278754	4,290035
2,172206	2,193704	2,214884	2,235653	2,255949	2,275731	2,294981	2,313688	2,331855	2,340738
1,869187	1,885377	1,899059	1,910475	1,920842	1,928389	1,935468	1,942585	1,946899	1,950297
8,130813	8,114623	8,100941	8,089525	8,079858	8,071611	8,064532	8,057415	8,053101	8,049703
0°46'28"	0°44'45"	0°43'22"	0°42'15"	0°41'19"	0°40'32"	0°39'53"	0°39'14"	0°38'51"	0°38'33"
89°13'32	89 15 15	16 38		89° 18' 41	89 19' 28	89 20 7	89° 20 46	89 21 9	89 21 27
10000									
20001									
4,000000									
2,150526									
1,849474									
8,150536									
0°48'37"									

178°22'46"	178°21'10"	178°20'15"	178°16'41"	178°10'56"	178°1'49"	177°46'16"	177°20'31"	176°25'21"	173°36'48	168°2'0
3,106686	3,106686	3,106686	3,106686	3,106686	3,106686	3,089233	3,089237	3,071779	3,019426	2,932153
6399	6399	5818	4654	2909	291	13287	5818	7272	10472	582
223	48	63	199	272	238	78	150	179	233	
3,113368	3,113133	3,112567	3,111539	3,109867	3,107215	3,102692	3,095201	3,079280	3,025125	2,932735

~~5,031877~~ ~~5,073410~~ ~~5,113999~~ ~~5,153559~~ 5,192054 5,229467 5,265798 ~~5,283564~~

5,290595 ~~5,297516~~	5,297516	5,301065	5,304534	5,311440	5,318306	5,325289	5,368502	5,400748

300 / √40052	100 / √40020	0						
2,477121 2,301312 0,175809	2,000000 2,301128 0,698872-1	0						
56° 17' 34"	26° 33' 34"	0	−26° 33' 34"	−56° 17' 34"	−68° 10' 12"	−78° 27' 58"	−84° 10' 34"	−86° 1' 4"
19700 195252	19900 198388	20000 200016	20100 201620	20300 204852	20500 208016	21000 216416	22000 233616	23000 257620
4,294466 2,645298 1,649168	4,298853 2,648758 1,650095	4,301030 2,650532 1,650497	4,303196 2,652267 1,650929	4,307496 2,655720 1,651776	4,311754 2,659153 1,652601	4,322219 2,667645 1,654574	4,342423 2,684251 1,658172	4,361728 2,700373 1,661355
8,350832	8,349905	8,349503	8,349071	8,348224	8,347399	8,345426	8,341828	8,338645
1° 17' 6"	1° 16' 57"	1° 16' 53"	1° 16' 48"	1° 16' 39"	1° 16' 31"	1° 16' 10"	1° 15' 32"	1° 14' 59"
88° 42' 54"	88 43 3	88 43 7	88 43 12	88 43 21	88 43 29	88 43 50	88 44 28	88 45 1
145° 0' 28"	115° 16' 37"	88° 43' 7"	62° 9' 38"	32° 25' 47"	20° 33' 17"	16° 5' 52"	40 33' 54	2° 43' 57"
2,530727 136	2,007129 4654 179	1,535890 12508 34	1,082104 2618 184	0,558505 7272 228	0,349066 9599 382	0,174533 1454 252	0,069813 9599 262	0,034907 12508 276
2,530863	2,011962	1,548432	1,084906	0,566005	0,358747	0,176239	0,079674	0,047691

3	1	0						
$\sqrt{20009}$	$\sqrt{20001}$							
0,477721	0.000000							
2,150613	2,150526							
8,927108	7,849474							
1°13'0"	0°24'19	0	−0°24'19	−1°13'0"	−2°1'30"	−4°2'5"	−7°58'16"	−11°43'24"

197	199	200	201	203	205	210	220	230
$\sqrt{58809}$	$\sqrt{59601}$	$\sqrt{60000}$	$\sqrt{60401}$	$\sqrt{61209}$	$\sqrt{62025}$	$\sqrt{64100}$	$\sqrt{68400}$	$\sqrt{72900}$
2,294466	2,298853	2,301030	2,303196	2,307496	2,311754	2,322219	2,342423	2,361728
2,384722	2,387627	2,389076	2,390522	2,393408	2,396319	2,403429	2,417528	2,431364
9,909744	9,911226	9,911954	9,912674	9,913988	9,915435	9,918796	9,924895	9,930364
39° 5' 20"	39° 11' 4"	39° 13' 54	39° 16' 41"	39° 21' 47"	39° 27' 24"	39° 40' 26	40° 4' 13"	40° 25' 34"
40° 18' 20"	39° 35' 23'	39° 13' 54	38° 52' 22"	38° 8' 47"	37° 25' 54"	35° 38' 21"	32° 5' 57"	28° 42' 10"
0,698132	0,680678	0,680678	0,663225	0,663225	0,645772	0,610865	0,558505	0,488692
#5236	~~6000~~ 10181	3782	15126	2327	7272	11054	1454	12217
97	112	262	107	228	262	102	276	45
0,703465	0,690971	0,684722	0,678458	0,665780	0,653306	0,622021	0,560235	0,500958

28100	26400	24900	23600	22500	21600	20900	20400	20100	20025
1,954243	1,903090	1,845098	1,771451	1,698970	1,602060	1,477121	1,301030	1,000000	0,698970
2,224353	2,210802	2,198100	2,186456	2,176692	2,167227	2,160072	2,154815	2,151598	2,150787
9,729890	9,692288	9,646998	9,591695	9,522878	9,434833	9,317048	9,146215	8,848402	8,548183
28° 13' 52"	26° 12' 51"	23° 55' 21"	21° 20' 2"	18° 26' 7"	15° 13' 31"	11° 43' 24"	7° 58' 16"	4° 2' 5"	2° 1' 30"
X = 0 30°									
100									
30000									
2,000000									
2,238561									
9,761439	2,044396								
0,523599									

32100	34400	36900	39600	42500	45600	48900	52400	56100	58025
2,041393	2,079181	2,113943	2,146128	2,176091	2,204120	2,230449	2,255273	2,278754	2,290035
2,253253	2,268279	2,283513	2,298848	2,314195	2,329483	2,344655	2,359666	2,374882	2,381807
9,788140	9,810902	9,830430	9,847280	9,861896	9,874637	9,885794	9,895607	9,902872	9,908228
31° 32' 54"	32° 54' 10"	34° 5' 18"	35° 7' 38"	36° 2' 24"	36° 50' 35"	37° 33' 7"	38° 10' 45"	38° 42' 37"	38° 59' 27"
59° 46' 46"	59° 7' 1"	58° 0' 39"	56° 27' 40"	54° 28" 31"	52° 4' 6"	49° 16' 31"	46° 9' 1"	42° 44' 42"	41° 0' 57"
1,029744	1,029744	1,012291	0,977384	0,942478	0,907571	0,855211	0,802852	0,733038	0,715585
13381	2036	0	7854	8145	1164	4654	2618	12799	0
225	5	189	194	150	29	150	5	204	276
1,043348	1,031785	1,012480	0,985432	0,950773	0,908764	0,860015	0,805475	0,746041	0,715861

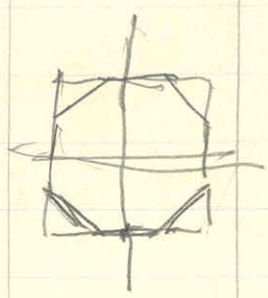
2,150787	2,129139	2,107753	2,086457	2,067169	2,048889	2,032697	2,019211	2,009038	2,002698
3,301030	3,255273	3,204120	3,146128	3,079181	3,000000	2,903090	2,778151	2,602060	2,301030
8,849757	8,873866	8,903633	8,940829	8,987988	9,048889	9,129607	9,241060	9,406978	9,701668
85°57'10"	85°42'21"	85°25'13"	85°0'46"	84°26'39"	83°36'51"	82°19'27"	80°7'5"	75°40'50"	63°17'32"
	2,172442	2,193918	2,215078	2,235829	2,256109	2,275878	2,295715	2,313811	2,331968
	3,342423	3,380211	3,414973	3,447158	3,477121	3,505756	3,531479	3,556303	3,579784
	8,830019	8,813707	8,806105	8,788671	8,778988	8,770728	8,763636	8,757508	8,752184
85°57'10"	86°7'55"	86°16'27"	86°23'20"	86°28'57"	86°33'35"	86°37'28"	86°40'44"	86°43'31"	86°45'55"
171°54'20"	171°51'16"	171°41'40"	171°24'6	170°55'36	170°10'26"	168°46'55"	166°47'49"	162°24'21"	150°3'27"
2,984513	2,984513	2,984513	2,984513	2,967060	2,967060	2,932153	2,897247	2,827433	2,677994
15708	14835	11926	6981	15993	29091	13381	13672	6987	873
97	78	194	29	175	126	267	238	102	131
3,000318	2,999426	2,996633	2,991523	2,983234	2,970095	2,945801	2,911157	2,824516	2,618998

2,001083	2,000737	2,000564							
2,000000	1,778151	1,301030							
10,001083	10,222586	10,699534	∞						
44°55'43"	30°55'15"	11°17'44"	0	−11°17'44"	−30°55'15"	−44°55'43"	−63°17'32"	−75°40'50"	−80°7'5"
2,340847	2,344361	2,347855	2,349594	2,351328	2,354779	2,358211	2,361629	2,364345	2,366412
3,591065	3,595496	3,599883	3,602060	3,604226	3,608526	3,612784	3,616989	3,618048	3,620136
8,749782	8,748865	8,747972	8,747534	8,747102	8,746253	8,745427	8,743450	8,739847	8,736754
86°46'59"	86°47'23"	86°47'47"	86°47'59"	86°48'10"	86°48'32"	86°48'54"	86°49'46"	86°57'20"	86°52'40"
131°42'42"	117°42'38"	98°5'31"	86°47'59"	75°30'26"	55°53'17"	41°53'11"	23°32'14"	11°12'30"	6°45'25"
2,286381	2,042035	1,710443	1,500983	1,308997	0,959931	0,731585	0,410428	0,195986	0,117920
12217	12217	1454	13672	8727	15417	15417	9308	2909	13090
204	184	150	286	126	82	53	68	145	170
2,298802	2,054436	1,712047	1,514941	1,317850	0,975430	0,731055	0,410804	0,195040	0,117980

2,129139 3,301030	2,107753 3,255273	2,086957 3,204126	2,067169 3,146128	2,048889 3,079181	2,032697 3,000000	2,019211 2,903090	2,009038 2,778151	2,002698 2,602060	2,001083 2,301030
8,828109 86°8'56"	8,852480 85°55'39"	8,882837 85°38'1"	8,921041 85°14'2"	8,969708 84°40'29"	9,032697 83°50'47"	9,116121 82°33'23"	9,230887 80°20'33"	9,400638 75°33'52"	9,700053 69°22'40"
2,172442	2,193918	2,215078	2,235829	2,256109	2,275878	2,295715	2,313811	2,331968	2,340847

2,000737 2,000000	2,000564 1,778151	2,000542 1,301030	0						
10,000737 44°57'5"	10,222413 30°55'57"	10,699512 11°17'46"	0	−11°17'46"	−30°55'57"	−44°57'5"	−63°22'40"	−75°33'52"	−80°20'33
2,344361	2,347855	2,349594	2,						

$C=1$	$a=100$ $b=100$ $c=1$	$C=100$	$c=1$	$C=100$	$+y+$	$-y-$
y	$100+\sqrt{10001+(100+y)^2}$	$\sqrt{10000+(100-y)^2}$	$100+\sqrt{10001+(100-y)^2}$	$\sqrt{10000^2+(100+y)^2}$		
50	241,42	20000	241,42	20000		
10	248,66	18700	234,54	22100	279,17	267,63
20	256,21	16400	228,07	24400	285,47	262,48
30	264,02	14900	222,07	26900	292,09	257,80
40	272,05	13600	216,63	29600	299,00	253,62
50	280,28	12500	211,80	32500	306,16	250,00
60	288,68	11600	207,70	35600	313,54	246,97
70	297,23	10900	204,41	38900	321,13	244,57
80	305,92	10400	201,99	42400	328,91	242,83
90	314,71	10100	200,50	46100	336,85	241,77
95	319,15	10025	200,13	48025	340,88	241,57
97	320,93	10009	200,05	48809	342,51	241,45
99	322,72	10001	200,01	49601	344,13	241,42
100	323,61	10000	200,01	50000	344,95	241,42
101	324,50	10001	200,01	50401	345,77	241,42
103	326,30	10009	200,05	51209	347,41	241,45
105	328,09	10025	200,13	52025	349,05	241,57
110	332,60	10100	200,50	54100	353,18	241,77
120	341,66	10400	201,99	58400	361,53	242,83
130	350,80	10900	204,41	62900	370,00	244,57



$C=2$	$a=100$	$b=100$				
	$100+\sqrt{10000+(100-y)^2}$	$\sqrt{y+(100+y)^2}$	$100+\sqrt{10000+(100+y)^2}$	$\sqrt{y+(100-y^2)}$		
10	234,55	12804	248,67	8704		
20	228,08	14404	256,22	6404		
30	222,08	16904	264,02	4904		
40	216,64	19604	272,06	3604		
50	211,82	22504	280,29	2504		
60	207,72	25604	288,69	1604		
70	204,42	28904	297,24	904		
80	202,00	32404	305,92	404		
90	200,52	36104	314,72	104		
95	200,15	38029	319,16	29		
97	200,07	38813	320,94	13		
99	200,03	39605	322,72	5		
100	200,02	40004	323,62	4		
101	200,03	40405	324,57	5		
103	200,07	41213	326,30	13		
105	200,15	42029	328,10	29		
110	200,52	44104	332,60	104		
120	202,00	48404	341,67	404		
130	204,42	52904	350,81	904		
1						

$C = 5$

	$100 + \sqrt{10025 + (100-y)^2}$	$25 + (100+y)^2$	$100 + \sqrt{10025 + (100+y)^2}$	$25 + (100-y)^2$		
10	234,63	12125	248,75	8125		
20	228,16	14425	256,29	6425		
30	222,17	16925	264,09	4925		
40	216,73	19625	272,12	3625		
50	211,92	22525	280,35	2525		
60	207,82	25625	288,75	1625		
70	204,52	28925	297,29	925		
80	202,10	32425	305,97	425		
90	200,62	36125	314,77	125		
95	200,25	38050	319,20	50		
97	200,17	38834	320,98	34		
99	200,13	39626	322,77	26		
100	200,12	40025	323,66	25		
101	200,13	40426	324,56	26		
103	200,17	41234	326,35	34		
105	200,25	42050	328,15	50		
110	200,62	44125	332,65	125		
120	202,10	48425	341,71	425		
130	204,52	52925	350,85	925		

$b=100$ $c=100$

	$20(b-y)$	$20(b+y)$	x	$b^2+b^2+x^2$		
0	2000	2000	0	20000	200	60000
10	1800	2200	1	20001	201	60401
20	1600	2400	3	20009	203	61209
30	1400	2600	5	20025	205	62025
40	1200	2800	10	20100	210	64100
50	1000	3000	20	20400	220	68400
60	800	3200	30	20900	230	72900
70	600	3400	40	21600		
80	400	3600	50	22500		
90	200	3800	60	23600		
95	100	3900	70	24900		
97	60	3940	80	26400		
99	20	3980	90	28100		
100	0	4000	95	29025		
101	− 20	4020	97	29409		
103	− 60	4060	99	29801		
105	− 100	4100	100	30000		
110	− 200	4200	101	30201		
120	− 400	4400	103	30609		
130	− 600	4600	105	31025		
			110	32100		
			120	34400		
			130	36900		
			140	39600		
			150	42500		
			160	45600		
			170	48900		
			180	52400		
			190	56100		
			195	58025		
			197	58809		
			199	59601		

2,370217	2,358068	2,346490	2,335719	2,325946	2,317457	2,310502	2,305330	2,302114	2,301312
2,041411	2,079197	2,113956	2,146139	2,176101	2,204129	2,230457	2,255279	2,278760	2,290435
4,411628	4,437265	4,460446	4,481858	4,502047	4,521586	4,540959	4,560609	4,580874	4,591347
2,395606	2,408596	2,421637	2,434649	2,447592	2,460417	2,473093	2,485608	2,497911	2,503995
1,954270	1,903124	1,845143	1,778212	1,699057	1,602196	1,477363	1,301572	1,002161	0,707487
4,349876	4,311720	4,266780	4,212861	4,146649	4,062613	3,950456	3,787180	3,500072	3,211482
0,061752	0,125545	0,193666	0,268997	0,355398	0,458973	0,590503	0,773429	1,080802	1,379865
0,284380	0,578185	0,891871	1,238785	1,636679	2,113662	2,719384	3,561795	4,977309	6,354554

2,301109	2,301052	2,301052	2,301312	2,302114	2,305330	2,300502		
2,294472	2,298859	2,301036	2,301312	2,322224	2,342427	2,361732		
4,595611	4,599911	4,602088	4,604248	4,608701	4,613071	4,624338	4,647757	4,662284

2,506410	2,508826	2,510022	2,571215	2,572617	2,573983	2,521422	2,533594	2,545060
0,500000	0,150515	0,000000	0,150515	0,500000	0,707487	0,002161	1,301572	1,477362
3,006410	2,659441	2,510022	2,661730	3,072617	3,281470	3,523583	3,835166	4,022423
1,883673	2,239328	2,393101	2,245725	1,892525	1,701350			
1,589201	1,940470	2,116966	1,942518	1,595084	1,389591	1,100255	0,812591	0,649811
7,318584	8,139252	9,634582	8,945684	7,345681	6,399344	5,066894	3,742144	2,946458

2509/A

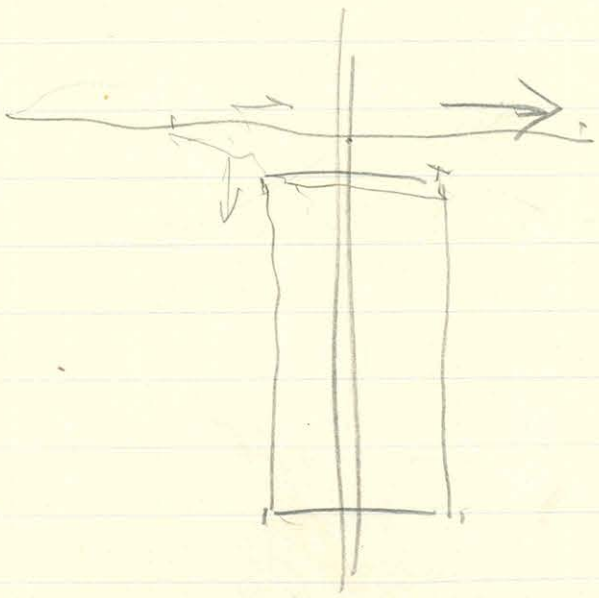
2,427535	2,419096	2,411283	2,404183	2,397940	2,392644	2,388403	2,385302	2,383402	2,382935
2,172196	2,193695	2,214876	2,235646	2,255942	2,275725	2,294975	2,313683	2,331851	2,350734
4,599731	4,612791	4,626159	4,639829	4,653882	4,668369	4,683378	4,698985	4,715253	4,733669
2,445869	2,455560	2,465517	2,475671	2,485948	2,496295	2,506681	2,517077	2,527437	2,537602
2,128840	2,107422	2,086593	2,066770	2,048455	2,032229	2,018713	2,008517	2,002161	2,000542
4,574709	4,562982	4,552110	4,542441	4,534403	4,528522	4,525394	4,525594	4,529598	4,533144
0,025022	0,049809	0,074049	0,097388	0,119479	0,139847	0,157984	0,173391	0,185655	0,190525
0,115231	0,229380	0,341010	0,448491	0,550225	0,644023	0,727548	0,798500	0,854978	0,877406

2,382827	2,382773	2,382773	2,382773	2,382827	2,382935	2,383402	2,385302	2,388403
2,344250	2,347745	2,349485	2,351220	2,354673	2,358106	2,366599	2,383207	2,399326
4,727077	4,730518	4,732258	4,733993	4,737500	4,741041	4,750001	4,768509	4,787729
2,534673	2,536723	2,537756	2,538787	2,540842	2,542888	2,547996	2,558144	2,568202
2,000196	2,000022	2,000000	2,000022	2,000196	0,000542	0,002161	2,008517	2,018713
4,534869	4,536745	4,537756	4,538809	4,541038	4,543430	4,550157	4,566661	4,586915
0,192208	0,193773	0,194502	0,195184	0,196462	0,197611	0,199844	0,201848	0,200814
0,885756	0,892363	0,895721	0,898861	0,904747	0,910038	0,920322	0,929550	0,924789

2,129139	2,107753	2,086957	2,067169	2,048889	2,032697	2,019211	2,009038	2,002698	2,001083
134,63	128,16	122,17	116,73	111,92	107,82	104,52	102,10	100,62	100,25
2,000737	2,000564	2,000542							
100,17	100,13	100,12							
2,174472	2,193918	2,215878	2,235829	2,256709	2,275878	2,295115	2,313811	2,331968	2,340847
148,75	156,29	164,09	172,12	180,35	188,75	197,29	205,97	214,77	219,20
2,344561	2,347855	2,349594	2,351328	2,354779	2,358211	2,366699	2,383300	2,394412	
220,98	222,77	223,66	224,56	226,35	228,15	232,65	241,71	250,85	
2,370384	2,358240	2,346685	2,335919	2,326172	2,317687	2,310736	2,305566	2,302374	2,301573
2,041841	2,079558	2,114265	2,146405	2,176333	2,204332	2,230637	2,255440	2,278904	2,290178
4,412225	4,437798	4,460950	4,482324	4,502505	4,522019	4,541073	4,561006	4,581278	4,591751
2,395763	2,408732	2,421752	2,434760	2,447701	2,460522	2,473186	2,485679	2,497993	2,504063
1,954912	1,903937	1,846203	1,779654	1,701131	1,605427	1,483071	1,314195	1,048455	0,849485
4,350675	4,312669	4,267955	4,214414	4,148832	4,065949	3,956251	3,799874	3,546448	3,353548
0,061550	0,125129	0,192995	0,267910	0,353673	0,456070	0,585122	0,761132	1,034830	1,238203
0,283450	0,576244	0,888781	1,233779	1,628735	2,100294	2,694604	3,505165	4,765599	5,702172
2,301399	2,301312	2,301290	2,301312	2,301399	2,301573	2,302374	2,305566	2,310736	
2,294606	2,298990	2,301166	2,303331	2,307628	2,311883	2,322343	2,342535	2,361831	
4,596005	4,600302	4,602456	4,604643	4,609027	4,613456	4,624717	4,648101	4,672567	
2,506478	2,508893	2,510089	2,511295	2,513684	2,516072	2,521988	2,533658	2,545721	
0,765740	0,707487	0,698970	0,707487	0,765740	0,849485	1,048455	1,314195	1,483071	
3,272218	3,216880	3,209059	3,218782	3,279424	3,365557	3,570443	3,847853	4,028192	
1,323787	1,383922	1,393397	1,385861	1,329603	1,247899	1,054277	0,800248	0,644375	
6,096304	6,373258	6,416872	6,382167	6,123088	5,746824	4,855743	3,685302	2,967476	

300	100	0						
V 10010	10002							
2,477721	2,000400							
2,000217	2,000044							
0,476904	0,999956 -1							
71° 33' 25"	44° 59' 50"	0	-44° 59' 50"	-71° 33' 25"	-78° 40' 33"	-84° 15' 39"	-87° 4' 51"	-88° 0' 24"
19700	19900	20000	20100	20300	20500	21000	22000	23000
V 48870	49602	50001	50402	57210	52026	54101	58401	62901
4,294466	4,298853	4,301030	4,303196	4,307496	4,311754	4,322219	4,342423	4,361728
2,344255	2,347750	2,349490	2,351224	2,354678	2,358710	2,366603	2,383210	2,399329
1,950211	1,951103	1,951540	1,951972	1,952818	1,953644	1,955816	1,959213	1,962359
8,049789	8,048897	8,048460	8,048028	8,047182	8,046356	8,044384	8,040787	8,037601
0° 38' 32"	0° 38' 28"	0° 38' 26"	0° 38' 24"	0° 38' 19"	0° 38' 15"	0° 38' 5"	0° 37' 46"	0° 37' 29"
	21 32	21 34	21 36	21 41	21 45	21 55	22 14	22 31
89° 21 47		89° 21' 34"	44° 21' 46"	17° 48' 16"	10° 41' 12"	5° 6' 16"	2° 17' 22"	1° 22' 2"
160° 54' 52"	134° 21' 22"							
2,792547	2,338741	1,559343	0,767945	0,296706	0,174533	0,087266	0,034907	0,017453
15708	6109	6109	6109	13963	11926	1745	4945	6400
252	107	165	223	78	58	78	112	34
2,808487	2,344957	1,559617	0,774277	0,310747	0,186517	0,089089	0,039964	0,023887

72016	65616	59616	54416	50016	46416	43616	41616	40416	40116
3,954243	2,903090	3,845098	3,778457	3,698970	3,602060	3,477121	3,301030	3,000000	2,698970
2,428715	2,408505	2,387682	2,367864	2,349555	2,333724	2,319823	2,309620	2,303277	2,301653
1,525528	1,494585	1,457416	1,410287	1,349415	1,268726	1,157298	0,991400	0,696723	0,397311
8,474472	8,505415	8,542584	8,589713	8,650585	8,731274	8,842702			
1° 42' 29"	1° 50' 13"	1° 59' 52"	2° 13' 35"	2° 33' 40"	3° 4' 59"	3° 58' 56"			
88° 17' 31"	88° 9' 57"	88° 0' 8"	87° 46' 25"	87° 26' 20"	86° 55' 1"	86° 1' 4"	84° 10' 34"	78° 27' 58"	68° 10' 12"
88416	97616	107616	118416	130016	142416	155616	169616	184416	192116
4,044139	4,079181	4,113943	4,146128	4,176091	4,204120	4,230449	4,255273	4,278754	4,290035
2,473266	2,494761	2,515929	2,536705	2,556999	2,576780	2,596027	2,614734	2,632899	2,641782
1,568127	1,584420	1,598004	1,609423	1,619092	1,627340	1,634422	1,640539	1,645855	1,648253
8,431873	8,415580	8,401996	8,390577	8,380908	8,372660	8,365578	8,359461	8,354145	8,351747
1° 32' 54"	1° 29' 24"	1° 26' 44"	1° 24' 29"	1° 22' 07"	1° 21' 4"	1° 19' 45"	1° 18' 39"	1° 17' 41"	1° 17' 16"
88° 27' 6"	88 30 31	88 33 16	88 35 31	88 37 53	88 38 56	88 40' 15"	88 41' 21	88 42 19	88 42 44
176° 44' 07"	176° 40' 28"	176° 33' 24"	176° 21' 56"	176° 4' 0"	175° 33' 57"	174° 41' 19"	172° 51' 55"	167 20' 17"	156° 52' 56"
3,071780	3,071780	3,071780	3,071780	3,071780	3,054226	3,036873	3,001966	2,914700	2,722714
12799	11636	9599	6109	873	9599	11926	14835	5818	1526
179	136	116	271	209	276	92	267	82	271
3,084758	3,083552	3,081495	3,078160	3,072862	3,064201	3,048891	3,017068	2,920600	2,738111
10000	4,	1° 27' 13"							
9808	2,451589	88° 22' 47"							
	1,548411			1,533890	6170072				
	8,451589			6400					
				228					
				1,542518					



$$P_y = \ln \frac{a+\sqrt{a^2+c^2}}{c} - \ln \frac{a+\sqrt{a^2+c^2+(b-y)^2}}{\sqrt{c^2+(b-y)^2}} - \ln \frac{a+\sqrt{a^2+c^2+(b+y)^2}}{\sqrt{c^2+(b+y)^2}}$$

$$P_y = 2\ln \frac{a+\sqrt{a^2+c^2+(b+y)^2}}{a+\sqrt{a^2+c^2+(b-y)^2}} \cdot \frac{\sqrt{c^2+(b-y)^2}}{\sqrt{c^2+(b+y)^2}}$$

$$\frac{a+\sqrt{a^2+c^2+4b^2}}{a+\sqrt{a^2+c^2}} \cdot \frac{\sqrt{c^2}}{\sqrt{c^2+4b^2}}$$

$$\frac{1+\sqrt{6}}{1+\sqrt{2}} \cdot \frac{1}{\sqrt{5}}$$

$$\frac{1+2{,}45}{2{,}41 \cdot 2{,}23}$$

46° 16' 37° 52' 5° 23

46° 26' 41° 54'

31

3° 40'

242.

242
46
1452
268
1132
14
11117.

3° 31

0,000291

22 582
582
6402

0,0000641 / 57

46° 20' 37° 55 0,21747.
-48
2571

61° 11 dl 21747. 209

0,21956

337299
259502
596931

0,059531
158
0,059689
871

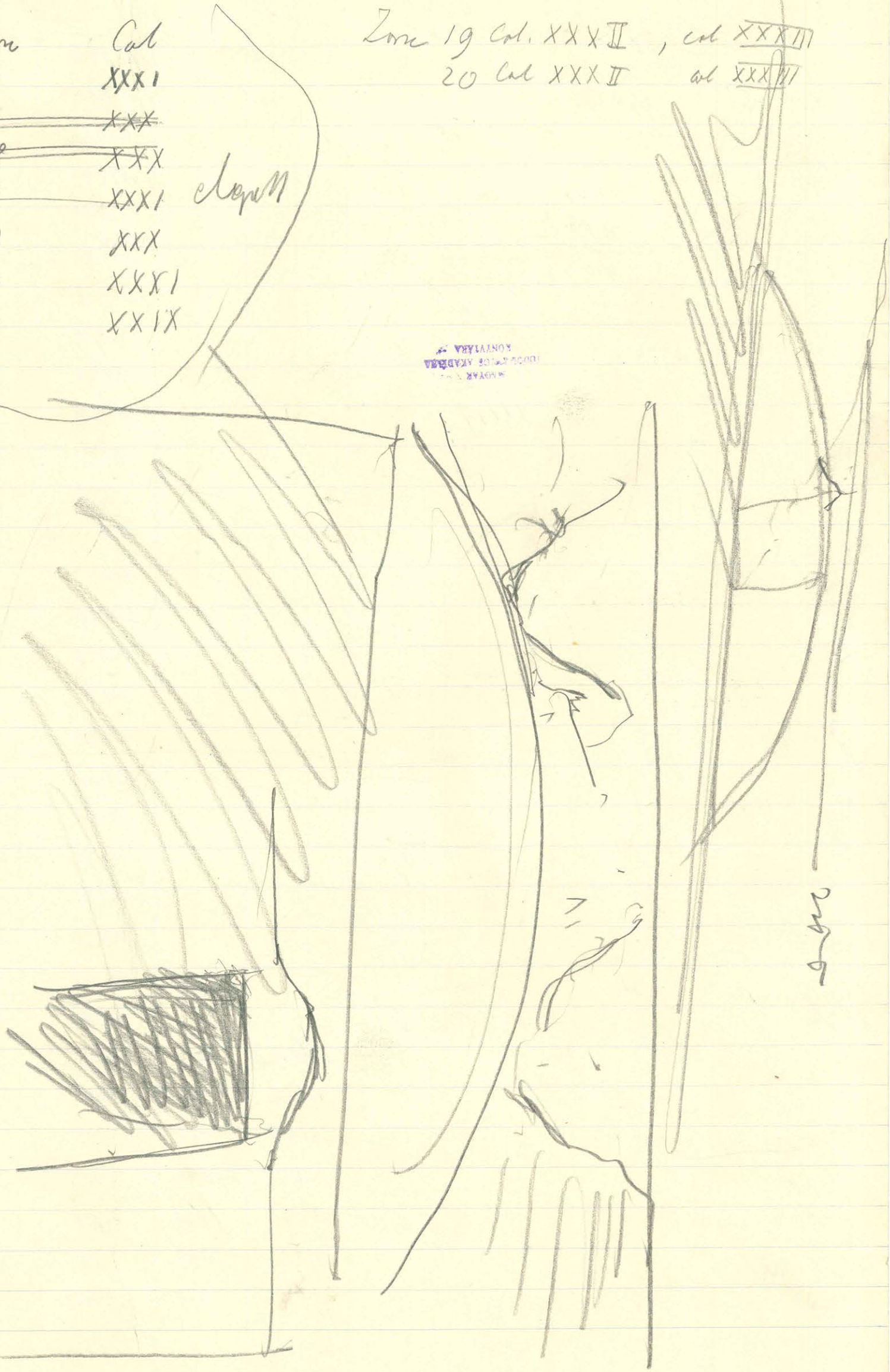
+93
65-

182

Zone	Col
19	XXXI
~~19~~	~~XXX~~
~~18~~	~~XXX~~
18	XXXI
20	XXX
20	XXXI
20	XXIX

clayey

Zone 19 Col. XXXII , col XXXIII
20 Col XXXII col XXXIII



$2X$	$b^2+c^2+x^2$	$2x$	$b^2+c^2+x^2$
0	10025	400	50025
2	10026	402	50426
6	10034	406	51234
10	10050	410	52050
20	10125	420	54125
40	10425	440	58425
60	10925	460	62925
80	11625		
100	12525		
120	13625		
140	14925		
160	16425		
180	18125		
190	19050		
194	19434		
198	19826		
200	20025		
202	20226		
206	20634		
210	21050		
220	22125		
240	24425		
260	26925		
280	29625		
300	32525		
320	35625		
340	38925		
360	42425		
380	46125		
390	48050		
394	48834		
398	49626		

0,150515 −8	0,150526 0,000000 −2	0,150613 0,477121 −2	0,150787 0,698970 −2	0,151598 0,000000 −1	0,154815 0,301030 −1	0,160073 0,477721 −1	0,167227 0,602060 −1	0,176092 0,698970 −1	0,186456 0,778751 −1
−8	9,150526 −2	9,627734 −2	9,849757 −2	9,151598 −9	9,455845 −1	9,637794 −1	9,769287 −1	9,875062 −1	9,964607 −1
90° 0	89° 11' 23"	89° 34' 12"	85° 57' 10"	81° 55' 51"	74° 3' 27"	66° 31' 28"	59° 32' 59"	53° 7' 48"	47° 19' 55"
1,570796	1,553343 3200 112	1,578436 3491 58	1,483530 16584 49	1,413717 15999 247	1,291544 873 131	1,151917 9018 136	1,029744 9308 286	0,925025 2036 233	0,820305 5527 267
1,570796	1,556655	1,521985	1,500160	1,429963	1,292548	1,161071	1,039338	0,927294	0,826099

						238567			
0,198700 0,845098 −1	0,210802 0,903090 −1	0,224353 0,954243 −1	0,231386 0,977724 −1	0,234240 0,986772 −1	0,237116 0,995635 −1	0,234861 0,000000	0,240011 0,004321	0,242925 0,012837	0,245856 0,021182
0,043198	0,113892	0,178596	0,209110	0,221012	0,232751	0,234861	0,244232	0,255762	0,267038
42° 9' 19"	37° 34' 18"	33° 22' 16"	31° 42' 37"	31° 0' 45"	30° 19' 59"	30° 12' 44"	29° 40' 17"	29° 1' 38	28° 24' 1"
0,733038 2618 92	0,645772 9890 87	0,575959 9308 78	0,541052 12217 179	0,541052 218	0,523599 5567 286	0,523599 341 204	0,506146 1 1636 82	0,506146 291 184	0,488692 6981 5
0,735748	0,655749	0,585345	0,555448	0,541270	0,529412	0,523294	0,517864	0,506621	0,495678
						30° 00 0,523599 1,047198			

0,000542 ∞	0,000564 0,301030 −1	0,000737 0,778151 −1	0,001083 0,000000	0,002698 0,301030	0,009038 0,602060	0,029211 0,778151	0,032697 0,903090	0,048889 1,000000	0,067168 1,079181
	0,201594 −1	0,778888 −1	0,001083	0,203728	0,611098	0,799262	0,935787	1,048889	1,146349
90°	78° 40′ 37″	58° 59′ 36″	44° 55′ 17″	26° 25′ 23″	13° 45′ 30″	9° 3′ 36″	6° 36′ 47″	8,951111 5° 6′ 22″	8,853651 4° 5′ 1″
1,570796	1,361357 11636 179	1,012291 17162 175	0,767945 15999 82	0,453786 7272 112	0,226893 13090 145	0,157080 873 175	0,104720 10472 228	0,087267 1745 107	0,069813 1454 5
1,570796 3,141592	1,373172 2,746344	1,029628 2,059256	0,784026 1,568052	0,461170 0,922340	0,240128 0,480256	0,158128 0,316256	0,115420 0,230840	0,089119 0,178238	0,071272 0,142544
0,086957 1,146128	0,107753 1,204120	0,129139 1,255273	0,139948 1,278754	0,144281 1,287802	0,148618 1,296865	0,150787 1,301030	0,152955 1,305357	0,152292 1,303867	0,161626 1,322219
1,233085 8,766915	1,311873 8,688127	1,384412 8,615588	1,418702 8,581298	1,432083 8,567917	1,445280 8,554727	1,451817 8,548183	1,458306 8,541694	1,466159 8,533841	1,483845 8,516155
3° 20′ 46″	2° 47′ 31″	2° 21′ 47″	2° 11′ 2″	2° 7′ 3″	2° 3′ 15″	2° 1′ 25″	1° 59′ 37″	1° 57′ 29″	1° 52′ 47″
0,052360 5818 223	0,034907 13672 150	0,034907 6109 228	0,034907 3200 10	0,034907 2036 15	0,034907 873 73	0,034907 291 121	0,017453 17162 179	0,017453 16581 141	0,017453 15126 228
0,058401 0,116802	0,048429 0,097458	0,041244 0,082488	0,038117 0,076234	0,036958 0,073916	0,035853 0,071706	0,035319 0,070638	0,034794 0,069588	0,034175 0,068350	0,032807 0,065614

2,032697 2,903090	2,048889 3,000000	2,067169 3,079181	2,086957 3,146128	2,107753 3,204120	2,129139 3,255273	2,150787 3,301030	2,172442 3,342423	2,193918 3,380211	2,215078 3,414973	2,235829 3,447158	2,256109 3,477121
9,129607 −82°19'27"	9,048889 −83°36'51"	8,987988 −84°26'39"	8,940829 −85°0'46"	8,903633 −85°25'13"	8,873866 −85°44'21"	8,849757 −85°57'10"	8,830019 −86°7'55"	8,813707 −86°16'27"	8,800105 −86°23'20"	8,788671 −86°28'57"	8,778988 −86°33'35"
2,415054 3,681241	2,430244 3,698970	2,445001 3,716003	2,459343 3,732394	2,473288 3,748188	2,486853 3,763428	2,500055 3,778151	2,512909 3,792392	2,525432 3,806180	2,537637 3,819544	2,549538 3,832509	2,561149 3,845098
8,733813 86°53'56" 4°34'29" 0,069813 9898 141	8,731274 86°55'1" 3°18'10" 0,052360 5236 49	8,728558 86°55'59" 2°29'20" 0,034907 8436 97	8,726949 86°56'57" 1°56'5" 0,017453 16290 24	8,725100 86°57'27" 1°32'24" 0,017453 9308 116	8,723425 86°58'19" 1°14'58" 0,017453 4072	8,721904 86°58'58" 1°1'48" 0,017453 291	8,720517 86°59'22" 0°51'37" 0,014835 179	8,719252 87°0'4" 0°43'37" 0,012508 179	8,718093 87°0'32" 0°37'12" 0,010763 58	8,717029 87°0'59" 0°32'2" 0,009308 10	8,716051 87°1'23" 0°27'48" 0,007854 233
0,079852	0,057645	0,043440	0,029767	0,026877	0,021525	0,017744	0,015014	0,012787	0,010821	0,009318	0,008087
1,602060 2,167227	1,695970 2,176092	1,778151 2,186456	1,845098 2,198100	1,903090 2,210802	1,954243 2,224353	2,000000 2,238561	2,041393 2,253253	2,079181 2,268279	2,113943 2,283513	2,146128 2,298848	2,176091 2,314195
9,494833 15°13'31"	9,522878 18°26'6"	9,591695 21°26'2"	9,646998 23°55'21"	9,692188 26°12'32"	9,729890 28°13'32"	9,761439 30°0'0"	9,788140 31°32'54"	9,810962 32°54'16"	9,830430 34°5'18"	9,847280 35°7'38"	9,861896 36°2'24"
2,380211 2,444931	2,397940 2,458227	2,414973 2,471252	2,431364 2,484008	2,447158 2,496498	2,462398 2,508726	2,477122 2,520697	2,491362 2,532416	2,505150 2,543898	2,518514 2,555127	2,531479 2,566130	2,544068 2,576908
9,985280 40°44'48" 25°31'17" 0,436332 9018 82	9,939713 41°2'9" 22°36'3" 0,383972 10472 15	9,943721 41°17'53" 19°57'51" 0,331613 16581 247	9,947256 41°32'9" 17°36'48" 0,296706 10472 233	9,950660 41°45'8" 15°32'36" 0,264799 9308 175	9,953672 41°56'53" 13°43'7" 0,226893 12508 34	9,956425 42°7'50" 12°7'50" 0,209440 2036 242	9,958946 42°17'46" 10°44'52" 0,174533 12799 252	9,961259 42°26'52" 9°32'40" 0,157080 9308 194	9,963387 42°35'16" 8°29'58" 0,139626 8436 281	9,965345 42°43'0" 7°35'22" 0,122173 10181 107	9,967160 42°50'9" 6°47'45" 0,104720 13672 218
0,445432	0,394459	0,348441	0,307411	0,271282	0,239435	0,211718	0,187584	0,166582	0,148343	0,132461	0,118610

3,876995

0		0	0			0	
10	0,1682	- 0,1682	5	35	- 0,8	- 0,6	+0,3264	10,1
20	0,5151	0,6833	10	70	3,4	2,6	0,6928	20,8
30	0,8947	1,5780	15	105	7,8	5,9	1,0956	32,9
40	1,3331	2,9111	20	140	14,5	10,9	1,5706	47,1
50	1,8638	4,7749	25	175	23,8	17,9	2,1570	64,7
60	2,5348	7,3097	30	210	36,5	27,4	2,9126	87,4
70	3,3234	10,6331	35	245	53,1	39,8	3,7342	112,0
80	4,5708	15,2039	40	280	76,0	57,0	5,4134	162,4
90	6,6173	21,8212	45	315	108,1	81,1	7,8212	234,6
100	9,4318	31,2530	50	350	156,2	117,2	11,0424	331,3
110	9,4560	40,7120	55	385	203,6	152,7	7,8696	236,1
120	6,6906	47,4026	60	420	237,0	177,8	5,5716	165,4
130	4,7985	52,2011	65	455	261,0	195,8	4,0854	122,6
140	3,6037	55,8048	70	490	279,0	209,3	3,1220	93,7
150	2,7767	58,5815	75					
160	2,1756	60,7571	80					
170	1,7262	62,4833	85					
180	1,3839	63,8672	90					
190	1,1289	64,9961	95					
200	0,9129	65,9090	100					
210	0,7413	66,6503	105					
220	0,6225	67,2728	110					
230	0,5197	67,7925	115					
240	0,4365	68,2290	120					
250	0,3690	68,5980	125					

0	2					1540	647
13	0	+13.1	+13	+39	+10	1530	660
32	0	+19.0	0	+0	0	1530	679
26	+1	+4.0,5	+2	+6	+2	1552	683
44	+8	+8.4,5	+36	+118	+30,5	1582	691
53	+3	+9.5,5	+49,5	+148,5	+37,0	1619	700
58	+1	+5.2	+10	+30	+7,0	1627	705
66	+13	+8.7	+56	+168	+42	1669	713
74	+4	+8.8,5	+68,0	+204	+57	1720	721
82	+3	+8.3,5	+28	+84	+21	1741	729
85	+4	+3.3,5	+10,5	+31,5	+8	1749	732
100	+1	+15.2,5	+37,5	+112,5	+28	1777	747
113	+2	+13.1,5	+29,5	+88,5	+22	1799	760
116	0	+3.1	+3	+9	+2	1801	763
122	+3	+6.1,5	+9	+27	+7	1808	769
126	+6	+4.4,5	+18	+54	+14,5	1822	773
132	−2	+6.2	+12	+36	+9	1831	779
140	+2	0	0	+0	0	1831	787
159	+2	+19.2	+38	+114	+28	1859	806
167	0	+8.1	+8	+24	+6	1865	814
183	0	0		0	0	1865	830
201	−3	−18.1,5	−27	−81	−20	1845	848
203	+3	0	0	0	0	1845	850
220	−13	−5.17	−85	−255	−64	1781	867
221	−6	−1.9,5	−9,5	−28,5	−7,0	1711 1774	868
235	−14	−14.10	−140	−420	−105	1606 1669	882
241	−9	−6.11,5	−69	−207	−52	1554 1617	888
243	−4	−2.6,5	−13	−39	−10	1544 1607	890
260	−7	−17.5,5	−93,5	−280,5	−70	1474 1537	907
264	−15	−4.11	−44	−132	−43	1431 1494	911
274	−15	−10.15	−150	−450	−113	1318 1381	921
283	−12	−9.13,5	−121,5	−364,5	−91	1227 1290	930
302	−4	−19.8	−152	−456	−114	1113 1176	949

85
85
905

905
418
487

122
266