Ms 5039/3-4. Eötvös Loránd jegyzetei. Gravitáció fed *110·8

210 9m. 47·6
220 10m. 8·2 —
230 " 28·6 +
240 " 49·7

fed *304·9

240 19m. 26·2
230 51·6 +
220 10m. 17·2 —
210

fd *151·0

210 30m. 3·7
220 36·0 —
230 31. 9·0 +

fd *272·9

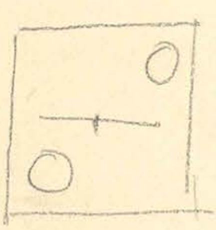
220 40m. 42·4 —

fd *176·2

220 51 5·5 —

f *252·5

220 1m. 4·8



T

10m. 13·3
" 13·3
" 13·8
" 12·6

fed *398·5

245 44m. 37·6 +
240 — 44·8 —
235 — 55·0

fed *179·0

240 — 51m. 29·4 —
245 40·8 +
250 52m. 59·0 •

f* 352·2

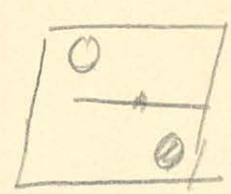
~~284~~ — 2m. 30·4
280 " 50·3 •
245 4m. 37·5 +
240 55·5

fed *214·9

270 12. 55·0
275 13m. 17·0
280 " 31·5 •

fed *323·8

280 23m. 9·2 •



T

10m. 13·4
" 12·7

$T = 607{,}5$ $\quad l_{580} = 7{,}1204$
$l_{640} = 7{,}1308$

$T = 617{,}5$ $\quad l_{580} = 6{,}2582$
$l_{640} = 7{,}7325$

$\cancel{T = 607{,}5}$

$l = 382$

$l' = 436.$

382 | 540 | 0,1415

607,5 $\quad$ 607,5

$\frac{0{,}0074}{7{,}1204}$ $\quad$ $\frac{1{,}4743}{6{,}2582}$

$$T = 607{,}5 + \frac{l'-l}{l} \cdot \frac{10}{\frac{1{,}4743}{6{,}2582} - \frac{0{,}0074}{7{,}1204}}$$

1,415

626 | 1,4743 | 0,2355

$\frac{10}{0{,}234}$ | 1,415 | 6,48

712 | 0,0074 | 0,0014

$T = 613{,}98$

$T = 607{,}5$ $\quad k_{580} \quad 6{,}1062 \qquad 0{,}3480$
$k_{640} = 5{,}7582$

$T = 617{,}5$ $\quad k_{580} = \cancel{7{,}1640} = 5{,}3200 \quad \frac{1{,}6232}{1{,}9712}$
$k_{640} \quad \cancel{8{,}94} = 6{,}9432$

$$\frac{x-y}{x}\ \frac{65}{208} \cdot \frac{10}{\frac{1{,}6232}{5{,}3200} + \frac{0{,}3480}{6{,}1062}}$$

$$\frac{650}{208} \cdot \frac{5{,}3200 \cdot 6{,}1062}{1{,}6232 \cdot 6{,}1062 + 0{,}3480 \cdot 5{,}32}$$

$T = 613{,}37$

$\log x = 0{,}717062 - 1$

$\log v = 0{,}412008 - 2$

$\log$ Hét[illegible]

ρ^0

$$\begin{array}{r} 0{,}412008 - 2 \\ 0{,}717062 - 1 \\ \hline 0{,}694946 - 3 \end{array}$$

$$\begin{array}{r} 0{,}0049539 \\ -3856 \\ \hline 0{,}0053395 \end{array}$$

44 / 252 / 636

$$\begin{array}{r} 0{,}727500 - 2 \\ 713604 - 2 \\ \hline \end{array}$$

$\log \operatorname{tg} \frac{t_0}{T}\pi = 0{,}013856 = 45^0\ 54'\ 50''$

$$\begin{array}{r} 0{,}717062 - 1 \\ \log \cos\ 0{,}842402 - 1 \\ \hline 0{,}874660 - 1 \end{array}$$

$\log A = 0{,}874660 - 1 \qquad A = 0{,}74931$

$\frac{t - t_0}{T}\pi \quad 4^0\ 15'\ 52''$ lehát

$$\begin{array}{r} 0{,}715585 \\ 11054 \\ 281 \\ \hline 0{,}726920 \end{array}$$

$\frac{t}{T}\pi = 41^0\ 38'\ 58'' = 0{,}726920$

$t = 140{,}57.$

$$\begin{array}{r} 0{,}861487 - 1 \\ 713604 - 2 \\ \hline \log t\ 2{,}147883 - 3 \end{array}$$

$$\begin{array}{r} 2{,}147883 \\ 586180 - 4 \\ 637784 - 1 \\ \hline 0{,}371847 - 2 \end{array}$$

$0{,}023542$

$\log e^{-\alpha t} = 0{,}976458 - 1$

$$\begin{array}{r} 958796 \\ 0{,}976458 - 1 \\ 874660 - 1 \\ \cancel{873452 - 1} \\ \cancel{0{,}724570 - 1} \end{array}$$

$\log K_{max} = 0{,}849914 - 1 \qquad K_{max} = 0{,}70781$

lehát $1{,}41562$

Hiba: $0{,}41562$.

$x' = -\vartheta x \qquad x' + x = K$

$v' = -\vartheta v \qquad v' + v = 0$

$k = (1-\vartheta) x$

$x = \frac{k}{1-\vartheta} + \ldots$

0	$-\vartheta k$	$-k$	$+k\vartheta$
$k(1+\vartheta)$	$-\vartheta(1+\vartheta)k$	$-(1+\vartheta+\vartheta^2)k$	$+\vartheta(1+\vartheta+\vartheta^2)k$

$k \qquad = k\vartheta$

$x = \xi' + k$
$v = \omega'$

$x' = ax + bv$
$v' = -(cx + av)$

$\xi = x' - k$
$\omega = v'$

$\xi' = a\xi + b\omega$
$\omega' = -(c\xi + a\omega)$

28·5
2280

$\log a = 0{,}821704 - 2$

~~log b = 0,665140~~

~~log~~ $\log b = 2{,}225524$

$\log c = 0{,}665140 - 3$

273
80

141

2,1992
5862 −4

0,7854 −2
0,6278 −1

0,4232 −2

~~0,0265 −2~~

35

0,9894

0,0265

0,6106[4]   9,9735

0,9894

$$h = (a+1)\,x_0 + \frac{bc}{\alpha+1}\,x_0$$

$$x_0 \left(a+1 + \frac{bc}{\alpha+1} \right.$$

$$\frac{6 m_1 M}{r^4}\, l + \frac{6 m_2 M}{r_4}\, l = h(m_1 - m_2)\,\varepsilon + C\,\varepsilon$$

$$\varepsilon = \frac{6 M (m_1 + m_2)}{r_4 \cdot \left(h (m_1 - m_2) + C \right)}$$

$M =$ $\quad m_1 + m_2 = 2000$

$\quad m_1 - m_2 = 7 \qquad C = 0{,}0$

$$\varepsilon = \frac{87000\, M}{r_4}$$

24 000

32 00

48

72

768 00 000

$\varepsilon = 80{,}000000 \dfrac{M}{r^4}$ pour

$h_4 \; r = 1 \quad M = 1$

3000

~~[illegible]~~ t/J

5h 3 6 30 j
46 0 b
55 30 j T. m. p.
6h. 5m. 0 b. ~~[illegible]~~
14 30 j.
24 0 b.
33 30 j

43 m 5 1 b.
52 40 j
7h. 2 m 15 b.
11 m 50 j
21 m 25 b
31 m 0 j á
40 m 35 b
50 m 10 j
59 m 45 b
8h. –9 m. 20 j á .. 10s-val korán.
18 55 b
28 30 j
38 5 b.
47 40 j
57 15 b
9h 6 50 j
16 25 b
26 0 j
35 35 b
45 10 j
54 45 b
10h 4 20 j
13 55 b

h m s
10 23 30. j
rom. 33 5 b. ... 32 5. b.
42 40 j
52 15 b
11h 1 50 j
11 25 b
21 0 j
30 35 b
40 10 j
49 45 b
59 20 j
12h 8 55 b
18 35 j
28 15 b
37 55 j
47 35 b
57 15 j
1h –6 55 b
16 35 j
26 15 b
35 55 j
~~45 35 b~~
55 15 j
2h –4 55 b
14 35 j
24 15 b
33 55 j
43 35 b
53" 15 j
3h –2 55 b
12 35 j
22 15 b
31 55 j

41 35 b
51 15 j
4h – 55 b
10 35 j
20 15 b
29 55 j
39 35 b
49 15 j
58 55 b
5h –8 35 j
13 35

~~9~~m

3h 6m he fellern. j.

nyyd. 7h. 13m 0 0 b.
22 40s j.
nyy. 32 ~~20~~ 20 0 b.
42 ~~10~~ j.
nyy. 51 ~~55~~ 40 b
8h. 1m 20 s j.
11m 0 0 b.
20m 40s j.
30m 20 0 b.
40m 0 j
49m 40 b.
59 20 j
9h 9 0 b
18 40 j
28 20 b
38 0 j
47 40 b
57 20 j
10h 7 0 b
16 40 j
26 20 b
36 0 j
45 40 b.
55 20 j
11h 5 0 b
14 40 j
24 20 b.
34 0 j
43 40 b
53 20 j
12h 3 0 b.

~~12h 12m 40s j.~~
~~22 20 b.~~
32m 0 j
41 40 b
51 20 j
1h. 1. 0 b
10 30 j
20 m 0 b
29 m 30 j.
39 " 0 bá
48 " 30 j
58 " 0 b
2h -7 " 30 j
17 0 b
26 " 30 j
36 " 0 b
45 30 j
55 " 0 b
3h. -4 " 30 j
14 " 0 b
23 " 30 j
33 " 0 bá
42 30 j T. m. p.
52 0 b
4h. 1m 30 j
11 0 b
20 30 j
30 0 b
39 30 j
49 0 b
58. 30 j
5h. 8m 0 b
17m. 30 j
27 0 b

$x' = ax + bv$

0,643408 −4 $\quad v' = -cx - av$

$x' + x = (a+1)x + bv$

$x' - x = k$

0,0004400

0,004202

$\cancel{a = (a-1)x + bv}$

$\cancel{v(a+1) = -cx}$

0,620408 −2 $\quad \cancel{a = (a-1)x - \frac{cb}{a+1}x}$

2,235524
665140 −3
0,900664 −1

0,643408 −3

0,00440
0,99560

0,79554

$k = (a-1)x + bv$

$(a-1)v = -cx$

$v = -\frac{c}{a-1}x$

$k = (a-1)x - \frac{bc}{a-1}x = x\left((a-1) - \frac{bc}{a-1}\right)$

$x = k\frac{(a-1)}{(a-1)^2 - bc} =$

$x = k\frac{-0,93367}{0,93367^2 - 172 \cdot 0,004625}$

2,235524
0,665140 −3
0,900664

~~0,970200 −1~~
~~0,940400 −1~~
~~0,87177~~

43402
27402

0,93367
0,94 0400 −1
0,8711

$k = (a+1)x + bv$

$(a-1)v = -cx$

$k = (a+1)x - \frac{bc}{(a-1)}x$

$x = k\frac{a-1}{a^2 - 1 - bc}$

91/110 = 0,121
890
80

99580 $\quad x = k\frac{-0,93367}{-0,99560 - 0,79554}$

0,99560
0,79554
1,79114

$\frac{x}{x'}$

$x = k \cdot 523428$

0,970200 −1
0,253100
0,727070 −1
665140 −3
~~2,061930 −3~~
4

93367 9,99956

0,80642
6193
0,79554
0,990063 −1
0,665112 −2
2,235524

0,392210 −3
960200 −1

93367

0,06493 −
0,791898 −2
0,970197 −1
0,871704 −2

0,432010 −3

0,432010 - 4
0,727070 - 1

0,704940 - 3

175 16,49 0,00526 92
1614

2856

0,0054548

28,5
1771,0
18810

285 / 1250 / 4,31
1140
900

179 / 32,5 / 18,1 0,736795 - 3
179

1460

1432

280

~~71~~ 3604 - 3

0,023191

190
256

18
24

1,46372

46° 31' 45''

130
93

16,2

28,5
16,2

12,3

0,837180 - 1

0,727071 - 1
837580 - 1

0,889491 - 1

155
17
32,5

77534

73186

[redacted]

0,586180 -
713 604

0,872576

4° 15'

II
V

0,958756 - 1
0,889491 - 1

0,888287 - 1
0,976 129 - 1

0,864416 - 1

$\frac{\sin d}{\cos \alpha}$

II

175 0 44
46
4
129° 13

$\frac{\pi}{2}$

tg

2,061920
0,727070 - 1

~~1,789000~~
3,334860
710 604
216,202

5,621256

4 2 4 2 9 4

~~log α = 0,01~~

log α = 0,586180 − 4

log T = 2,482445

71

log log e = 0,637784 − 1

0,706480 − 2

log a = −x

~~log a = log 1 / 7~~

$\log e^{-\alpha T} = -0,050872$

= 0,949128 − 1

~~0,000~~

0,586180 − 4

0,535308 − 4

713604 − 3

0,821704 − 2

1 −

~~91117~~

66029

0,172060 − 8

0,427208 − 5

0,745152 − 3

0,949128 − 1

0,713604 − 3

2,205524

− 0,005561

994439

171,998

1,005561 0,002408

0,713604 − 3

0,716012 − 3

949128 − 1

0,665140 − 3

0,046254

0,586180 − 4

949128 − 1

0,535308 − 4

713604 − 3

0,821704 − 2

$$k = (a+1)x - \frac{bc\,x}{a-1}$$

$$k = x\left\{(a+1) - \frac{bc}{a-1}\right\}$$

$$\frac{a^2-1-bc}{a-1}$$

0,643408 −3

$\{$1,0004?995

−0,9956005 −1

0,765140 −3

~~0,760740 −3~~

2,205524

0,000664

1,00015?

995 60

1,99710

970240 −1

1,000400

lg x 0,669840 −1

0,765140 −3

669840 −1

0,434980 −3

970240 −1

~~0,405220 −3~~

0,464740 −3

25 420

0,405220 − 3
669840 − 1
0,735380 − 3

0,0054123
3856
0,0057979

0,7602707 − 3
713604 − 3
0,0496667

48° 16′ 8″

0,669840 − 1
lg cos = 0,823230 − 1
0,846610

70244

0,464740 − 3
669840 − 1
0,794900 − 3

0,00 6235 − 9
3856
0,0066215

0, 8209564 − 3
713604
10,1073532

260
160

52° 0′ 36″

160 / 1960 / 36
26 788
180

0,669840 − 1
lg cos = 0,789246 − 1
0,880594

160
36
96
48
6 / 576 / 96
042
246

75962

$x_1' = 0{,}066329\,k \qquad v_1' = 0{,}046254\,k$

$\xi_1 = -k + 0{,}066329\,k \qquad \omega_1 = (\quad '' \quad)\,k.$

$\xi_1' =$

$\xi = x - k$

$x' = ax + bv$

$v' = cx + av$

$x_1' = ak$

$v_1' = ck$

$\xi_1 = x_1' - k \qquad \omega_1 = v_1' \qquad \xi_1 = k(a-1) \qquad \omega_1 = ck$

$\cancel{\xi_1' = a(a}$

$\xi_1' = ka(a-1) + bck = k$

$\omega_1' = kc(a-1) + ack$

$x_2 = \xi_1' + k = k + ka(a-1) + bck$

$v_2 = \qquad = kc(a-1) + ack.$

$x_2' = ak + ka^2(a-1) + abck + bk + abk(a-1) + b^2ck$

$v_2' = ck + kac(a-1) + bc^2k + kac(a-1) + a^2ck$

$\cancel{x_2' = ak + ka^2(a-1) +}$

$\frac{1-t_0}{T}\pi = -4^\circ 16'$

$\frac{t}{T}\pi = -4^\circ 16' + 46^\circ 31'$

46° 31'
4 16
42° 15'

0,720638
4063
0,727401

0,867700 − 1
710604 − 0
2,150899

2,153899
0,586180 − 4
0,637784 − 1
0,377863 − 2

− 0,023871
0,976129 − 1

0,727070 − 1
0,8275 80 − 1
0,889490 − 1

Végleges egyensúly esetében

$x = 0{,}53342\, k$ $\quad$ $\lg 9727070 - 1$

~~$v = 115{,}327$~~ $\quad$ ~~$\lg 0{,}992210 - 3$~~

~~$\lg 2{,}061930$~~

$v = 0{,}0027402$ $\quad$ $\lg 0{,}432010 - 3$

tehát

$$\cancel{\operatorname{tg} \frac{t_0}{T}\pi = \left(\frac{115{,}327}{0{,}53342} + \alpha\right)\frac{T}{\pi}} =$$

$$\cancel{\operatorname{tg} \frac{T - t_0}{T}\pi = -\alpha \frac{T}{\pi}} \quad \frac{1-t_0}{T}\pi =$$

$$\operatorname{tg} \frac{t_0}{T}\pi = \left(\frac{0{,}0027402}{0{,}53342} + \alpha\right)\frac{T}{\pi} = 46^\circ\, 31'\, 45''$$

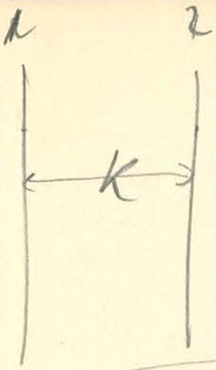
$$A = \frac{x}{\cos \frac{t_0}{T}\pi} = 0{,}77534 k. \qquad \lg A = 0{,}889491 - 1$$

$$\operatorname{tg} \frac{1-t_0}{T}\pi = -\alpha \frac{T}{\pi} = 4^\circ\, 15'\, 52''$$

$t = 142{,}53$

Kitérés maximum $= 0{,}73186\, k$.

tehát $\ell = 2x_m - k = 0{,}46372 k$



$\rightarrow$

$x_1 - k = x_2$

I

T lengési idő

T multiplikációs idő

tegyük $x_2 = 0$

Kérdés $t = 0$ időben ugrik 2ből 1be.
tehát $t = 0$ kor $x_1 = k$ $\quad v_{x_1} = 0$

$$x = A e^{-\alpha t} \cos \frac{t - t_0}{T} \pi$$

$$v_x = -\alpha A e^{-\alpha t} \cos \frac{t - t_0}{T} \pi - \frac{\pi}{T} A e^{-\alpha t} \sin \frac{t - t_0}{T} \pi$$

Minden egyes lengésre nézve az idő azon pillanattól lesz számítva mikor az ugrás arra történt.

tehát 1re vonatkozóan.

$$x_1 = A \cos \frac{t_0}{T} \pi \quad \ldots \ldots \quad 1)$$

$$v_{x_1} = -\alpha A \cos \frac{t_0}{T} \pi + \frac{\pi}{T} A \sin \frac{t_0}{T} \pi \quad \ldots \quad 2)$$

azon lengésre T-vel később.

$$x_1' = A e^{-\alpha T} \cos \frac{T - t_0}{T} \pi = A e^{-\alpha T} \cos \frac{T}{T} \pi \cos \frac{t_0}{T} \pi + A e^{-\alpha T} \sin \frac{T}{T} \pi \sin \frac{t_0}{T} \pi$$

vagyis $\quad x_1' = \left(e^{-\alpha T} \cos \frac{T}{T} \pi + e^{-\alpha T} \sin \frac{T}{T} \pi \, tg \frac{t_0}{T} \pi \right) x_1 \quad \ldots \quad 3)$

$$v_1' = -\alpha A e^{-\alpha T} \cos \frac{T - t_0}{T} \pi - \frac{\pi}{T} A e^{-\alpha T} \sin \frac{T - t_0}{T} \pi$$

$$v' = -\alpha A e^{-\alpha T} \cos \frac{T}{T} \pi \cos \frac{t_0}{T} \pi - \alpha A e^{-\alpha T} \sin \frac{T}{T} \pi \sin \frac{t_0}{T} \pi - \frac{\pi}{T} A e^{-\alpha T} \sin \frac{T}{T} \cos \frac{t_0}{T} \pi + \frac{\pi}{T} A e^{-\alpha T} \cos \frac{T}{T} \pi \sin \frac{t_0}{T} \pi$$

$$4) \ldots \quad v' = \left[\left(-\alpha \cos \frac{T}{T} \pi - \frac{\pi}{T} \sin \frac{T}{T} \pi \right) + \left(-\alpha \sin \frac{T}{T} \pi + \frac{\pi}{T} \cos \frac{T}{T} \pi \right) tg \frac{t_0}{T} \pi \right] e^{-\alpha T} x_1$$

mint pedig 1 és 2 ből

$$tg \frac{t_0}{T} \pi = \left(\frac{v_1}{x_1} + \alpha \right) \frac{T}{\pi} \quad \ldots \ldots \quad 5)$$

ez értékeket helyére 3)ba és 4)be tegyük.

II

$$x_1' = e^{-\alpha T}\cos\frac{T}{\mathcal{T}}\pi\, x_1 + e^{-\alpha T}\sin\frac{T}{\mathcal{T}}\pi\cdot\frac{\mathcal{T}}{\pi}v_1 + e^{-\alpha T}\sin\frac{T}{\mathcal{T}}\pi\cdot\frac{\mathcal{T}}{\pi}\alpha x_1$$

$$6)\quad x_1' = \left(e^{-\alpha T}\cos\frac{T}{\mathcal{T}}\pi + e^{-\alpha T}\frac{\mathcal{T}}{\pi}\alpha\sin\frac{T}{\mathcal{T}}\pi\right)x_1 + \frac{\mathcal{T}}{\pi}e^{-\alpha T}\sin\frac{T}{\mathcal{T}}\pi\, v_1$$

$$v' = \left(-\frac{\pi}{\mathcal{T}}\sin\frac{T}{\mathcal{T}}\pi - \alpha\cos\frac{T}{\mathcal{T}}\pi\right)e^{-\alpha T}x_1 + \frac{\mathcal{T}}{\pi}e^{-\alpha T}\left(-\alpha\sin\frac{T}{\mathcal{T}}\pi + \frac{\pi}{\mathcal{T}}\cos\frac{T}{\mathcal{T}}\pi\right)v_1$$
$$+\alpha\frac{\mathcal{T}}{\pi}e^{-\alpha T}\left(-\alpha\sin\frac{T}{\mathcal{T}}\pi + \frac{\pi}{\mathcal{T}}\cos\frac{T}{\mathcal{T}}\pi\right)x_1$$

$$v' = -\frac{\pi}{\mathcal{T}}\left(1+\frac{\alpha^2}{\pi^2}\mathcal{T}^2\right)\sin\frac{T}{\mathcal{T}}\pi\cdot e^{-\alpha T}x_1 + \left(-\frac{\alpha\mathcal{T}}{\pi}\sin\frac{T}{\mathcal{T}}\pi + \cos\frac{T}{\mathcal{T}}\pi\right)e^{-\alpha T}v_1 \qquad 7)$$

ebből ha adva x_1 és v_1 kiszámíthatók x_1' és v_1'

és pedig. $x_2 = x_1' - k \qquad v_2 = v_1'$

legyen $x_1 = x$ és $x_2 = \xi$ és $v_1 = v \qquad v_2 = w$

és az első operatiónál $x \quad x_1$ ele.

akkor

kiszámítani. $\mathcal{T} = 607{,}5$ és $T = \frac{\mathcal{T}}{2}$ akkor. és
$= 303{,}75$

$$x_1' = e^{-\alpha T}\frac{\mathcal{T}}{\pi}\alpha\, x_1 + \frac{\mathcal{T}}{\pi}e^{-\alpha T}v_1$$

$$v' = \frac{\pi}{\mathcal{T}}\left(1+\frac{\alpha^2}{\pi^2}\mathcal{T}^2\right)e^{-\alpha T}x_1 + \frac{\alpha\mathcal{T}}{\pi}e^{-\alpha T}v \quad \text{tehát}$$

$\frac{\alpha^2}{\pi^2}\mathcal{T}^2 = 0{,}00561$

$$\log e^{-\alpha T} = 0{,}949128 - 1$$

$$x_\xi' = 0{,}066329\, x_\xi + 177{,}998\cdot v_\xi$$
$\log\ 0{,}821704-2 \qquad 2{,}225524$

$$v' = 0{,}046254\, x + 0{,}066329\, v.$$
$0{,}665140-2$

$$x' = \left(e^{-\alpha T}\cos\frac{T}{\mathcal{T}}\pi + e^{-\alpha T}\frac{\mathcal{T}}{\pi}\alpha\sin\frac{T}{\mathcal{T}}\pi\right)x_{\xi} + \frac{\mathcal{T}}{\pi}e^{-\alpha T}\sin\frac{T}{\mathcal{T}}\pi \cdot v \quad \ldots 6)$$

$$v' = -\frac{\pi}{\mathcal{T}}\left(1+\frac{\alpha^2}{\pi^2}\mathcal{T}^2\right)\sin\frac{T}{\mathcal{T}}\pi\, e^{-\alpha T}x, + \left(-\frac{\alpha\mathcal{T}}{\pi}\sin\frac{T}{\mathcal{T}}\pi + \cos\frac{T}{\mathcal{T}}\pi\right)e^{-\alpha T}v \quad 7.$$

ha $\mathcal{T} = 607{,}5$ $\quad T = \frac{\mathcal{T}}{2} = 303{,}75$ akkor.

$$x' = e^{-\alpha T}\frac{\mathcal{T}}{\pi}\alpha \cdot x + \frac{\mathcal{T}}{\pi}e^{-\alpha T}v$$

$$v' = -\frac{\pi}{\mathcal{T}}\left(1+\frac{\alpha^2}{\pi^2}\mathcal{T}^2\right)e^{-\alpha T}x + \frac{\alpha\mathcal{T}}{\pi}e^{-\alpha T}v.$$

vagyis

$$\underline{x' = 0{,}066329\,x + 171{,}998\,v}$$

0,821704−2 $\qquad$ 2,235524

$$v' = \cancel{-0{,}0046254}\,x - 0{,}066329\,v$$

~~0,665140−3~~ $\qquad$ 0,821704−2

0,665140−2

$$v' = -0{,}0046254 - 0{,}066329\,v.$$

egykkel

$$\frac{v'}{e^{-\alpha T}} = \left(-\alpha\cos\frac{T}{\mathcal{T}}\pi - \frac{\pi}{\mathcal{T}}\sin\frac{T}{\mathcal{T}}\pi - \alpha^2\frac{\mathcal{T}}{\pi}\sin\frac{T}{\mathcal{T}}\pi + \alpha\cos\frac{T}{\mathcal{T}}\pi\right)x$$

$$\left(-\alpha\frac{\mathcal{T}}{\pi}\sin\frac{T}{\mathcal{T}}\pi + \cos\frac{T}{\mathcal{T}}\pi\right)v$$

608
93
1824
5472
314 | 565 | 17.
314
2510

0,00,572 / 0,0003860 / 0,075
3102
3619
2410

2,4818008 =

0,075
93
225
675

IV

$\frac{\alpha T}{2} = T'$ és $T = 667{,}5$-re kiszámítjuk a végállapot

adva van

$$x' = 0{,}066329\,x + 171{,}998\,v$$

$$v' = -0{,}0058229\,x - 0{,}066329\,v$$

vagyis

$$x' = ax + bv$$

$$v' = -cx - av.$$

mivel a végén $x' + x = k$ és

$v' + v = 0$ lesz

$$k = (a+1)x + bv \quad \text{és}$$

$$(a-1)v = -cx \qquad v = -\frac{cx}{a-1}$$

$$x = k\frac{a-1}{a^2-1-bc}$$

ezért

$x = 0{,}46756$ $\qquad \log x = 0{,}669840-1$

$v = 0{,}0029157$ $\qquad \log v = 0{,}464740-3$

~~$v = 0{,}00\ldots$~~ ~~$\log v = 0{,}4\ldots 3$~~

~~$\operatorname{tg}\frac{t_0}{T}\pi = \left(\frac{v}{x}+\alpha\right)\frac{T}{\pi} = 48^\circ\ 16'\ 8''$~~

~~$A = \frac{x}{\cos\frac{t_0}{T}\pi} = 0{,}70244$~~ ~~$\log A = 0{,}846610-1$~~

$$\operatorname{tg}\frac{t_0}{T}\pi = \left(\frac{v}{x}+\alpha\right)\frac{T}{\pi} = 52^\circ\ 0'\ 36''$$

$$A = \frac{x}{\cos\frac{t_0}{T}\pi} = 0{,}75962 \qquad \log A = 0{,}880594$$

$\operatorname{tg}\frac{t-t_0}{T}\pi = -(4^\circ\ 15'\ 52'')$ $\quad \frac{t}{T}\pi = 47^\circ 44' 44''$ $\quad t = 161{,}14$

$X_{maximum} = 0{,}71188$ $\quad L = 2X_m - 1 = 0{,}42376.$

0,934

1664/9340/56
8320
10200

1787/9340/522
8935
4050
3574
4760

lg 922671 =
lg(a-1)

0,9.22671 = 0,970194 -1

~~0,940388~~ -1

~~0,87175~~

~~0,132658~~

0,643408 -2

0,0042996
0,995601
795548
1,791149

934
934
2736
2802
8406
0,872356

0,128

872
792
1664

172
0,0046
1032
688
7916

0,066

396
396
0,004356
0,9957
7916
17872

2,235524
665140 -2
0,900664 -1

0,970194 -1
0,253132
0,717062

0,717062 -1
665140 -2
0,382202 -3
970194 -1
0,412008 -2

lg x = 0,717062 -1, lg X = 0,52127

lg v = 0,412008 -3 v = 0,0025822

25822

IV.

μ	$\varphi+\mu\frac{2\pi}{n}$	$\log\sin(\varphi+\mu\frac{2\pi}{n})$	$\log\cos(\varphi+\mu\frac{2\pi}{n})$	$\sin(\varphi+\mu\frac{2\pi}{n})$	$\cos(\varphi+\mu\frac{2\pi}{n})$	$\log[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}$	$\frac{\sin(\varphi+\mu\frac{2\pi}{n})}{[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}}$
48	271° 24' 22·5"			-0,9996 989	0,0245 412	0,9983 9920-1	-1,0033 921
49	277° 1' 52·5"			-0,9924 793	0,1224 107	0,9197 6350-1	-1,1938 725
50	282° 39' 22·5"			-0,9757 020	0,2191 012	0,9855 6805-1	-1,0086 700
51	288° 16' 52·5"			-0,9459 280	0,3136 817	0,~~28~~97 92 4345-1	-~~1~~0,9960 113
52	293° 54' 22·5"			-0,9142 098	0,4052 413	0,9730 5100-1	-0,9727 357
53	299° 31' 52·5"			-0,8700 870	0,4928 980	0,9670 7230-1	-0,9386 213
54	305° 9' 22·5"			-0,8175 847	0,5758 082	0,9613 6615-1	-0,8936 485
55	310° 46' 52·5"			-0,7572 089	0,6531 728	0,9559 9630-1	-0,8379 525
56	316° 24' 22·5"			-0,6895 404	0,7242 470	0,9510 2380-1	-0,7718 555
57	322° 1' 52·5"			-0,8152 315	0,~~84~~78 83 463	0,9465 0640-1	-0,6958 766
58	327° 39' 22·5"			-0,5349 976	0,8448 535	0,9424 9795-1	-0,6107 365
59	333° 16' 52·5"			0,44~~47~~96 112	0,8932 245	0,9390 4690-1	-0,5173 569
60	338° 54' 22·5"			-0,3598 950	0,9329 928	0,9361 9588-1	-0,4168 501
61	344° 31' 52·5"			-0,2667 127	0,9637 762	0,9339 8035-1	-0,3105 012
62	350° 9' 22·5"			-0,1709 618	0,9852 775	0,9324 2860-1	-0,1997 426
63	355° 46' 52·5"			-0,0735 645	0,9972 904	0,9315 5995-1	-0,0861 209

Összeg: -11,4539 442

III.

μ	$\varphi+\mu\frac{2\pi}{n}$	$\log\sin(\varphi+\mu\frac{2\pi}{n})$	$\log\cos(\varphi+\mu\frac{2\pi}{n})$	$\sin(\varphi+\mu\frac{2\pi}{n})$	$\cos(\varphi+\mu\frac{2\pi}{n})$	$\log[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}$	$\frac{\sin(\varphi+\mu\frac{2\pi}{n})}{[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}}$
32	181° 24′ 22·5″			-0,0245 412	-0,9996 989	0,0620 7120	-0,0212 728~~1~~
33	187° 1′ 52·5″			-0,1224 107	-0,9924 793	0,0616 4340	-0,1062125
34	192° 39′ 22·5″			-0,2191 012	-0,9757 020	0,0606 4845	-0,1905 444
35	198° 16′ 52·5″			-0,3136 817	-0,9495 280	0,0590 9310	-0,2737 764
36	203° 54′ 22·5″			-0,4052 413	-0,9142 098	0,0569 8680	-0,3554 078
37	209° 31′ 52·5″			-0,4928 98~~1~~0	-0,8700 870	0,0543 4950	-0,4349 183
38	215° 9′ 22·5″			-0,5758 082	-0,8175 847	0,0511 9545	-0,5117 789
39	220° 46′ 52·5″			-0,653~~2~~1 728	-0,7572 089	0,0475 4940	-0,5854 350
40	226° 24′ 22·5″			-0,7242 470	-0,6895 400	0,0434 3850	-0,6553 ~~148~~ 20
41	232° 1′ 52·5″			-0,7883 463	-0,6152 315	0,0388 9410	-0,7208 136
42	237° 39′ 22·5″			-0,8448 5~~60~~35	-0,5349 976	0,0339 5160	-0,7813 216
43	243° 16′ 52·5″			-0,8932 24~~1~~5	-0,4496 112	0,0286 5015	-0,8362 004
44	248° 54′ 22·5″			-0,9329 928	-0,3598 950	0,0230 3310	-0,8848 002
45	254° 31′ 52·5″			-0,9637 762	-0,2667 158	0,0171 4710	-0,9264 651
46	260° 9′ 22·5″			-0,9852 775	-0,1709 618	0,0110 4300	-0,9605 402
47	265° 46′ 52·5″			-0,9972 90~~0~~4	-0,0735 645	0,0047 7315	-0,9863 895

Összeg: -9,23118~~8~~77

II.

μ	$\varphi+\mu\frac{2\pi}{n}$			$\sin(\varphi+\mu\frac{2\pi}{n})$	$\cos(\varphi+\mu\frac{2\pi}{n})$	$\log[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}$	$\frac{\sin(\varphi+\mu\frac{2\pi}{n})}{[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}}$
16	91° 24' 22'5"			0,99~~8~~9 6 989	-0,0245 412	0,0015 96~~70~~75	0,9960 300 ~~0,9982 7230~~
17	97° 1' 52'5"			0,9924 793	-0,1224 107	0,0079 2585	0,9745 309
18	102° 39' 22'5"			0,9757 020	-0,2191 012	0,0141 1905	0,9444 915
19	108° 16' 52'5"			0,9495 280	-0,3136 817	0,0201 2055	0,9065 404
20	113° ~~31'~~ 54' 22'5"			0,9142 098	-0,4052 413	0,0258 7830	0,8613 260
21	119° ~~9'~~ 31' 52'5"			0,8700 870	-0,4928 980	0,0313 4325	0,8095 047
22	125° 9' 22'5"			0,8175 847	-0,5758 082	0,0364 1025	0,7518 344
23	130° 46' 52'5"			0,7572 089	-0,6531 728	0,0412 1835	0,6886 479
24	136° 24' 22'5"			0,6895 404	-0,7242 470	0,0455 5020	0,6208 827
25	142° 1' 52'5"			0,6152 315	-0,7883 463	0,0494 3220	0,5490 430
26	147° 39' 22'5"			0,5349 976	-0,8448 535	0,0528 3555	0,4737 140
27	153° 16' 52'5"			0,4496 112	-0,8932 245	0,0557 3460	0,3954 600
28	158° 54' 22'5"			0,3598 950	-0,9329 928	0,0581 0850	0,3148 236
29	164° 31' 52'5"			0,2667 127	-0,9637 762	0,0599 4015	0,2323 290
30	170° 9' 22'5"			0,1709 618	-0,9852 775	0,0612 1650	0,1484 850
31	175° 46' 52'5"			0,0735 645	-0,9972 904	0,0619 2855	0,0637 882

Összeg: +9,7314 31~~1~~3

I.

$$\sum_{\mu=0}^{n-1} \frac{\sin\left(\varphi+\mu\frac{2\pi}{n}\right)}{\left[1-k\cos\left(\varphi+\mu\frac{2\pi}{n}\right)\right]^{\frac{3}{2}}} = \begin{array}{r} 10,7709228 \\ +9,731431\cancel{1}3 \\ -9,2311188\cancel{5}7 \\ -11,4539442 \\ \hline -20,685132\cancel{7}9 \\ +20,50235\cancel{349}1 \\ \hline -0,1827788 \end{array} = -0,1827788$$

$n = 64$

$k = 0{\cdot}1$

$\varphi = \frac{2\pi}{256}$

$-0,1827788$

μ	$\varphi+\mu\frac{2\pi}{n}$	$\log\sin(\varphi+\mu\frac{2\pi}{n})$	$\log\cos(\varphi+\mu\frac{2\pi}{n})$	$\sin(\varphi+\mu\frac{2\pi}{n})$	$\cos(\varphi+\mu\frac{2\pi}{n})$	$\log[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}$	$\frac{\sin(\varphi+\mu\frac{2\pi}{n})}{[1-k\cos(\varphi+\mu\frac{2\pi}{n})]^{\frac{3}{2}}}$
0	1° 24′ 22·5″	8,3898 961	9,9998 692	0,0245 412	0,9996 989	0,9313 8950−1	0,0287 413
1	7° 1′ 52·5″	9,0878 193	9,9967 215	0,1224 107	0,9924 793	0,9319 0795−1	0,1431 895
2	12° 39′ 22·5″	9,3406 449	9,9893 172	0,2191 012	0,9757 020	0,9331 2010−1	0,2555 788
3	18° 16′ 52·5″	9,4964 892	9,9775 078	0,3136 817	0,9495 280	0,9350 0695−1	0,3643 191
4	23° 54′ 22·5″	9,6077 137	9,9610 459	0,4052 413	0,9142 098	0,9375 4405−1	0,4679 178
5	29° 31′ 52·5″	9,6927 572	9,9395 627	0,4923 98~~1~~0	0,8700 870	0,9406 9990−1	0,5650 115
6	35° 9′ 22·5″	9,7602 779	9,9125 328	0,5758 082	0,8175 847	0,9444 3535−1	0,6543 988
7	40° 46′ 52·5″	9,8150 281	9,8792 157	0,653~~2~~1 728	0,7572 089	0,9487 0480−1	0,7350 608
8	46° 24′ 22·5″	9,8598 867	9,8385 598	0,7242 470	0,6895 40~~8~~4	0,9534 5665−1	0,8061 763
9	52° 1′ 52·5″	9,8967 171	9,7890 386	0,7883 463	0,6152 315	0,9586 3525−1	0,8671 252
10	57° 39′ 22·5″	9,9267 8~~27~~14	9,7283 519	0,8448 5~~60~~35	0,5349 976	0,9641 8105−1	0,9174 881
11	63° 16′ 52·5″	9,9509 606	9,6528 372	0,8932 24~~7~~5	0,4496 112	0,9700 3165−1	0,9570 373
12	68° 54′ 22·5″	9,9698 783	9,5561 758	0,9329 928	0,~~1~~3598 950	0,9761 2255−1	0,9857 ~~3~~248
13	74° 31′ 52·5″	9,9839 762	9,4260 438	0,9637 762	0,2667 1~~58~~27	0,9823 8910−1	1,0036 610
14	80° 9′ 22·5″	9,9935 586	9,2328 993	0,9852 775	0,1709 618	0,9887 ~~3~~6650−1	1,0110 951
15	85° 46′ 52·5″	9,9988 217	8,8666 686	0,9972 90~~8~~4	0,0735 645	0,9951 8995−1	1,0083 974

Összeg: 10,7709 228

8 h. 5 m	0 s.	j.
10 m	4 s	b
15 m	7,5	j.
20 m	11 s	b.
25 m	15 s	j.
30	19	b.
35	22,5	j.
40	26	b
45	30	j.
50	34	b.
55	37,5	j

— — — .

— — —

26 m	45 s.	b.
31 m	49 s	j.
36 m	52,5	b.
41 m	56 s	j.
17 46 m	0 s.	b.
52 m	4 s	j
57 m	7,5 s	b.

$$\frac{m_2}{r_2^3} = -\frac{m_1}{r_1^3}\frac{a_1}{a_2}$$

$$\frac{a_1}{a_2}\frac{a_2^2}{r_1^2}$$

$$\cancel{A = 3\frac{m_1}{r_1^3}\sin^2\vartheta_1 + 3\frac{m_1}{r_1^3}}$$

$$\frac{m_1}{r^2} \quad \frac{m_2}{r_2^3} = x$$

$$A = 3\frac{m_1}{r_1^3}\sin^2\vartheta_1 + 3x\sin^2\vartheta_2$$

1) $-\frac{m_1}{r^3}$

$$B = 3\frac{m_1}{r_1^3}\sin\vartheta_1\cos\vartheta_1 + 3x\sin\vartheta_2\cos\vartheta_2$$

2)

$$C = -\frac{m_1}{r_1^3}(1 - 3\cos^2\vartheta_1) - x(1 - 3\cos^2\vartheta_2)$$

3)

$\sin^2 x - 2\cos^2 x$

1es 2)

$\cancel{A = B}$

$$A - B\,tg\,\vartheta_2 = 3\frac{m_1}{r_1^3}\sin^2\vartheta_1 - \frac{3}{2}\frac{m_1}{r_1^3}\sin 2\vartheta_1\,tg\,\vartheta_2$$

$$A(1 - 3\cos^2\vartheta_2) + 3C\sin^2\vartheta_2 = 3\frac{m_1}{r_1^3}\sin^2\vartheta_1(1 - 3\cos^2\vartheta_2) - 3\frac{m_1}{r_1^3}(1 - 3\cos^2\vartheta_1)\sin^2\vartheta_2$$

$$\frac{m_1}{r_1^2}\cos\vartheta_1 - \frac{m_1}{r_1^2}\sin\vartheta_1\,tg\,\vartheta_2 = g$$

$g\vartheta\,tg\,\vartheta_2 = \Delta g$

$\Delta g = g\vartheta\,tg\,\vartheta_2$

$$A - B\frac{\frac{m_1}{r_1^2}\cos\vartheta_1 - g}{\frac{m_1}{r_1^2}\sin\vartheta}$$

$$A - B\frac{\Delta g}{g\vartheta} = 3\frac{g}{r}\vartheta^2 + \frac{3}{r_1}\left(g - \frac{m_1}{r_1^2}\cos^2\vartheta\right)$$

$$A\vartheta = n\frac{\Delta g}{g}$$

$$\vartheta = \frac{B}{A}\frac{\Delta g}{g}$$

$$\frac{\Delta g}{g} = \frac{\frac{m_2 c_2}{r_2^3}}{\frac{m_1 c_1}{r_1^3}}$$

$$\frac{\partial X}{\partial x} = \frac{\partial^2 V}{\partial x^2} = -\frac{m_1}{r_1^3} - \frac{m_2}{r_2^3} + \frac{3 m_1 a_1^2}{r_1^5} + \frac{3 m_2 a_2^2}{r_2^5}$$

$$\frac{\partial Y}{\partial y} = \frac{\partial^2 V}{\partial y^2} = -\frac{m_1}{r_1^3} - \frac{m_2}{r_2^2}$$

$$\frac{\partial Z}{\partial z} = \frac{\partial^2 V}{\partial z^2} = -\frac{m_1}{r_1^3} - \frac{m_2}{r_2^3} + \frac{3 m_1 c_1^2}{r_1^5} + \frac{3 m_1 c_2^2}{r_2^5}$$

$$\frac{\partial Z}{\partial x} = \frac{\partial X}{\partial z} = \frac{\partial^2 V}{\partial x \partial z} = + 3 m_1 \frac{a_1 c_1}{r_1^5} + 3 m_1 \frac{a_2 c_2}{r_2^5}$$

1) $\frac{m_2}{r_2^3} a_2 = -\frac{m_1}{r_1^3} a_1$

$$\frac{m_1 c_1}{r_1^3} + \frac{m_2 c_2}{r_2^3} = g.$$

$$\frac{m_1 c_1}{r_1^3} + \frac{m_1}{r_1^3} \frac{a_1}{a_2} c_2 = g.$$

$\frac{m_2}{r_2^3}$ $\frac{a_1^2}{r_1^2}$ $\frac{a_2^2}{r_2^2}$

2) $\frac{\partial^2 V}{\partial x^2} - \frac{\partial^2 V}{\partial y^2} = 3 \frac{m_1 a_1^2}{r_1^5} + \frac{3 m_2 a_2^2}{r_2^5} = A.$

3) $\frac{\partial^2 V}{\partial x \partial z} = 3 \frac{m_1}{r_1^3} \frac{a_1}{r_1} \frac{c_1}{r_1} + 3 \frac{m_2}{r_2^3} \frac{a_2}{r_2} \frac{c_2}{r_2} = B$

$$\frac{\partial^2 V}{\partial z^2} = -\frac{m_1}{r_1^3} - \frac{m_2}{r_2^3} + \frac{3 m_1 c_1^2}{r_1^5} + \frac{3 m_1}{r_2^5} c_2^2 = C$$

$$A = 3 \frac{m_1}{r_1^3} \sin^2\vartheta_1 + 3 \frac{m_2}{r_2^3} \sin^2\vartheta_2$$

$$B = 3 \frac{m_1}{r_1^3} \cos\vartheta_1 \sin\vartheta_1 + 3 \frac{m_2}{r_2^3} \cos\vartheta_1 \sin\vartheta_1$$

$$C = -\frac{m_1}{r_1^3}(1 - 2\cos^2\vartheta_1) - \frac{m_1}{r_1^3}(1 - 2\cos^2\vartheta_2)$$

$$\frac{A}{B} = 2 \frac{\sin^2\vartheta_1 + \sin^2\vartheta_2}{\sin 2\vartheta_1 + \sin 2\vartheta_2}.$$

$\frac{C}{B} =$

$\cancel{\frac{A}{C} = \frac{3}{2} \frac{\sin^2\vartheta_1 + \sin^2\vartheta_1}{\cos^2\vartheta_1}}$

II

4/64 / 16

4/ 28

7.

8/66 / 1,65

28 1,3

1.

151°5) 106°0 91 +15

257,5) 115°0 91 + 24

~~120~~ 6) 77°5 91 − 13,5

90°) 65°0 91 − 25,5

155°

183,5

180

282

201

372

285,3

867

6/36/4

51 / 38/9

151,5
372,5
240
262
353,5

257,5
90
347,5
360
707,5
353,5

364
200
100
0/20 35
60

2 5'2 / 81

157°5
256,6
10°7
87,3
151,5

105,1
114,1
76,6
64,2

162° 162°
122,5 123,1
284°5 285°3
186,0 186°7
10°5 12°
59 55°2
69°5 67°2
95,5 94°8
165° 162°

106
364
3,5

151,5
256,6
14,3
87,2
151,5

105,1
117,7
73
64,2

530
318
64 / 37 10
221
25
1105
663
773
728
4450 22

151,5
256,5
10,3
87,1
157,0

105
113,8
76,1
63,9

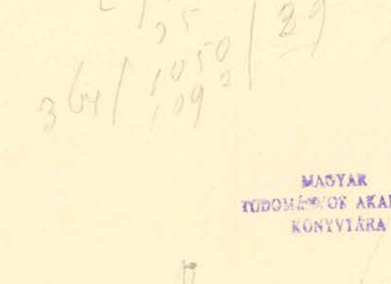
1,8

151,5) 106,5
258,0 115,4
13,4 78,0
91,3 62
153,3

298
25
364 / 1050
109 / 29

151,5
258,4
10,7
92,7
157,5

106,9
112,3
82



157,5 105,5
114,6
257,0
11,6 77,1
88,7 64,5
153,2

151,5) 106,9 123 +33
258,4) 115,9 86 −4
14,3) 73,0 57 −33
87,3 64,2 94 +4
151,5

107 116

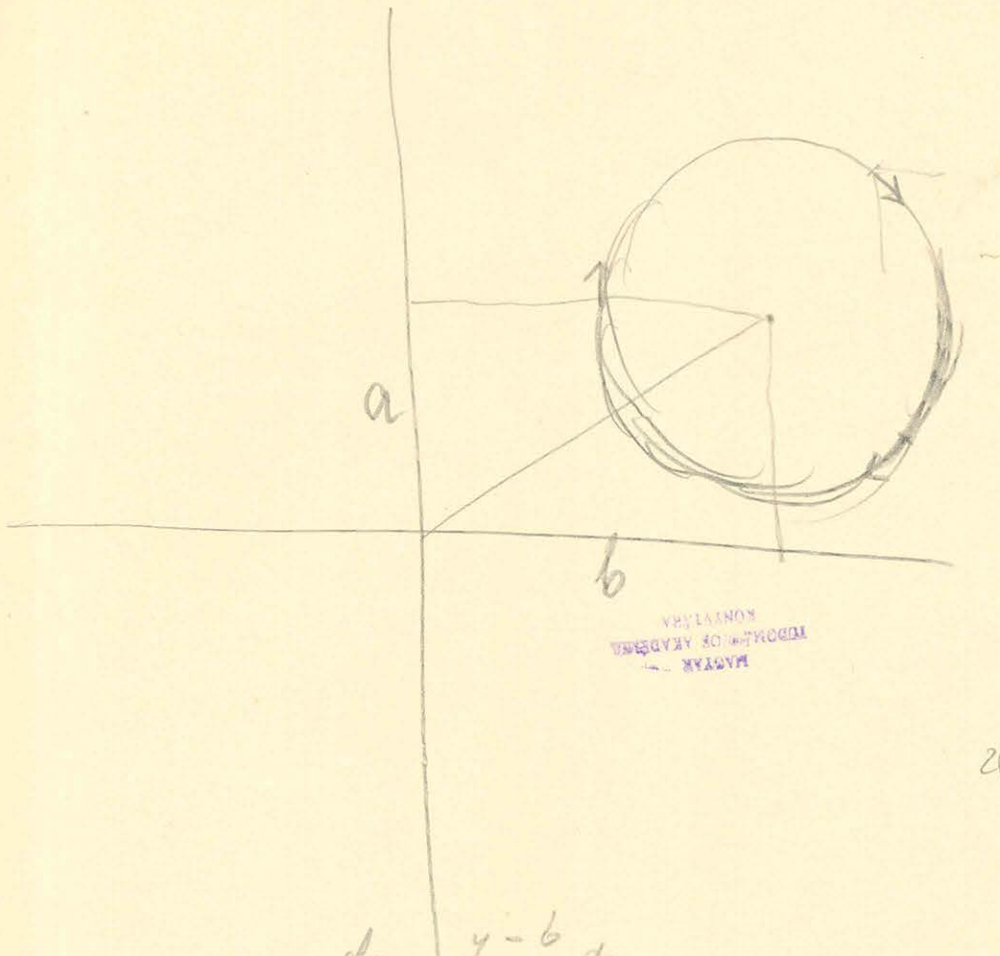
+17
+26 +50 +17 +33
+22 +26 −4
−17 −50 −17 −33
−26 −22 −26 +4

$$M \cos\delta \frac{\partial X}{\partial x} + M \sin\delta \frac{\partial X}{\partial y}$$

$$M \sin\delta \frac{\partial Y}{\partial y} + M \cos\delta \frac{\partial Y}{\partial x}$$

$$M \sin 2\delta \left(\frac{\partial X}{\partial x} - \frac{\partial Y}{\partial y} \right) + M \cos 2\delta \frac{\partial X}{\partial y}$$

X $\qquad \frac{\partial Y}{\partial x} - \frac{\partial X}{\partial y} = C$ $\qquad C\,ds(x \sin\vartheta + y \cos\vartheta)$



Y

$ds \cos\vartheta = dx$

$ds \sin\vartheta = dy$

$C x\,dy + C y\,dx$

$(x-a)^2 + (y-b)^2 = r^2$

$2(x-a)\,dx + 2(y-b)\,dy = 0$

$\cancel{dy}$ $\quad dy = -\frac{x-a}{y-b}\,dx$

$y-b = \sqrt{r^2-(x-a)^2}$

$dy = -\frac{(x-a)\,dx}{\sqrt{r^2-(x-a)^2}}$

$dx = -\frac{y-b}{x-a}\,dy$

$dx = -\frac{(y-b)\,dy}{\sqrt{r^2-(y-b)^2}}$

$\int -C\left(\frac{(x-a)\,x\,dx}{\sqrt{r^2-(x-a)^2}} + \frac{(y-b)\,y\,dy}{\sqrt{r^2-(y-b)^2}}\right)$

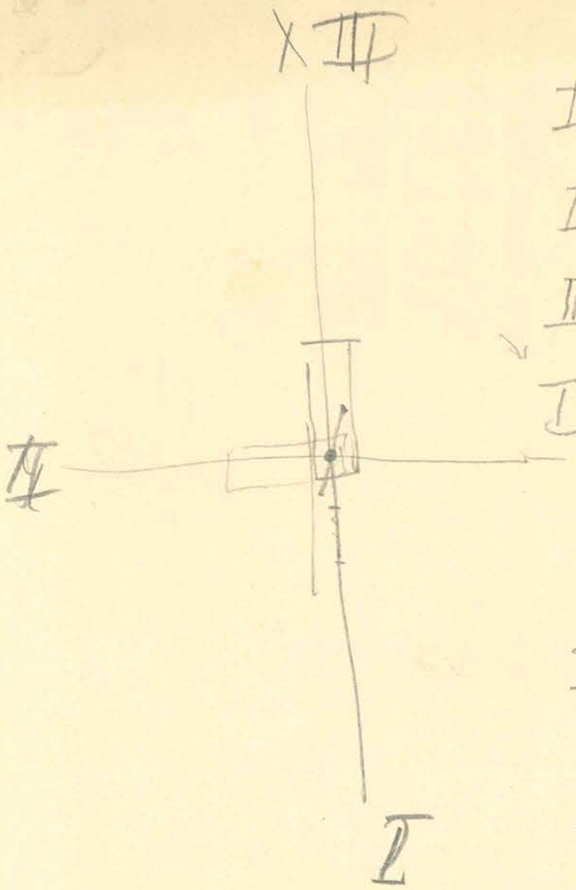
$ds = r\,d\vartheta$ $\qquad \cancel{x = r\cos\vartheta}$ $\qquad y = r\ldots$

$x = a + r\cos\vartheta \qquad y = b + r\sin\vartheta.$

C

$C r\,d\vartheta\left(a\sin\vartheta + \frac{r}{2}\sin 2\vartheta + b\cos\vartheta + \frac{r}{2}\sin 2\vartheta\right)$

$r(\cos^2\vartheta - \sin^2\vartheta)$



$$\mathrm{I} \quad lM\left(\sin\vartheta_1\frac{\partial y}{\partial y} + \cos\vartheta_1\frac{\partial y}{\partial x}\right)$$

$$\mathrm{II} \quad -lM\left(\cos\vartheta_2'\frac{\partial X}{\partial x} + \sin\vartheta_2'\frac{\partial X}{\partial y}\right)$$

$$\mathrm{III} \quad -lM\left(\sin\vartheta_3\frac{\partial y}{\partial y} + \cos\vartheta_3\frac{\partial y}{\partial x}\right)$$

$$\mathrm{IV} \quad +lM\left(\cos\vartheta_4\frac{\partial X}{\partial x} + \sin\vartheta_4\frac{\partial X}{\partial y}\right)$$

$$\mathrm{I} - \mathrm{III} = 2lM\frac{\partial y}{\partial x} + lM(\vartheta_1+\vartheta_3)\frac{\partial y}{\partial y}$$

$$\mathrm{II} - \mathrm{IV} = -2lM\frac{\partial X}{\partial x} - lM(\vartheta_2+\vartheta_4)\frac{\partial X}{\partial y}$$

$\mathrm{I} \quad \cancel{lM\vartheta}$

$$\mathrm{I} \quad \frac{\partial y}{\partial y}lM\vartheta_1 + \frac{\partial y}{\partial x}$$

$$\mathrm{II} \quad -\frac{\partial X}{\partial x}lM - \frac{\partial y}{\partial x}\vartheta_2$$

$$\mathrm{III} \quad -\frac{\partial y}{\partial y}lM\vartheta_3 - \frac{\partial y}{\partial x}$$

$$\mathrm{IV} \quad \frac{\partial X}{\partial x}lM + \frac{\partial y}{\partial x}\vartheta_4$$

$$\mathrm{I}' \quad \frac{\partial y}{\partial y}lM\vartheta' + \frac{\partial y}{\partial x}$$

$$\vartheta_2 = \frac{\vartheta'-\vartheta}{4} = \frac{a}{4\frac{\partial y}{\partial y}}$$

$$\mathrm{I}'-\mathrm{I} = lM\frac{\partial y}{\partial y}(\vartheta'-\vartheta) = a$$

$$\frac{\partial y}{\partial x}$$

$$\mathrm{I}-\mathrm{III} = 2\frac{\partial y}{\partial x} + 2\frac{\partial y}{\partial y}(\vartheta_1+\vartheta_3)$$

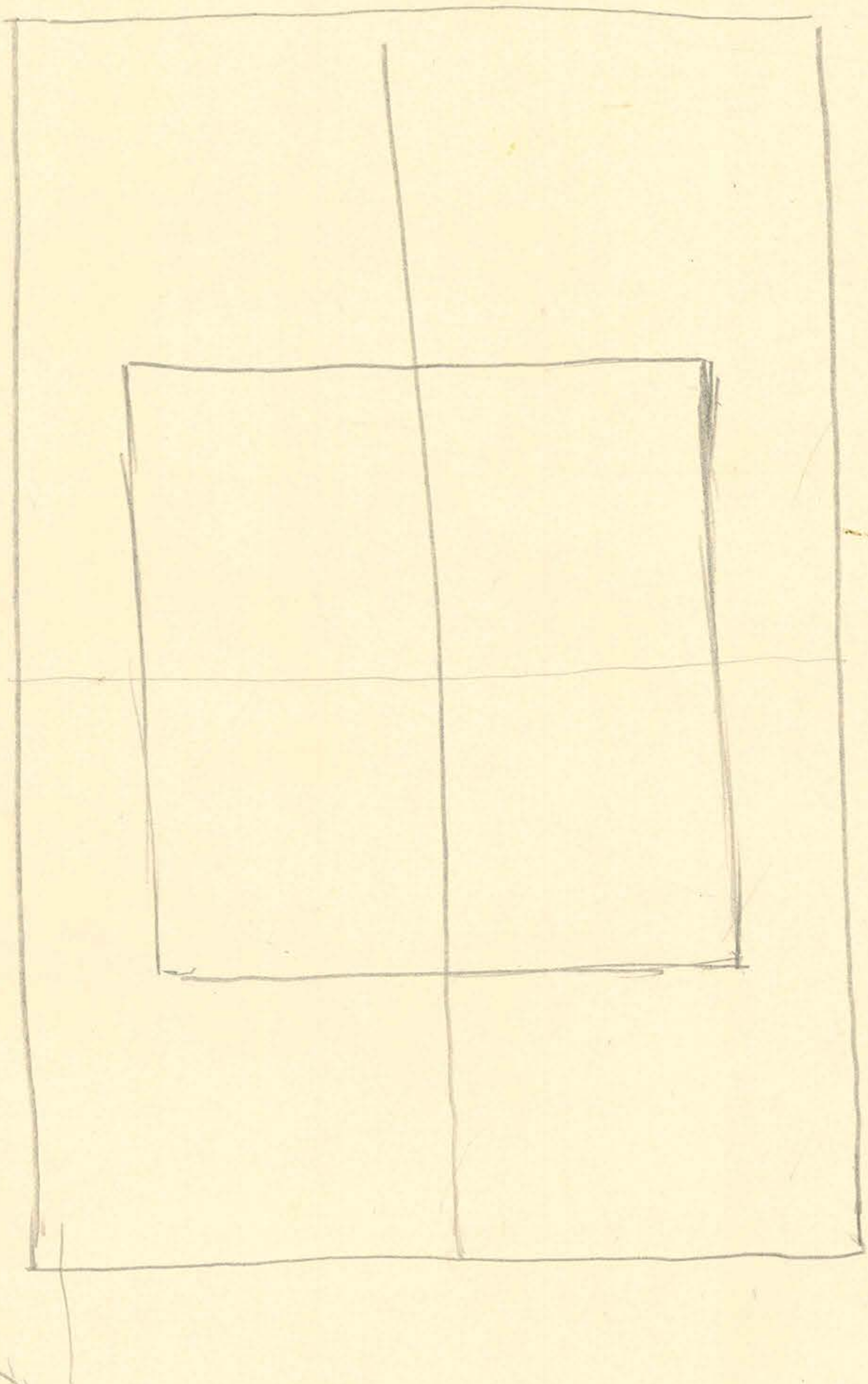
~~I – III~~

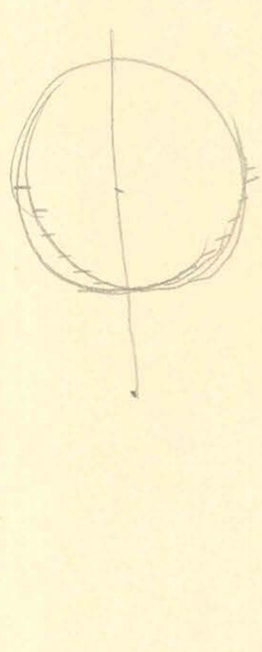
$$\mathrm{II} - \mathrm{IV} = -2\frac{\partial X}{\partial x} - 2\frac{\partial y}{\partial x}(\vartheta_2+\vartheta_4)$$

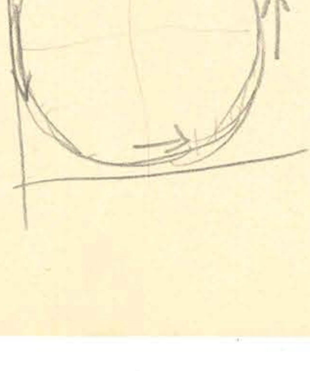
37
37
259
111
1369
841
2210

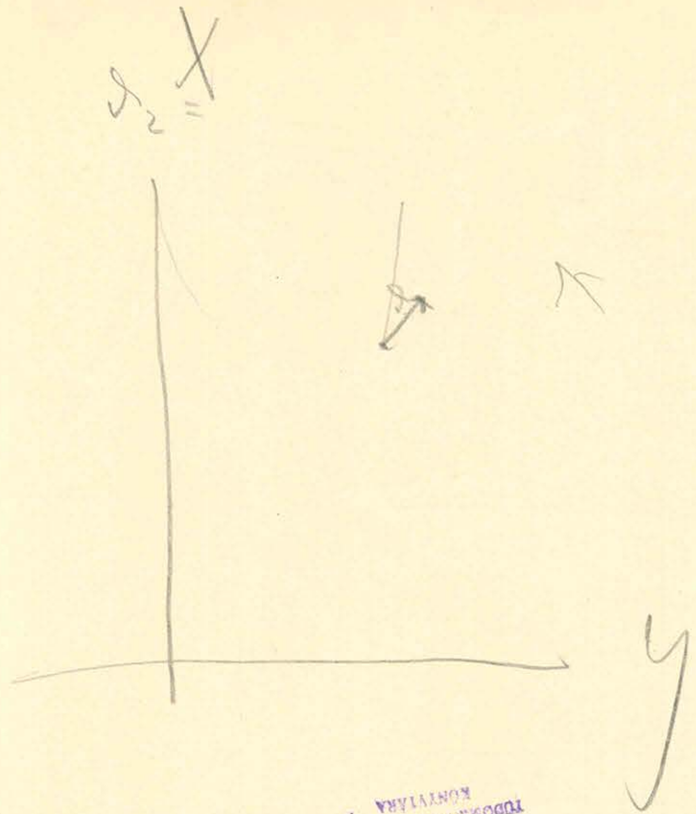
29
29
261
58
841

46
46
276
184
2116









M.

$$\left(\cancel{X} + \cancel{\frac{\partial X}{\partial x} x} + \frac{\partial X}{\partial y} y\right)\sin\vartheta - \left(\cancel{Y} + \cancel{\frac{\partial Y}{\partial y} y} + \frac{\partial Y}{\partial x} x\right)\cos\vartheta$$

$$\cancel{y \frac{\partial X}{\partial x}}\cos\vartheta + y\frac{\partial X}{\partial y})\cos\vartheta - \cancel{x\frac{\partial Y}{\partial y}}\sin\vartheta - \frac{\partial Y}{\partial x} x \sin\vartheta$$

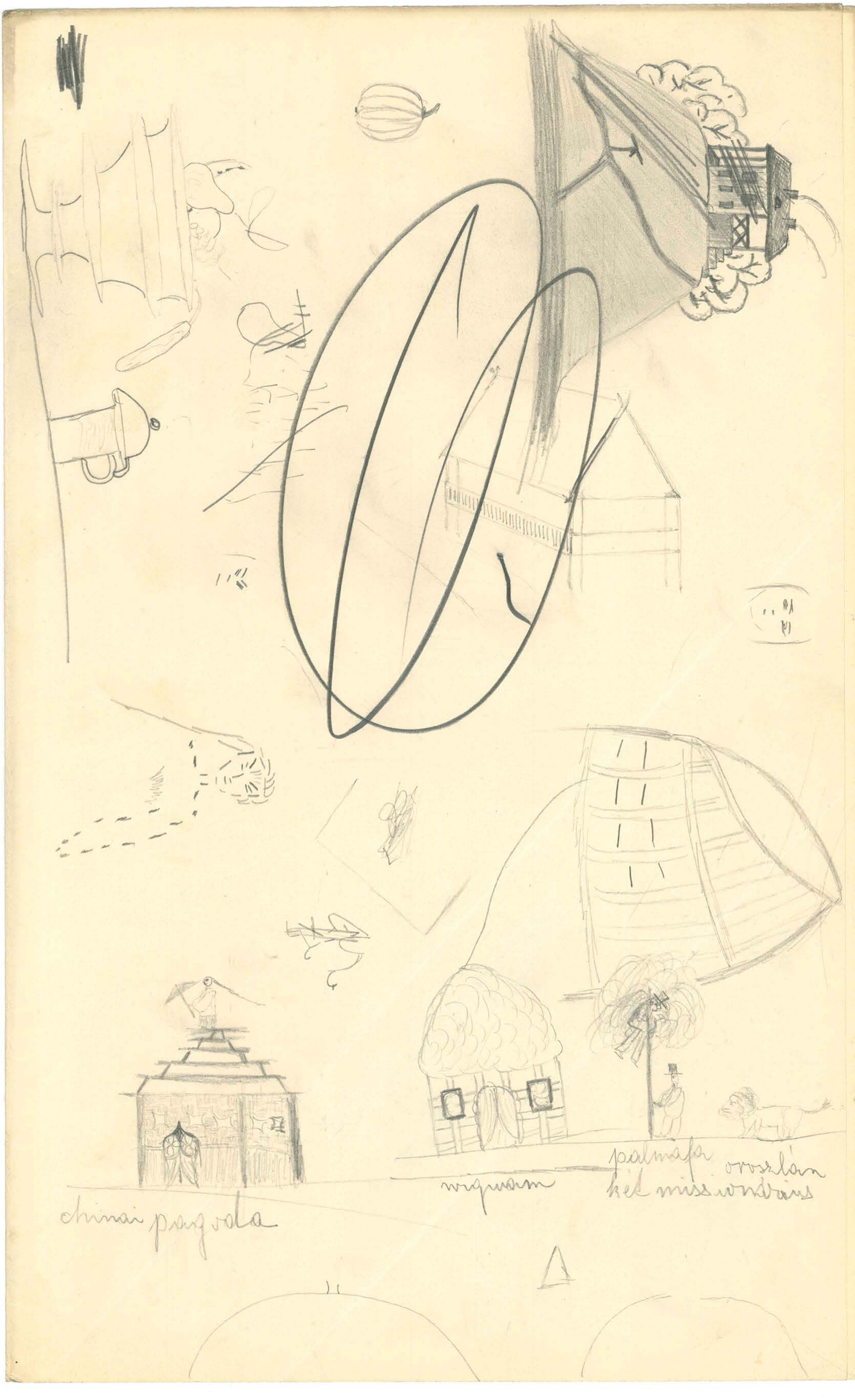
$$Y\cos\vartheta - X\sin\vartheta + x\sin\vartheta\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) + y\cos\vartheta\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)$$

$$+ \frac{\partial Y}{\partial x} x(\cos\vartheta + \sin\vartheta) \quad \frac{\partial Y}{\partial x} = 0$$

$$\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) = C$$

$A(x\sin\vartheta\, ds$

$C\, ds\,(x\sin\vartheta + y\cos\vartheta)$



chinai pagoda
wigwam
palmafa
oroszlán
két missionárius

$MH = (2\pi - \varepsilon)\,\tau$

$MH =$

$\frac{MH}{\tau} = \frac{2\pi-\varepsilon}{\varepsilon}$

$$T_1^2 = \pi^2 \frac{K + r_1^2 2m}{MH(1+\vartheta)}$$

$$\frac{MH(1+\vartheta)}{\pi^2} T_1^2 = K + r_1^2 2m$$

$$\frac{MH(1+\vartheta)}{\pi^2} T_2^2 = K + r_2^2 2m$$

$\lg = 5{,}5822460$

$$\frac{MH(1+\vartheta)}{\pi^2}\left(T_1^2 - T_2^2\right) = 2m\left(r_1^2 - r_2^2\right)$$

$\log\left(T_1^2 - T_2^2\right) = 2{,}0933760$

2,0933760
~~0,054136~~
2,147912

$MH(1+\vartheta)(T_1^2 - T_2^2) = \lg 5{,}5822460$

5,5822460
2 147912
3,434434

437
~~353~~
84

84

~~10-2~~
11,4

11,6754280
2328990,9

9,1862331 9,3464371
2220400000
1535441000
684989000

$\lg$ 8,835684.
~~4,031166~~
4,804518
4,89

2,429106
1 602060
4031166

$\lg \frac{M}{H} = 4{,}796518$.

$\lg MH = 3{,}434434$
4 796518

$\lg M^2 = 8{,}230952$ $\lg M = 4{,}115476$ + $M = 13046$

$\lg H^2 = -{,}637916-2$ $\lg H = 0{,}318958-1$ $H = 0{,}2133$

$Mdl = mgx$ $x =$

$\sum m_x x = \xi \sum M_x$

$10 \frac{1}{100} = x$ $\frac{1}{100}$ $\frac{1}{3000}$

$\frac{3}{4}$

ha $\sum M_x = 0$ akkor $\sum m_x x$?

$2° 54' 20''$

$m x_1 - m x_2$

$m(x_1 - x_2)$

$$\begin{array}{r} 8,4046 \\ 3010 \\ \hline 8,7056 \end{array}$$

$1° 27' 10''$

lg ξ

$$\begin{array}{r} 8,7960 \\ 3010 \\ \hline 9,0970 \end{array}$$

10 941829

lg φ_1 8,404170

$7° 8'$

$3° 34'$

8,794701

lg φ_2 = 8,794701

$$\begin{array}{r} 10,290231 \\ \hline 9,084932 \end{array}$$

r^5 lg φ

9,045559

r^5 lg φ'

2218190000

1216992000

1,001198000

9,000477

4031166

$\lg \frac{M}{H} = 4,969311$

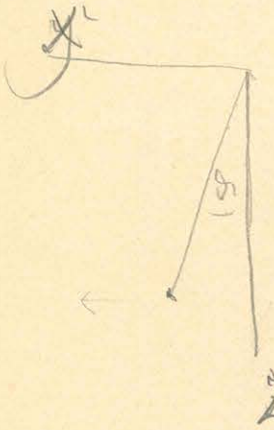
$\lg Mdl = 3,434434$

~~5 34877~~

$\lg h^2 = 8,403745 = 4,201872$ $M = 159180$

$\lg H^2 = 0,465123 - 2 = 0,232561 - 1$ $H = 0,1669$

$\frac{\partial X}{\partial z} l^2 \sin\vartheta\cos\vartheta + \frac{\partial X}{\partial x}$



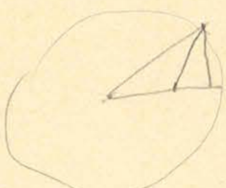
$$\frac{\partial X}{\partial x} l^2 \sin\vartheta\cos\vartheta + \frac{\partial X}{\partial z} l^2\cos^2\vartheta$$

$$-\frac{\partial Z}{\partial x} l^2\sin\vartheta\cos\vartheta - \frac{\partial Z}{\partial x} l^2\sin^2\vartheta$$

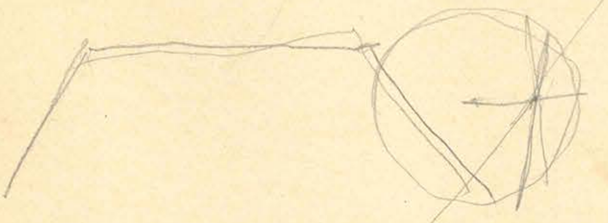
$$\left(\frac{\partial X}{\partial x}-\frac{\partial Z}{\partial x}\right) l^2 \frac{\sin 2\vartheta}{2} + \frac{\partial Z}{\partial x} l^2\cos 2\vartheta$$

$r\cos\vartheta$

$$\frac{z(r\cos\vartheta - a)}{\left(r^2\sin^2\vartheta + (r\cos\vartheta - a)^2 + z^2\right)^{\frac{5}{2}}} = \frac{z(r\cos\vartheta - a)}{\left(r^2 + a^2 - 2ar\cos\vartheta + z^2\right)^{\frac{5}{2}}}$$



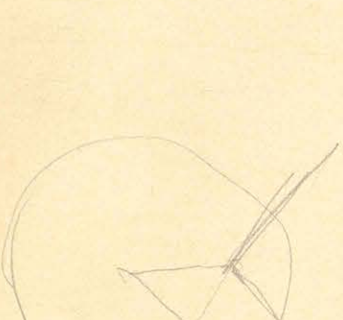
$(\cancel{r\cos\vartheta - a})$

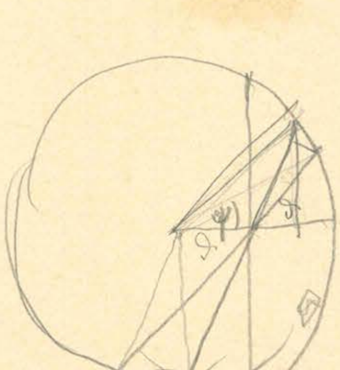


$$\sqrt{r^2 + a^2 - 2ar\cos\vartheta)}\; d\vartheta$$

$\cos\varepsilon$

$\varepsilon + \psi = \vartheta$





$(x+a)^2$

$r^2 - (x+a)^2$

$$\frac{XZ\,dx\,dy\,dz}{(x^2+y^2+z^2)^{\frac{5}{2}}}$$

y na nejprv integrální

$r = z \operatorname{tg} \vartheta$

$\sin^2 \vartheta$

$$\frac{2\pi\, dr\, dz\, z^2 \operatorname{tg}\vartheta}{z^5 (1 + \operatorname{tg}^2 \vartheta)^{\frac{5}{2}}}$$

$dr = z \frac{d\vartheta}{\cos \vartheta}$

$$\frac{2\pi\, dr\, dz}{z^2} \sin\vartheta \cos^4\vartheta\, d\vartheta$$

$$\frac{2\pi\, d\sigma\, dz}{z^4} \sin\vartheta \cos^4\vartheta\, d\vartheta$$

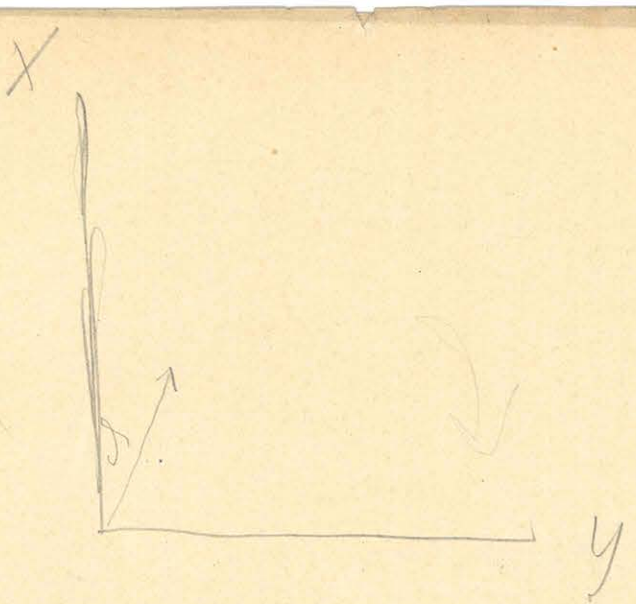
$$-\frac{2\pi\, \sigma\, dz}{z^3} + 3\, \frac{2\pi \tau\, \sigma\, dz}{z^4} \sin\vartheta \cos^2\vartheta\, d\vartheta$$

$$-\frac{2\pi\, dz}{z^3} \int \sin\vartheta \cos^2\vartheta\, d\vartheta$$

π

$d \frac{1}{z^2} = -\frac{2}{z^3} dz$

$f(z'x) = X$



~~M sin i~~

$$\xi = M\cos i\left(\cos\delta\,\frac{\partial X}{\partial x} + \sin\delta\,\frac{\partial X}{\partial y}\right) + M\sin i\,\frac{\partial X}{\partial z}$$

$$\eta = M\cos i\left(\sin\delta\,\frac{\partial Y}{\partial y} + \cos\delta\,\frac{\partial Y}{\partial x}\right) + M\sin i\,\frac{\partial Y}{\partial z}$$

$$\xi' = M\cos i'\left(\qquad\qquad\right) + M\sin i'\,\frac{\partial X}{\partial z}$$

$$\eta' = M\cos i'\left(\right.$$

$$-\left(\cos\delta\,\frac{\partial X}{\partial x} + \sin\delta\,\frac{\partial X}{\partial y}\right)\sin\delta$$

$$\left(\sin\delta\,\frac{\partial Y}{\partial y} + \cos\delta\,\frac{\partial X}{\partial y}\right)\cos\delta$$

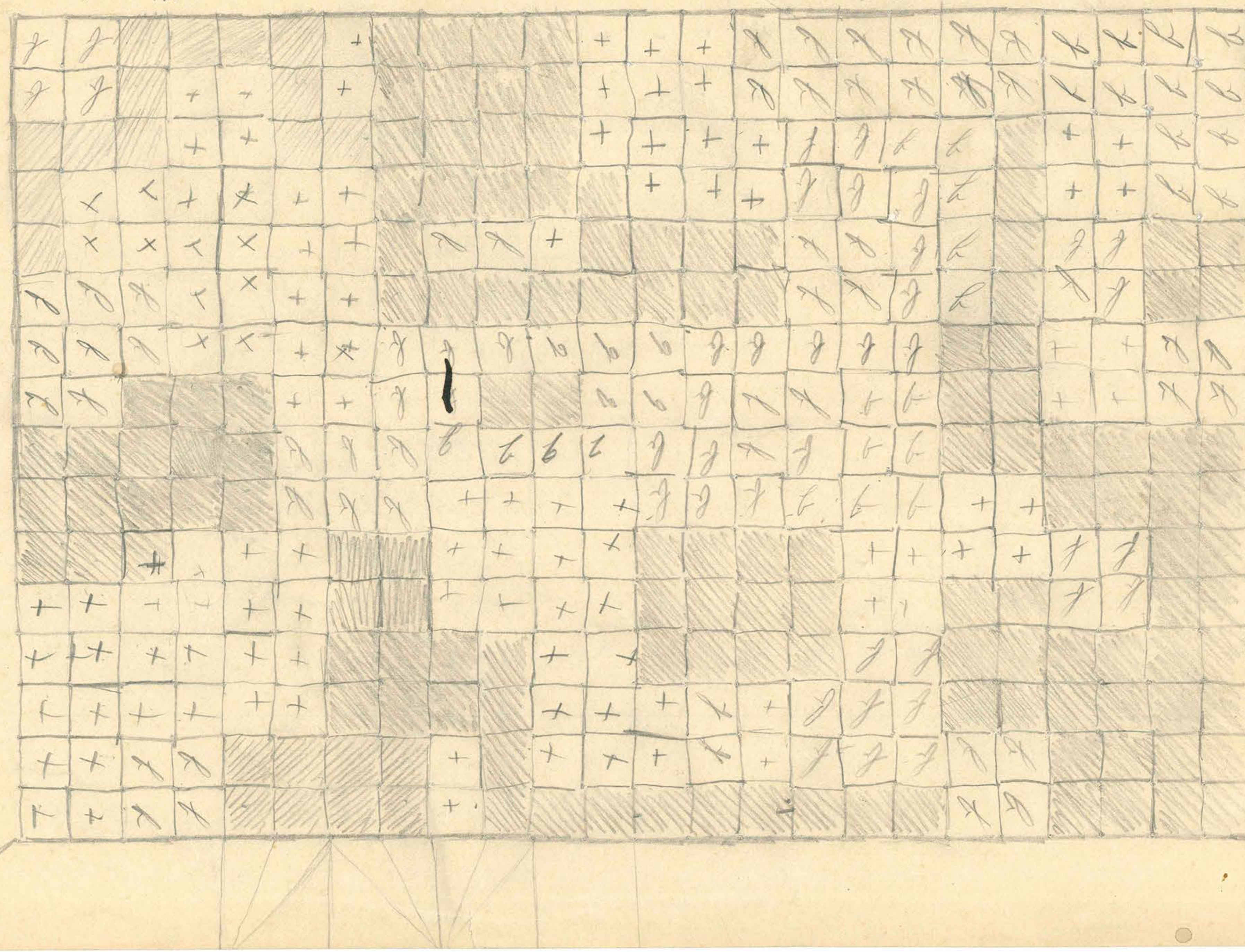
$$\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)\frac{\sin 2\delta}{2} + \frac{\partial X}{\partial y}\cos 2\delta$$

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, ~~27~~

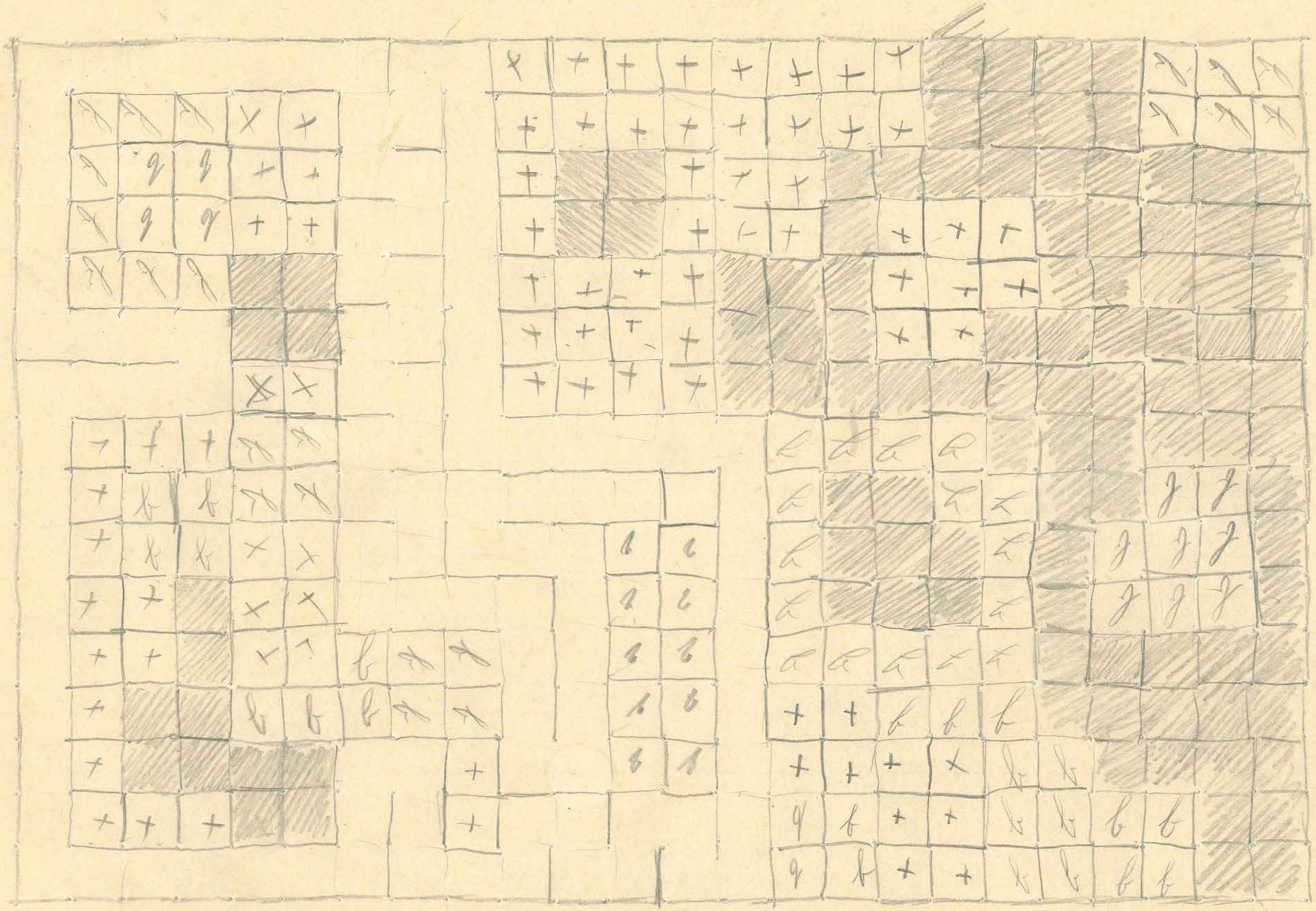
209

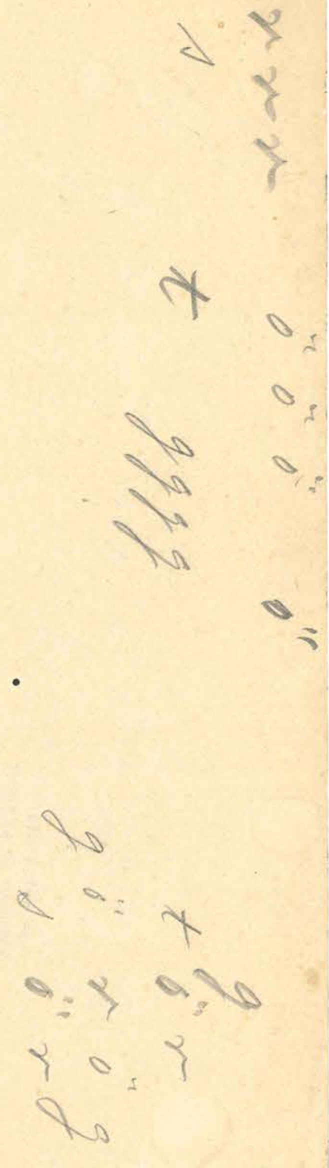
n a m e ~~s c h e d a l~~ m á a l á l l l o

126 m e s o r e a r a l m a f a j a t o l 108



4	12		8
9	12		9
8	9		10
11	9		7
7	8		9
4	9		11
9	16		7
4	13		7
|	13		11
9	9		9
12	2		10
12	2		10
8	2		11
10	4		10
7	8		9
5	4		17





15 · $\frac{100}{30}$

50 100 · 6 · $\frac{300}{180}$

$1\frac{1}{2}$°

$\frac{180}{}$ 10

150 120 90

70/10

$\frac{200}{30}$ 70 $\frac{40}{2}$ 120

355
1

73
45

$\cancel{90} \cdot \frac{80}{300}$

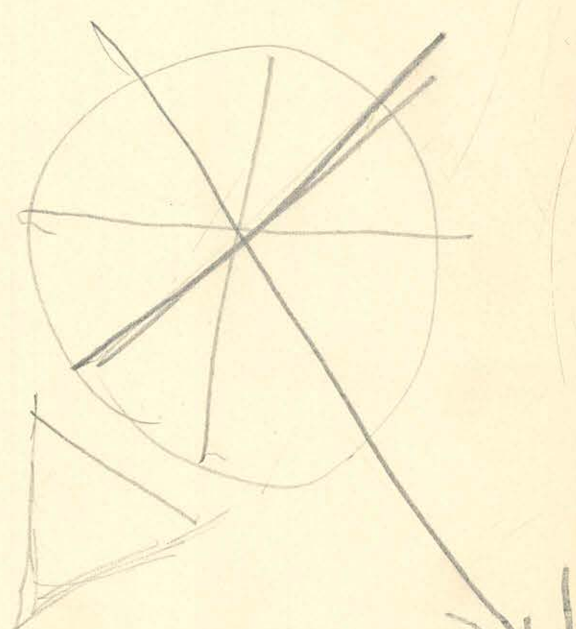
$\cancel{40} \cdot \frac{100}{30}$
120

253) 103
180) 15 125
109) 125 162
10) $\frac{162}{405}$
208 405

$90 \frac{300}{8}$ 8 | $\frac{2700}{30}$ | 340 ~~90~~ ~~180~~

103

Ny 253) 41
150) 99
D 109) 162
K 190)
E 208



$$\cancel{-\frac{\partial^2 V}{\partial x^2}\sin\vartheta}$$

$$-\frac{\partial^2 V}{\partial x^2}\sin(\vartheta-\gamma)\cos(\vartheta-\gamma+\varepsilon)-\frac{\partial^2 V}{\partial x^2}\cos(\vartheta-\gamma)\sin(\vartheta-\gamma+\varepsilon)+\frac{\partial^2 V}{\partial y^2}\sin(\vartheta-\gamma)\cos(\vartheta-\gamma+\varepsilon)+\frac{\partial^2 V}{\partial y^2}\cos(\vartheta-\gamma)\sin(\vartheta-\gamma+\varepsilon)$$

$\cos(\vartheta-\gamma)\sin$

$$\frac{\partial^2 V}{\partial y^2}\cos(\vartheta-\gamma)\sin(\vartheta-\gamma)\cos\varepsilon-\frac{\partial^2 V}{\partial x^2}\sin(\vartheta-\gamma)\cos(\vartheta-\gamma)\cos\varepsilon$$

$$\frac{\partial^2 V}{\partial y^2}\cos(\vartheta-\gamma)\cos(\vartheta-\gamma)\sin\varepsilon+\frac{\partial^2 V}{\partial x^2}\sin(\vartheta-\gamma)\sin(\vartheta-\gamma)\sin\varepsilon$$

$\cos^2\alpha-\sin^2\alpha=\cos 2\alpha$

$\cos^2\alpha+\cos^2\alpha-1=\cos 2\alpha$

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

$\sin^2\alpha$ $\quad 1-2\sin^2\alpha=\cos 2\alpha$

$\sin^2\alpha=\frac{1}{2}-\frac{\cos 2\alpha}{2}$

$$\frac{1}{2}\sin 2(\vartheta-\gamma)\cos\varepsilon\left(\frac{\partial^2 V}{\partial y^2}-\frac{\partial^2 V}{\partial x^2}\right)\qquad \frac{1}{2}\sin 2(\vartheta-\gamma)\cos\varepsilon\left(\frac{\partial^2 V}{\partial y^2}-\frac{\partial^2 V}{\partial x^2}\right)$$

$$\frac{\partial^2 V}{\partial y^2}\frac{1}{2}\cos 2\alpha\sin\varepsilon$$

~~cos 45~~ =

3~~00 cos~~ 45 =

a + 180 cos 45 = 300 t

500 cos 45 =

a − 80 cos 45 = 300 t

5·3

~~260 cos 45 = 600~~ t

c 80 . 180 cos 45 = 24000 t

c 80 180 cos 45 = 54000 t

−14400

$c = \frac{30000 t}{28800 t}$

c = t

c 180 cos 45 = 50t

100t

180

a

120 t =

260 cos 45 100t

$c = \frac{100}{260} t$

$\frac{110}{250}$

c 80 cos 45

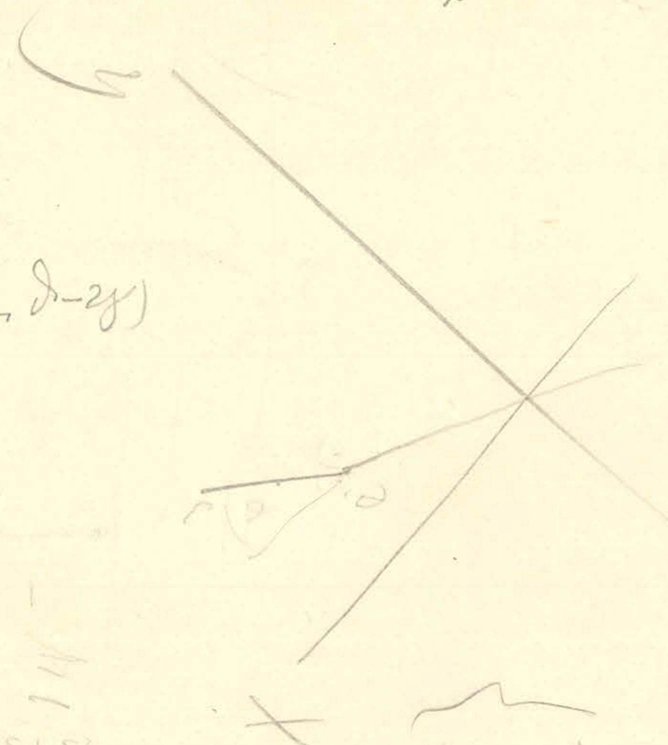
+ c 180 cos 45

$\vartheta + \varepsilon$

$2\vartheta - 2\gamma + \varepsilon$

$\vartheta + \beta - \gamma$.

$\beta \cos(\vartheta - 2\gamma) + (\sin \vartheta - 2\gamma)$

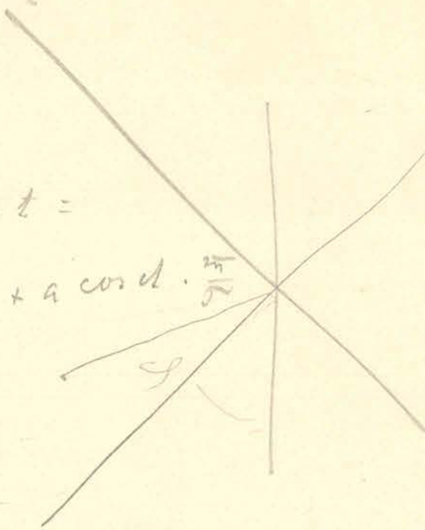


$x = a \sin y \qquad x = a \sin \frac{2\pi}{T} t \cdot \frac{\pi}{T} t$

$x = a \sin ct \qquad ct + cT = 2\pi$

$a \sin ct =$

$a \sin ct + a \cos ct \cdot \frac{2\pi}{T}$



$\alpha \sin(\vartheta - \gamma) + \beta \cos(\vartheta - \gamma) = I$

$\alpha \cos(\vartheta - \gamma) + \beta \sin(\vartheta - \gamma) = II$

$\alpha^2 + \beta^2 + 2\alpha\beta \sin 2(\vartheta - \gamma) = I^2 + II^2$

$\alpha^2 + \beta^2 + \alpha\beta \sin 2(\vartheta' - \gamma) = I'^2 + II'^2$

$\tau(t - \varphi) = T\varphi$

$\tau t = (T + \tau)\varphi$

$\varphi = \frac{\tau}{T + \tau} t$

$$Ml\left(\frac{\partial^2 V}{\partial x^2}-\frac{\partial^2 V}{\partial y^2}\right)\sin(\vartheta-\gamma)\cos\gamma - Ml\left(\frac{\partial^2 V}{\partial x^2}-\frac{\partial^2 V}{\partial y^2}\right)\cos(\vartheta-\gamma)\sin\gamma$$

$$\frac{\partial^2 V}{\partial y^2}\sin\vartheta-\gamma\cos\gamma \qquad - \qquad \frac{\partial^2 V}{\partial x^2}\cos\vartheta-\gamma\sin\gamma$$

$$Ml\frac{\partial^2 V}{\partial x^2}\sin(\vartheta-\gamma)\cos\gamma$$

$$\beta = \frac{\tau(\alpha+\vartheta\pm 2n\pi)}{HM+\tau}$$

$$HM\beta = \tau(\alpha+\vartheta-\beta\pm 2n\pi)$$

$$-\tau(c+\vartheta+\varepsilon) = \Theta\alpha$$

$$\frac{\partial^2 V}{\partial y^2}M\cos(\gamma+\varepsilon)l\sin\gamma - \frac{\partial^2 V}{\partial x^2}M\sin(\gamma+\varepsilon)l\sin\gamma$$

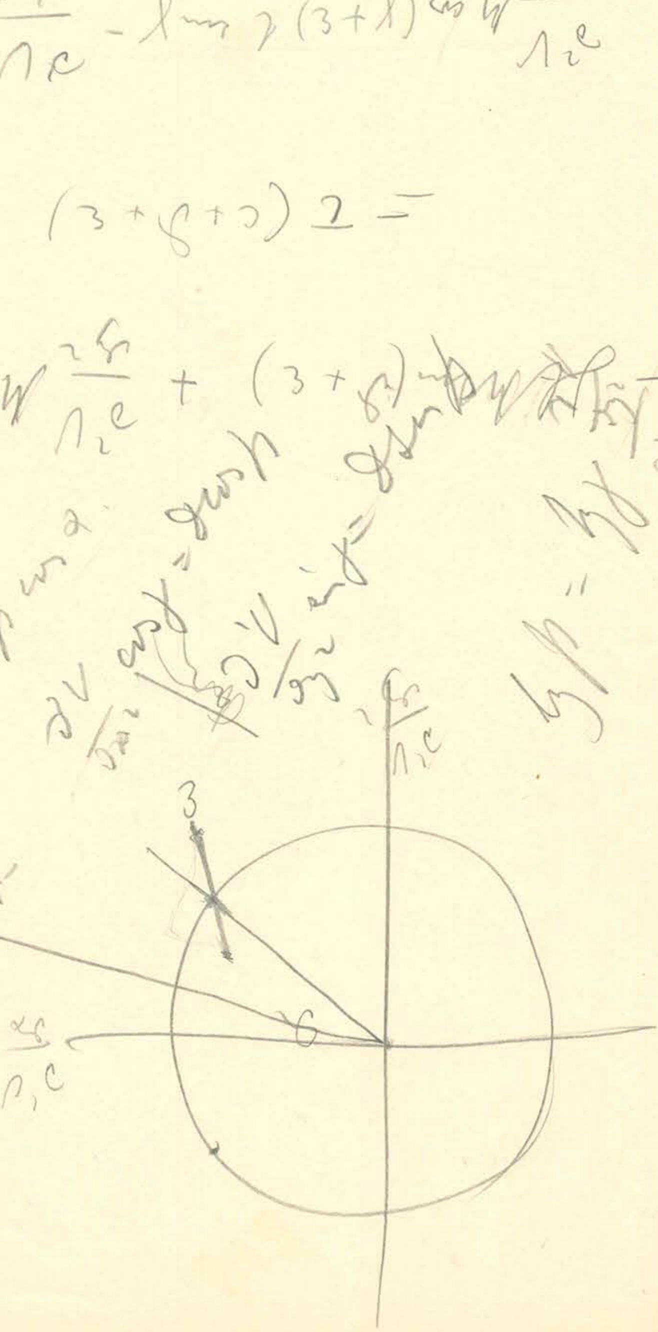
$$-\tau(c+\vartheta+\varepsilon)$$

$$+\frac{\partial^2 V}{\partial y^2}M\sin(\gamma+\varepsilon)l\cos\gamma - \frac{\partial^2 V}{\partial y^2}M\cos(\gamma+\varepsilon)l\sin\gamma$$

$\sin\vartheta-\gamma$

$+\cos(\vartheta-\gamma)\Delta\vartheta \quad A\sin\alpha+B\cos\alpha + C\sin\beta\cos\alpha + \frac{\partial V}{\partial x^2}\cos\gamma = M\cos\vartheta$

$+\cos(\vartheta-\gamma)\Delta\vartheta \quad \sin\beta\sin\alpha \quad \cos\beta = \sin\vartheta$



$300\tau = a\,180 + b\cos 45\; 180$

$300\tau = a\,80 - b\cos 45\; 80$

$\frac{300}{180}\tau = a + b\cos 45$

$\frac{300}{80}\tau = a - b\cos 45$

$2b\cos 45 = 300\left(\frac{1}{80} - \frac{1}{180}\right.$

$\frac{300.80}{}$

$-\frac{60\tau}{180} = b\cos 45$

$b = \frac{24000}{14400}$

$b = \frac{28000}{28000}$

$b = \frac{24}{28\cos 45}\tau$

$120\tau = a\,180 + b\cos 45\; 180$

$220\tau = a\,80$

$\frac{120}{180} - \frac{220}{80} = 2b\cos 45$

$\frac{9600 - 39600}{1440}$

$\frac{30000}{25800}$

$\frac{30}{28}\tau$

14400

$300\tau \equiv$

$x_1\tau = c + b\sin\vartheta'$

$x_1\tau + \xi\tau = c + c\alpha + b\sin\vartheta'$

$x_1\tau + \xi\tau\, \xi\; c\alpha + b\sin\vartheta' - b\sin\vartheta'$

$x_1\tau = c + b\sin\vartheta$

$x_2\tau + b\sin\vartheta = c\,3\,b\alpha$

$x_1\tau = 90\,a + b\sin\vartheta$

$x_2\tau = 180\,a_1 + b\sin\vartheta'$

$\frac{x_1}{90}\tau - \frac{x_2}{180}\tau = b(\sin\vartheta - \cos\vartheta')$

$\frac{x_1}{180}\tau - \frac{x_2}{270}\tau =$

Vonzó henger nyomatéka. $x\ y\ z$. pontja $\xi\ 0\ 0$.

Tömeg elem $= \sigma\, r\,dr\, d\vartheta\, dz$

$$\frac{\partial^2 V}{\partial x \partial z} = 3 f\sigma \int \frac{r\,dr\,d\vartheta\,dz\ x(z-\xi)}{\left(r^2+(z-\xi)^2\right)^{\frac{5}{2}}}$$

$\dfrac{\sigma\, r^4 dr\, d\vartheta\, dz \sin\varepsilon \cos\varepsilon \cos\vartheta}{r^5}$ vagy mivel $x = r\cos\vartheta$.

$f\sigma \dfrac{dr}{r} \cos\vartheta\, d\vartheta \dfrac{\sin 2\varepsilon\, d\varepsilon}{2}$

$$\frac{\partial^2 V}{\partial x \partial z} = 3 f\sigma \int \cos\vartheta\, d\vartheta \iint \frac{r^2 dr\,(z-\xi)\,dz}{\left(r^2+(z-\xi)^2\right)^{\frac{5}{2}}}$$

$\frac{1}{3}\left(r^2+(z-\xi)^2\right)^{\frac{3}{2}}$

$$\frac{\partial^2 V}{\partial x \partial z} = -f\sigma \int \cos\vartheta\, d\vartheta \int r^2 dr \left(\frac{1}{\left(r^2+(z-\xi)^2\right)^{\frac{3}{2}}} - \frac{1}{\left(r^2+\xi^2\right)^{\frac{3}{2}}}\right)$$

$$\frac{1}{\left(r^2+(z-\xi)^2\right)^{\frac{3}{2}}} = \frac{1}{\left(r^2+\xi^2+z^2-2z\xi\right)^{\frac{3}{2}}} = \frac{1}{\left(r^2+\xi^2\right)^{\frac{3}{2}}} \cdot \frac{1}{\left(1+\frac{z^2-2z\xi}{r^2+\xi^2}\right)^{\frac{3}{2}}}$$

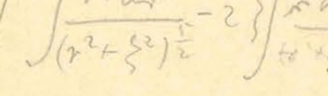
$$= \frac{1}{\left(r^2+\xi^2\right)^{\frac{3}{2}}}\left(1 - \frac{3}{2}\frac{z^2-2z\xi}{r^2+\xi^2}\right)$$

$z_1 + (R-R_1)\varepsilon$

$z_1 - R_1\varepsilon$

$$\frac{\partial^2 V}{\partial x \partial z} = \frac{3}{2} f\sigma \int \cos\vartheta\, d\vartheta \int r^2 dr \frac{z^2-2z\xi}{\left(r^2+\xi^2\right)^{\frac{5}{2}}}$$

Már most ha például $z = r\varepsilon$ a hol $\varepsilon = \operatorname{tg}\alpha$ α hajlásszög



$$\frac{\partial^2 V}{\partial x \partial z} = \frac{3}{2} f\sigma \int \cos\vartheta\, d\vartheta \left\{ \int \frac{r^4 dr}{\left(r^2+\xi^2\right)^{\frac{5}{2}}} - 2\xi\varepsilon \int \frac{r^3 dr}{\left(r^2+\xi^2\right)^{\frac{5}{2}}} \right\}$$

$$\left\{ \int \frac{r^4 dr}{\left(r^2+\xi^2\right)^{\frac{5}{2}}} - 2\xi \int \frac{r^3 dr}{\left(r^2+\xi^2\right)^{\frac{5}{2}}} \right\}_0^R = -\varepsilon^2 \frac{\left(\frac{4}{3}R^3 + \xi^2 R\right)}{\left(R^2+\xi^2\right)^{\frac{3}{2}}} + \varepsilon^2 \log \frac{R+\sqrt{R^2+\xi^2}}{\xi} + \varepsilon \frac{2\xi\left(R^2+\frac{2}{3}\xi^2\right)}{\left(R^2+\xi^2\right)^{\frac{3}{2}}} - \frac{4}{3}\varepsilon$$

$$= -\frac{4}{3}\varepsilon(1+\varepsilon) + 2\varepsilon\frac{\xi}{R} + \varepsilon^2 \log \frac{R+\sqrt{R^2+\xi^2}}{\xi}$$

$\dfrac{\partial^2 V}{\partial x \partial z} =$

$\varepsilon = \dfrac{R\cos\vartheta}{\xi}$ $\quad \dfrac{4}{3}\xi \quad 2\dfrac{\xi}{R_1}\dfrac{\xi}{2} \quad \dfrac{\xi}{R} = \varepsilon$

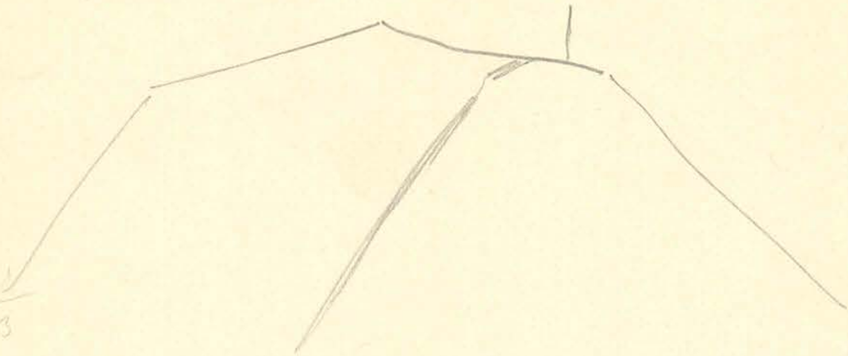
5,7,7
17,3 1

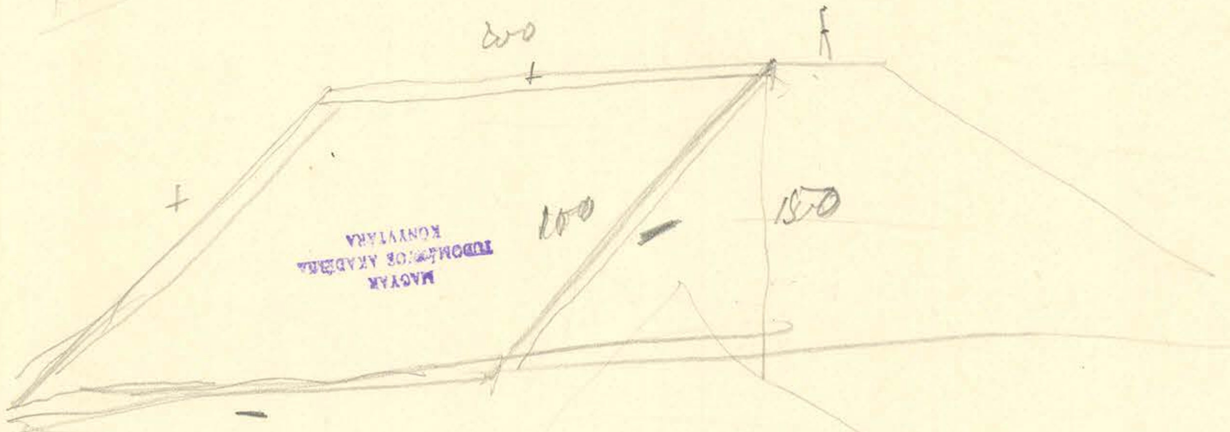
577
1 7,
59,4

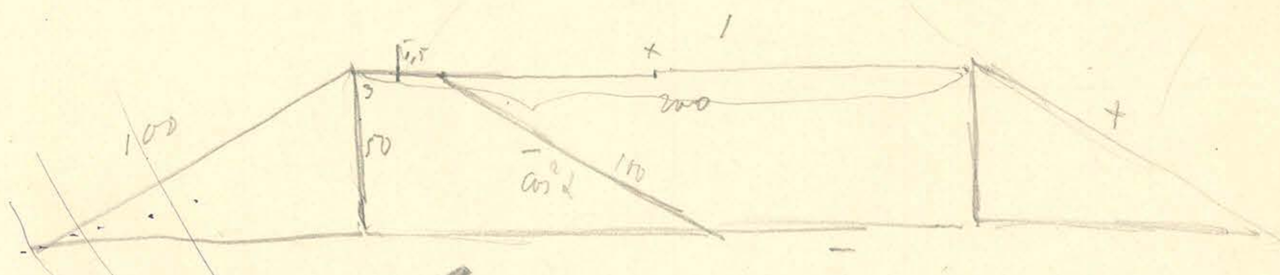
11
165, 3000.13
165, 13.0,000

1,95
1,65
21,4 5,0000

11
21,4.50000
164
1
1,9000000







$\log \frac{2B}{B+\sqrt{A^2+B^2}} \cdot \frac{\sqrt{A^2+C^2}}{C} \cdot \frac{C}{\sqrt{A_0^2+C^2}}$

$\log \frac{B+\sqrt{B^2+C^2}}{A+\sqrt{B}}$

$\log \frac{2B}{A+\sqrt{A^2+B^2}} \cdot \frac{\sqrt{A^2+C^2}}{\sqrt{A_0^2+C^2}}$

324
3,4
1296
972
1101,6

241
34
964
723
8194

$2 \log \frac{200}{100+100\sqrt{5}} \cdot \frac{200}{\sqrt{11,25}} - \frac{3}{2} \log \frac{200}{100+100\sqrt{2}} \cdot \frac{100}{\sqrt{11,25}}$

2,3
1,2
46
2,3
2,76

2

$2 \log \frac{40000}{1100} - \frac{3}{2} \log \frac{20000}{820}$

2,60206
1,04139
1,56067
3,12
193
1,19

23
21
23
69

3,30103
1,91381
1,387
0,861
1,93

2,8.
5m.
1,800000.

$$\frac{\partial X}{\partial x} = -\frac{3}{2}\,\frac{2l\xi\cos\delta\cos i + 2l\xi\cos\delta\sin i}{r^5} - \cancel{\frac{3l\xi\cos\delta\cos i}{r^5}}$$

$$-3\cancel{\frac{\xi^2}{r^5}}$$

$$+3\,\frac{\xi^2 - 2l\xi\cos\delta\cos i}{r^5}\left(1 + \frac{5}{2}\,\frac{2l\xi\cos\delta\cos i + 2l\xi\cos\delta\sin i}{r^2}\right.$$

$$+3\cancel{\frac{\xi^2}{r^5}} - \frac{6l\xi\cos\delta\cos i}{r^5}$$

$$\frac{\partial X}{\partial x} = -\frac{9l\xi\cos\delta\cos i + 3l\xi\,\cancel{\cos}\,\delta\sin i}{r^5} + \frac{15\xi^2}{r^2}\cdot\frac{l\xi\cos\delta\cos i + l\xi\,\cancel{\cos}\,\delta\sin i}{r^5}$$

$$\frac{\partial Y}{\partial y} = -\frac{3l\xi\cos\delta\cos i + 3l\xi\,\cancel{\cos}\,\delta\sin i}{r^5} + 15\frac{\eta^2}{r^2}\,\frac{l\xi\cos\delta\cos i + l\xi\,\cancel{\cos}\,\delta\sin i}{r^5}$$

$$\frac{\partial Z}{\partial z} = -\frac{3l\xi\cos\delta\cos i + 9l\xi\,\cancel{\cos}\,\delta\sin i}{r^5} + 15\frac{\zeta^2}{r^2}\,\frac{l\xi\cos\delta\cos i + l\xi\cos\delta\sin i}{r^5}$$

$$\frac{\partial X}{\partial y} = -3\frac{\xi\eta}{r^5} + 3\eta\frac{(\xi - l\cos\delta\cos i)}{\cancel{r^5}}\left(1 + \frac{5}{2}\,\frac{\quad}{r^2}\right)$$

η olyan rendű mint $l\cos\delta\cos i$ [illegible]

$$\underline{\frac{\partial X}{\partial y} = 0}$$

$$\frac{\partial X}{\partial z} = -3\frac{\xi\zeta}{r^5} + 3\frac{(\xi - l\cos\delta\cos i)(\zeta - l\,\cancel{\cos}\,\delta\sin i)}{r^5}\left(1 + \frac{5}{2}\,\frac{\quad}{r^2}\right)$$

$$= +\frac{3\xi\zeta}{r^5}\,\frac{5}{2}\,\frac{l\xi\cos\delta\cos i + l\xi\,\cancel{\cos}\,\delta\sin i}{r^2} - 3\,\frac{\xi l\,\cancel{\cos}\,\delta\sin i + \zeta l\cos\delta\cos i}{r^5}$$

$$\underline{\frac{\partial X}{\partial z}} = \cancel{\frac{3\xi\zeta}{r^5}} = 15\frac{\xi\zeta}{r^2}\,\frac{l\xi\cos\delta\cos i + l\xi\,\cancel{\cos}\,\delta\sin i}{r^5} - 3\,\frac{l\xi\,\cancel{\cos}\,\delta\sin i + l\zeta\cos\delta\cos i}{r^5}$$

$$\frac{\partial Z}{\partial y} = 0.$$

$$P_x = M$$

$$P_x = \frac{m\sqrt{3}}{\sqrt{2}}\left(\frac{\partial X}{\partial x} + \frac{\partial X}{\partial z}\right) \quad \text{befelé}$$

$$P_x = \frac{m\sqrt{3}}{\sqrt{2}}\left(\frac{\partial X}{\partial x} - \frac{\partial X}{\partial y}\right) \quad \text{felfelé}$$

$$\delta = 0$$

$$\frac{\partial X}{\partial x} = 3\frac{M}{r^7} a \cos i\,(5a^2 - 3r^2) + 3\frac{M}{r^7} c \sin i\,(5a^2 - r^2)$$

$$\frac{\partial X}{\partial y} = 3\frac{M}{r^7}\left(a\cos i\,(5a^2 - 3r^2) + 3\cancel{\frac{M}{r^7}}\left(c \sin i\,(5a^2 - r^2)\right)\right)$$

$$\frac{\partial X}{\partial z} = 3\frac{M}{r^7}\left(c\cos i\,(5a^2 - r^2) + a\sin i\,(5c^2 - r^2)\right)$$

$$\cos i\left[(5a^2 - 3r^2)a \pm (5a^2 - r^2)c\right] + \sin i\left[(5a^2 - r^2)c \pm (5c^2 - r^2)a\right] = 0$$

$$\cos i\left(5 - \frac{3}{\cos^2\vartheta} \pm 5\,\mathrm{tg}\,\vartheta \mp \mathrm{tg}\,\vartheta\frac{1}{\cos^2\vartheta}\right) + \sin i\left[5\,\mathrm{tg}\,\vartheta - \frac{\mathrm{tg}\,\vartheta}{\cos^2\vartheta} \pm 5\,\mathrm{tg}^2\vartheta - \frac{1}{\cos^2\vartheta}\right] = 0$$

$$2\cos^2\vartheta - 3\sin^2\vartheta$$
$$2\cos 2\vartheta - \sin^2\vartheta$$

$$\mathrm{tg}\, i = -\frac{5\cos^2\vartheta - 3 \pm 5\sin\vartheta\cos\vartheta \mp \mathrm{tg}\,\vartheta}{5\sin\vartheta\cos\vartheta - \mathrm{tg}\,\vartheta \cancel{\mp\cos^2\vartheta} \pm 5\sin^2\vartheta \mp 1}$$

$r^2 = 2a^2$

$8a$

$8\sqrt{2}\,a^7$

$5a^2 - 6a^2$

$-\dfrac{a^3}{\cancel{r^7}\,8\sqrt{2}\,a^7}$

$-\dfrac{9}{8\sqrt{2}\,a^4}\,\mu \sin i$

$-\dfrac{3}{8\sqrt{2}\,a^4}\,\mu\,\delta \cos i$

$\dfrac{9a^2}{r^7}$

$-\dfrac{9}{8\sqrt{2}\,a^4}\,\mu\cos\delta + \dfrac{9\mu}{}$

$\dfrac{9\mu}{8\sqrt{2}\,a^4}\left(-\cos i + \sin i\right)$

$i = 0$

Sz.-Lőrincz Jul 19 – 90

A mágneses variatió eszközre külső mágnes hatása.

A ~~mágnes~~ potential második differential hányadosai.

Coordinatarendszer: A kezdőpont a felfüggesztett mágnes közepe.

XZ sík a kezdőponton és a külső mágnesen át fektetett függélyes sík. Ebben Z lefelé

Külső mágnes vonatkozásai:

Momentuma M

A mágnes XZ síkba való vetületének déli pólusától az északi felé húzott egyenes és az X tengely által képezett inclinatio szöglet = $\underline{i}$

A mágnes vízszintes vetületének déli pólusától az északi felé húzott egyenes és az X tengely által a positiv X-től a positiv y felé menő declinatio szöglet $\underline{\delta}$

$$r^2 = a^2 + b^2 + c^2$$

a hol a, b, c a mágnes középpontjának coordinátái: akkor

$$\left.\begin{aligned}
\frac{\partial^2 V}{\partial x^2} &= \frac{\partial X}{\partial x} = \frac{3M\cos\delta}{r^5}\left(-3a\cos i - c\sin i + \frac{5a^2}{r^2}(a\cos i + c\sin i)\right)\\
\frac{\partial^2 V}{\partial y^2} &= \frac{\partial Y}{\partial y} = \frac{3M\cos\delta}{r^5}\left(-a\cos i - c\sin i + \frac{5b^2}{r^2}(a\cos i + c\sin i)\right)\\
\frac{\partial^2 V}{\partial z^2} &= \frac{\partial Z}{\partial z} = \frac{3M\cos\delta}{r^5}\left(-a\cos i - c\sin i + \frac{5c^2}{r^2}(a\cos i + c\sin i)\right)
\end{aligned}\right\}\ \Delta V = 0$$

$$\frac{\partial^2 V}{\partial x\,\partial y} = \frac{\partial X}{\partial y} = \frac{\partial Y}{\partial x} = \cancel{3M\cos\delta} = 0$$

$$\frac{\partial^2 V}{\partial x\,\partial z} = \frac{\partial X}{\partial z} = \frac{\partial Z}{\partial x} = \frac{3M\cos\delta}{r^5}\left(-a\sin i - c\cos i + \frac{5ac}{r^2}(a\cos i + c\sin i)\right)$$

$$\frac{\partial^2 V}{\partial y\,\partial z} = \frac{\partial Y}{\partial z} = \frac{\partial Z}{\partial y} = 0$$

Kifejtés a megadott a külső mágnes tengelyének fele hossza az r-hez képest megfelelő $\frac{l}{r}$ elhanyagolva $\frac{l^2}{r^2}$ nevezetű tagok.

Az erdő mágnessége által gyakorolt translatorius erő-összetevői tehát P_x és P_y

a mágnes momentum m

inclinatio szöglete i' declinatio szöglete δ' egy része mint az M mágnesé

akkor.

$$P_x = M\cos i' \cos\delta' \frac{\partial X}{\partial x} + M \sin i' \cancel{\cos}\,\delta' \frac{\partial X}{\partial z} + m\cos i' \sin\delta' \frac{\partial X}{\partial y}$$

$$P_y = M\cos i' \sin\delta' \frac{\partial Y}{\partial y} + M\sin i' \cancel{\cos}\,\delta' \frac{\partial Y}{\partial z} + m\cos i'\cos\delta' \frac{\partial Y}{\partial x}$$

$$\frac{\partial X}{\partial x} = -3\frac{M\cos\delta}{r^5}\Big(3a\cos i$$

$$\frac{\partial X}{\partial x} = 3\frac{M\cos\delta}{r^5}\left(\frac{5a^2}{r^2}a\cos i - 3a\cos i\right) + \frac{3M}{r^5}\left(\frac{5a^2}{r^2}c\sin i - c\sin i\right)$$

$$\cancel{= 3 M\cos\delta}$$

$$\frac{\partial Y}{\partial y} = 3\frac{M\cos\delta}{r^5}\left(\frac{5b^2}{r^2}a\cos i - a\cos i\right) + \frac{3M}{r^5}\left(\frac{5b^2}{r^2}c\sin i - c\sin i\right)$$

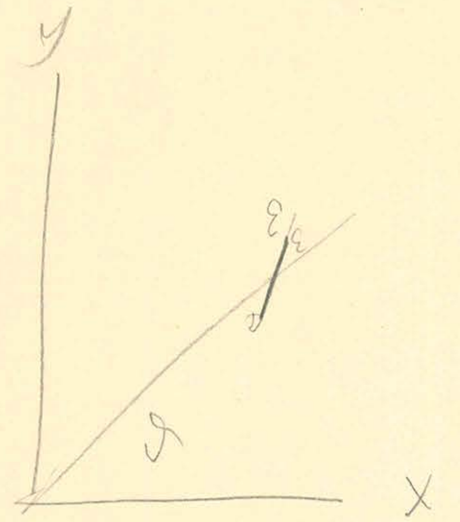
$$\frac{\partial Z}{\partial z} = 3\frac{M\cos\delta}{r^5}\left(\frac{5c^2}{r^2}a\cos i - a\cos i\right) + \frac{3M}{r^5}\left(\frac{5c^2}{r^2}c\sin i - 3c\sin i\right)$$

$$\left.\begin{aligned}
\frac{\partial X}{\partial x} &= 3\frac{M\cos\delta}{r^5}a\cos i\left(5\frac{a^2}{r^2} - 3\right) + 3\frac{M}{r^5}c\sin i\left(5\frac{a^2}{r^2} - 1\right)\\
\frac{\partial Y}{\partial y} &= 3\frac{M\cos\delta}{r^5}a\cos i\left(\frac{5b^2}{r^2} - 1\right) + 3\frac{M}{r^5}c\sin i\left(\frac{5b^2}{r^2} - 1\right)\\
\frac{\partial Z}{\partial z} &= 3\frac{M\cos\delta}{r^5}a\cos i\left(\frac{5c^2}{r^2} - 1\right) + 3\frac{M}{r^5}c\sin i\left(\frac{5c^2}{r^2} - 3\right)
\end{aligned}\right\}$$

$$\cancel{\frac{\partial Y}{\partial z} = 0} \qquad \frac{\partial X}{\partial y} = 0 \qquad \frac{\partial Y}{\partial z} = 0$$

$$\cancel{\frac{\partial X}{\partial z} = 3\frac{M\cos\delta}{r^5}a\left(5\frac{ac}{r^2}a\cos i - c\cos i\right) + \frac{3M}{r^5}\sin i\left(5\frac{ac}{r^2}c - a\right)}$$

$$\frac{\partial X}{\partial z} = 3\frac{M\cos\delta}{r^5}c\cos i\left(5\frac{a^2}{r^2} - 1\right) + \frac{3M}{r^5}a\sin i\left(5\frac{c^2}{r^2} - 1\right)$$

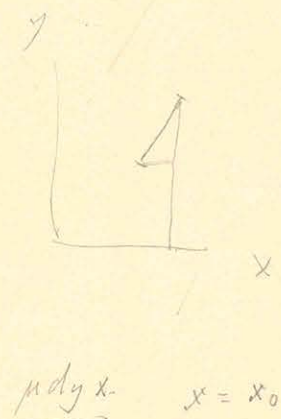


$$m_x = m\cos(\vartheta+\varepsilon)$$
$$m_y = m\sin(\vartheta+\varepsilon)$$
$$x = r\cos\vartheta$$
$$y = r\sin\vartheta$$

$$m_y x + m_x y = mr\sin\vartheta\cos(\vartheta+\varepsilon) + mr\cos\vartheta\sin(\vartheta+\varepsilon)$$
$$= mr\sin(2\vartheta+\varepsilon) = mr\sin 2\vartheta\cos\varepsilon + mr\cos 2\vartheta\sin\varepsilon$$
$$= \cancel{r}\sin 2\vartheta \textstyle\sum m_\xi + r\cos 2\vartheta \sum m_\eta$$
$$= \sin 2\vartheta \textstyle\sum \xi m_\xi + \cos 2\vartheta \sum$$
$$= \sin 2\vartheta \textstyle\sum \sqrt{\xi^2+\eta^2}\, m_\xi + \cos 2\vartheta \sum \sqrt{\xi^2+\eta^2}\, m_\eta$$

$$x\, m_x = \textstyle\sum$$

$$m_y x \frac{\partial y}{\partial y} - m_x y \frac{\partial x}{\partial x}$$



$$m_x = \cancel{m}\cos(\vartheta+\varepsilon) \qquad m_y = m\sin(\vartheta+\varepsilon)$$
$$x = r\cos\vartheta \qquad y = r\sin\vartheta$$

$$m\cos(\vartheta+\varepsilon)\sin\vartheta + m\cos\vartheta\sin(\vartheta+\varepsilon)$$

$$\textstyle\sum(m\, r\cos\vartheta\sin\vartheta\cos\varepsilon - mr\sin^2\vartheta\sin\varepsilon) = Mr$$
$$\textstyle\sum(m\, r\cos\vartheta\sin\vartheta\cos\varepsilon - mr\cos^2\vartheta\sin\varepsilon) =$$

$\underline{\mu\, dy\, x}$ $\quad x = x_0 +$

$\mu\, dl\sin\vartheta(x_0 + \mu\, dl\sin\vartheta\cos\vartheta\, l.$

$\mu\, l\sin\vartheta\, x_0 + \mu\sin\vartheta\cos\vartheta \frac{l^2}{2}$

$M x_0 \sin\vartheta + M\sin\vartheta \frac{l}{2}\cos\vartheta$

A

$\sum(m_y x + m_x y) = \xi\sum m_y + \eta\sum m_x$

$B\ \sum(m_z x + m_x z) = \xi\sum m_z + \zeta\sum m_x$

$B\ \sum(m_z y + m_y z) = \eta\sum m_z + \zeta\sum m_y$

C.

c

$1)\ A = \xi b + \eta a$

$2)\ B = \eta c + \zeta b$

$C = \zeta a + \xi c$

1 és 2 ből

$\zeta A = \zeta\xi b + \zeta\eta a$

$\xi B = \xi\eta c + \xi\zeta b$

$\zeta A - \xi B = \zeta\eta a - \xi\eta c$

$cA - aB = \xi bc - \zeta ab$

$Cb = \zeta ab + \xi bc$

$\xi = \dfrac{cA + bC - aB}{2bc}$

$A = xb + ya$

$B = yc + zb$

$C = za + xc$

$Ac - Ba = bcx - abz$

$Cb = abz + bcx$

$x = \dfrac{Ac - Ba + Cb}{2bc}$

$z = \dfrac{-Ac + Ba + Cb}{2ab}$

$y = \dfrac{Ac + Ba - Cb}{2ac}$

~~$y = B$~~

$y = \dfrac{B}{c} + \dfrac{+Ac \mp Ba \mp Cb}{2ca}$

$x\ (x' y' z')\ \alpha\ \ \beta\ \ \gamma$

$y\ (x' y' z'\ \ \alpha'\ \ \beta'\ \ \gamma'$

$\alpha''\ \ \beta''\ \ \gamma''$

$$\frac{\partial X}{\partial x} = \cancel{-\frac{3}{r^5} 3a M_x + 15 a^3}$$

$$\frac{\partial X}{\partial x} = + \cancel{15}\, \frac{6 M_x}{a^4}$$

$$\frac{\partial Y}{\partial y} = - \frac{3 M_x}{a^4}$$

$$\frac{\partial Z}{\partial z} = - \frac{3 M_x}{a^4}$$

$$\frac{\partial X}{\partial y} = - \frac{3 M_y}{a^4}$$

$$\frac{\partial Y}{\partial z} = 0$$

$$\frac{\partial Z}{\partial x} = - \frac{3 M_z}{a^4}$$

$\cancel{P_x = m_x}$ Aa $\quad Bb \cos^2\vartheta \quad Bb \cdot \cos^2\vartheta$

$$P_x = \frac{6 M_x m_x}{a^4} - \frac{3 M_y m_y}{a^4} - \frac{3 M_z m_z}{a^4}$$

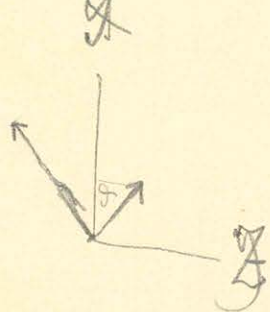
$$P_y = - \frac{3 M_y m_x}{a^4} - \frac{3 M_x m_y}{a^4}$$

$$P_z = - \frac{3 M_z m_x}{a^4} - \frac{3 M_x m_z}{a^4}$$

$$P_x = 6 \frac{Aa}{a^4} - 6 \frac{Bb}{a^4} \cos^2\vartheta$$

$$P_y = - \frac{3 a B \cos\vartheta}{a^4} - \frac{3 A b \cos\vartheta}{a^4}$$

$$P_z = - \frac{3 a B \sin\vartheta}{a^4} - \frac{3 A b \sin\vartheta}{a^4}$$



P

$$P_x = \frac{6 L l}{r^4} - \frac{3 T t}{r^4} \cos 2\vartheta$$

$$P_y = -3 \frac{l T \cos\vartheta}{r^4} - 3 \frac{L t \cos\vartheta}{r^4}$$

$$P_z = + \frac{3 l T \sin\vartheta}{r^4} - \frac{3 L t \sin\vartheta}{r^4}$$

$M_x = L \qquad m_x = l$

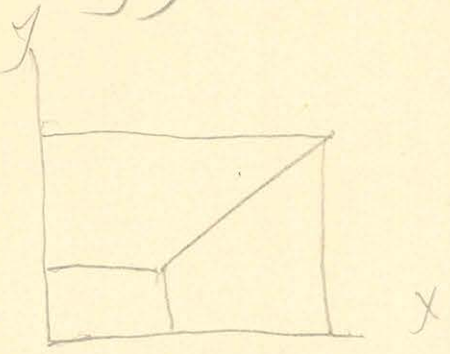
$M_y = T \cos\vartheta \qquad m_y = t \cos\vartheta$

$M_z = T \sin\vartheta \qquad m_z = t \sin\vartheta$

$M_x \qquad m_x = 0$

$M_y \; M_z = 0$

$\sum(m_y x + m_x y)$



$\sum(m_y x + m_x y)$

$\sum m_y(\xi+\xi) + \sum m_x(y+\eta) = \sum m_y x \; A + b\xi + a\eta$

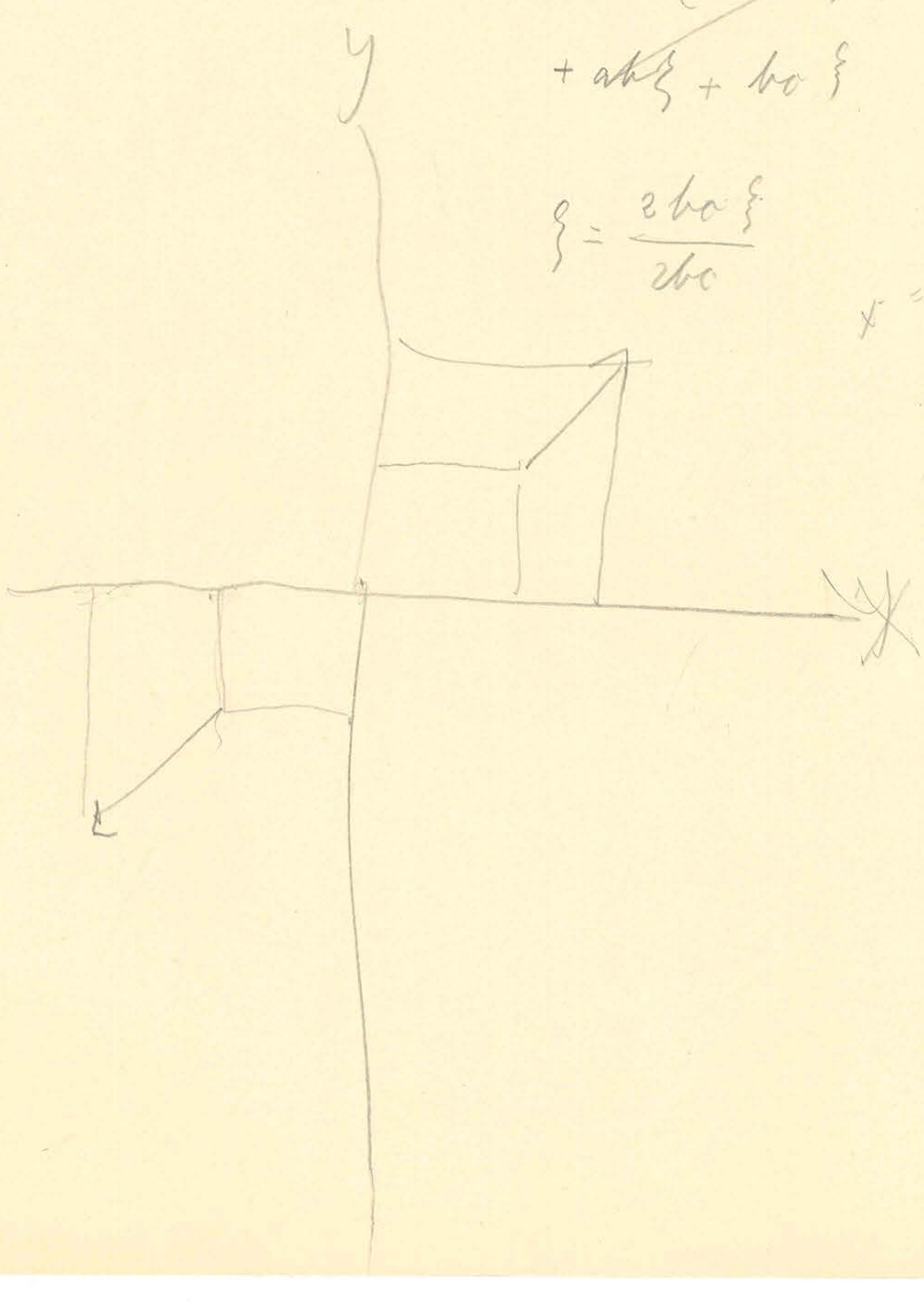
$bc\xi + \cancel{ac\eta}$

$- ac\eta - \cancel{ab\xi}$

$+ ab\xi + bc\xi$

$\xi = \dfrac{2bc\xi}{2bc}$

$x = \xi_0 +$



$x + \xi$

m, x

$d\cos\alpha$

$a \sin 2\varphi$

$f(\vartheta) + f(\vartheta+\pi) = a \sin 2\vartheta.$

$\frac{a}{2}\left(\sin\vartheta\, P + \cos\vartheta\, Q\right)$

$\frac{a}{2} \sin\vartheta \overset{\sin 2\vartheta}{} P + \frac{a}{2} \overset{\cos\vartheta}{\cancel{\cos 2\vartheta}}\, Q^{\sin 2\vartheta}.$

$-\frac{a}{2} \sin 2\vartheta \left(P_{\dots}\right)$