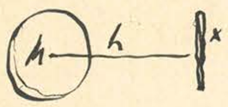
Ms 5009/14-15. Eötvös Loránd jegyzetei. Gravitáció

Golyó stb. kötése

Grav. észlelési Fei
értéke állandójának meghat.

Az 1901 Májusi drótkoz való számítások.



golyó helyére a l hosszú pálcahengerre

$$q l = m = 85,52$$

$$P = 2Mf \cdot q \int_0^{\frac{l}{2}} \frac{h\,dx}{(x^2+h^2)^{\frac{3}{2}}} = 2Mfqh \Big| \frac{x}{h^2\sqrt{x^2+h^2}}$$

$$P = \frac{Mf\,m}{h^2} \frac{1}{\sqrt{1+\frac{l^2}{4h^2}}} \qquad \cancel{\quad} =$$

$$\cancel{P} = \quad \cancel{\quad} \qquad l = 6 \qquad h = 11,01$$

$$M = 13135 \qquad f = 0,000\,000\,0667$$

skálatávol = ~~[illegible]~~ 616,0 mm.

$$P = 0,00017689$$

$$\frac{Pl}{\tau} = \vartheta \qquad \vartheta = \frac{19,625}{2464}$$

$$\underline{\underline{\tau = 0,4442}} \qquad \log \tau = 0,647569 - 1$$

$$\frac{K}{\tau} = \frac{T^2}{\pi^2 + (\log\text{ nat } D)^2} \qquad T = 722,0 \quad D = 0,352$$

$$\frac{T_0^2}{\pi^2} = \frac{K}{\tau} = 47565 \qquad K = 21128$$

$$\frac{mhl}{\tau} = 75608$$

a nagy ólom távola $h = 65,8$ 1901 Június 14-iki számítás

$$\frac{\partial^2 U}{\partial x \partial z} = -\frac{a}{2L}\frac{\tau}{mhl} = \underline{-53,68\;10^{-10}a} \;\Big|\; \frac{\partial^2 U}{\partial y \partial z} = +\frac{b}{2L}\frac{\tau}{mhl} = \underline{+53,68\;10^{-10}b} \qquad 2L = 2464$$

$$\left(\frac{\partial^2 U}{\partial y^2} - \frac{\partial^2 U}{\partial x^2}\right) = +\frac{2A}{2L}\frac{\pi^2}{T_0^2} = 166,76\;10^{-10}A. \qquad \frac{\partial^2 U}{\partial x \partial y} = +\frac{B}{2L}\frac{\pi^2}{T_0^2} = +83,38\;10^{-10}B$$

ezekkel kingsfelói megfigyelésekre:

$$\frac{\partial^2 U}{\partial x \partial z} \cancel{a} = +2,082(\vartheta_5 - \vartheta_2)10^{-9} - 1,262(\vartheta_4 - \vartheta_3)10^{-9}$$

$$\frac{\partial^2 U}{\partial y \partial z} = \cancel{b} = +1,737\left((\vartheta_3 - \vartheta_1) + (\vartheta_4 - \vartheta_1)\right)10^{-9} - 0,664\left((\vartheta_2 - \vartheta_1) + (\vartheta_5 - \vartheta_1)\right)10^{-9}$$

$$\left(\frac{\partial^2 U}{\partial y^2} - \frac{\partial^2 U}{\partial x^2}\right) = +3,921(\vartheta_5 - \vartheta_2) - 6,344(\vartheta_4 - \vartheta_3)$$

$$\frac{\partial^2 U}{\partial x \partial y} = -1,031.\left((\vartheta_3 - \vartheta_1) + (\vartheta_4 - \vartheta_1)\right) + 2,698\left\{(\vartheta_2 - \vartheta_1) + (\vartheta_5 - \vartheta_1)\right\}$$

901 májusi drót. 1)

1901 Május 10 ikén

behúztam a II számú gravimeterbe új drótot.

A drót ezelőtt 1,2 méter hosszan kifeszítve függött 1901 Januárban rövidre fonva, a ládában nem volt a Balatoni expedícióban Marcius elején megterhelve kifüggesztetlen.

Az erősségre behúzva Május 10-ikén felhúztam délk 12h. 45 perckor.

Legyen 100 és 300 között.

Főkör 23°20' (Meridiánnál, lógó súly Északon.

Megindítva Torsió kör 142°

Május 10	1h.	46m	238,4 ×	) 32,6		
		58m	205,8 ×		) 0,414	
	2h.	10	219,3 ×	) 13,5		
		22	215,2' ×	) 4,1	) 0,304	
	2h.	30m	218			
	2h	55m	219,2			
	4h.	40m	222,2			
este	10h	30m	225,8			t = 18°1
	éjjel	ütés				
Május 11 reggel lámpával	7h.	40	227,2			t = 18°1
	8h.	10	227,3			t = 18°2
	9h	3m	227,6			t = 18°2

1) előre forog.

10h.	43.	228,1	t = 18°4
	50	228,1,5	

2)

12h.	30m	228,6	t = 18°4

3)

2h.	10m	229,0	t = 18°8

4) rohamosan erősödő kötődés

4h.	15m	229,0	t = 18°3

5)

217,5 223,7 20°2 kör 2h 42.50 190,05 190,2 20° kör 10h 0m 193,4 kör 193,5 20°0 7h.30 8 Május 21 201,3 201,5 20°0 kör 12h.0 211,0 211,0 20°0 kör Május 20 ez 10h.0

(5)

Május 11 5h. 50m 229,4 t=18°4

(6)

7h. 30m 229,7 t=18°2

(7)

9h. 5m 229,8 t=18°2

(8)

10h. 50 229,9 t=18°4

(9)

Május 12 r. 7h. 35 230,0 t=18°3

~~9h 25 230,2 t~~

(10)

9h. 25m 230,3 t=18°3

(11)

1h. 35m 230,8 t=18°9

(12)

este 8h. 20m 230,95 t=18°4

(13)

Május 12 este 10h. 5m 231,0 t=18°7

(14)

Május 13 reggel 7h. 36m 231,1 t=18°4

Fökör 95° 20'

V Fökör 311°20'
IV Fökör 239°20'
III Fökör 167°20'
II Fökör 95°20'
I Fökör 23°20'
mandium

meridian I Fökür 23°20'			II Fökür 95°20'			III Fökür 167°20'			IV Fökür 239°20'			V Fökür 311°20'		
Idő	Temperatur	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör
1901 Máj. 13 r. 7h30	18°4	231,1	d. 9h.30	18°8	221,6$_5$	11h 10m	19°1	?. tökés ! 214,0	12h.50	~~2~~ 19°2	229,8	2h 30	19°2	253,2
d.u. 4h.10	19°1	250,8	5h.50	19°1	241,1$_5$	7h 30m	19°1	233.2	9h.15	19°2	230,0	10h 55	19°0	253.3
12h 35m	19°0	250.9	r. 7h.50 Tisztító jegen égmintás Máj 14 r. 8h.0m	18°9 18°9	241,1 201,0	9h 40m	19°0	193.2	11h.20	19°2	190,4	1h.0	19°2	213,8
2h.40	19°2	211,0	4h.20m	19°2	201,9	6h.0m 7h 40m	19°2 19°0	193,4 193,3	~~7h 40m~~	~~19°0~~	~~193.3~~	9h.25	19°2	213,8
11h 5m	19°0	210.8	12h 45m	19°0	201.3	Május 15 r. 7h.30	19°1	193,3	9h.10m	19°2	Felső lencse benedvesedett 190,8	12h.10m	19°2	213,75
1h.50m	19°2	210,9$_5$	3h.30m	19,2	201,3	5h.10	19°2	193,2$_5$	7h 0m	19°2	190.0	9h.0	19°2	213,6$_5$
11h 0m	19°1	210.8	1h 0	19°0	201.2	Május 16 r. 8h.0	19°2	193,15	10h 10m	19,2	190,0	12h.0	19°2	213,7
2h.0m	19°2	210,9$_5$	4h.5m	19,2	201,2$_5$	d.u. 6h.0	19°2	193,3	8h 0m	19°2	190,0	10h 0	19°2	213,6$_5$
12h 10	19°2	210.9	Május 17. reg. 6h 25m	19°1$_5$	201,1$_5$	8h.15	19°2	193,2	10h 10m	19°3	190,0$_5$	12h 8m	19°4	213,8
2h 0m	19°6	211,0	4h 10m	19° 8°	201.3	6h.10m	19°7	193,8	8h 10m	19°7	190,0$_5$	10h.5m	19°6	213,7$_5$
Május 18 12h 10m	19°8	210.9$_5$	2h.10	19°6	201,25	r. 4h 0m	19°4	193,3	reggel 8h.0m	19°5	190,0$_5$			
		Közép 210,43			Közép 201,27			193,23			190,02			213,72

No 1 Fökör 59°20			No 2. Fökör 131°20'			No 3 Fökör 203°20'			No 4 Fökör 275°20'			No 5 Fökör 347°20'		
Idő	Temp.	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör	Idő	Temp.	Tükör
Május 18				12 m után [illegible] eső [illegible]				[illegible]			eső	eső		
d.e 10h.0m	19°4	$204,0_5$	12h.0	19°9	199,3	2h.0m	20°0	188,0	4h.5	20°0	202,0	6h.0m	19°9	$216,9_5$
8h 5m	19°9	$204°2_5$		~~19°6~~	~~201,5~~									

I Fökör 23°20			II Fökör 95°20'			eső után III Fökör 167°20			IV Fökör 239°20			V Fökör 311°20'		
			Május 18						Május 19					
			d.u. 10h.	~~[illegible]~~, 19°6	$201,4_5$ 201,5	12h 15m	19°7	193·4	reggel 6h 30	19°5	$190,2_5$	8h.30m	19°6 ~~213~~,	213,9
								[illegible]						
10h.30m	19°9	$211,0_5$	12h.30	19°9	201,7	2h. 30	19°9	193,7	4h.35m	20°0	190,40	6h.30	20°0	214,0
									Május 20					
8h 35m	19°9°	211·0	d.u. 10h.35	20°0	201,4	12h40	20°0	193·3	r. 6h 20	19,6	$190,1_5$	10h 20m	19°9	213,9
									8h.20m	19°5	190,1			
12h.35 -	20°0	211,0	2h 20m	20°0	201,6	4h.20	20°0	192,6 -	6h 10m	20°0	190.2 -	8h 0m	20°0	$213·9_5$

901
majusi dout 2.

Fökör 311° 20'

Majus 21	d. u.	6h. 30	213,9	t = 20°1
		8h 10	213,85	20°1
	este	10h 0	213,85	20°1
Majus 22	reggel	7h 0	213,85	20°1
		9h 30	213,9	20°0
		11h 0	213,9	
		1h 15	213,9	20°,2
		4h 0	213,95	
		6h 0m	213,95	

Fökör 167° 20'

Majus 22	este	9h 20m	193,35	t = 20°1
		10h 30	193,3	20°0
		11h 0	193,3	20°0
		12h 0	193,25	20°0
23dikán	reggel	7h 20	193,2	20°0
		9h 20	193,2	
		11h	193,25	
		1h 15	193,3	
		2h 15	193,35	t = 20°2
		4h 30	193,35	
	este	8h 0	193,25	
		10h 30	193,2	
		11h 40	193,15	
Majus 24	reggel	5h 35	193,05	derült
		7h 30	193,15	
Majus 25	r.	9h 50	193,20	t = 20°2
dörög egy kicsit	d. u.	4h 5	193,3	20°4
eső, dörgés elállt		4h 25	193,25	
		6h 35	193,25	
	este	9h 30	193,2	

./.

Május 26 reggel		8h.	15m	193,15	20°6
		1h	0	193,4	21°0
		2h	30	193,4	21°0
		4h	50	193,4	21°0
		6h	30	193,35	20°9
		8h	10	193,3	20°9
	este	11h	0	193,2	20°9
Május 27 reggel		7h	20	193,25	21°0

átforgatva

Főkör 347° 20'

Május 27 reggel		10h.	0m	216,65	21°1
		11h	0	216,7	21°0
		11	40	216,8	21°0
			45	216,7	
			51	216,65	
		1h	25	216,95	
			31 . . .	216,8	
			35	216,7 lóg	
			47 . . .	216,95	21°1
		2h	20	216,95	21°1
		3h	15	216,95	
		5h		216,9	21°0
		7h	10m	216,9	
	este	9h	30	216,85	21°1
		10h	20	216,8	
		11h	50	216,8	21°2
Május 28 reggel		6h	20	216,8	21°2
		8h	30	216,95	21°1
		10h	20	216,95	21°2
		12h	35	217,0 . . .	21°2
		2h	15	217,0	21°2
		4h	50	217,0 . . .	21°2

Törés 347° 20'

Majus dik 3.

Majus 28 dikán	d.u.	6h. 0m	217,0	t = 21,2	
		8h. 25m	217,0	t = 21°2	
29ikén reggel		5h. 0m	217,0	t = 21°0	
		6h 25m	217·0	t = 21°0	
		7h 45	217,0	t = 21°2	
	d.u.	2h. 5m	217,1	t = 21°2	Dörög
		5h 50	217,1	t = 21°4	kiderül
		9h. 5m	217,0	t = 21°4	"
		12h 5m	217·0	t = 21° 5	este
30dikán reggel		7h 10m	217,0	t = 21°3	Derült
		10h 35m	$217,0_5$	21°4	
		2h. 13m	217,2	21°2	
		7h 25m	217·1	21°6	borongós
		8h 35	217.1_5	21°7	
		2h 0m	$217·0_5$	21·8	derült
31dikén r.		6h 20m	217,0	21°7	"
	r.e.	10h 10m	$217·0_5$	22·0°	"
	este	9h. 40	217,2	22°0	
		11h. 0m	$217,1_5$	22°0	
		12h 35m	$217·0_5$	22·0	"
Junius 1	r.	6h 20	$217,0_5$	22°	
	este	7h. 10	217,4	22,2	
		10h 20m	$217·3_5$	22°4	"
Junius 2	r.	7h. 0	217,3	22°2	"
		9h 30m	217·3	22°3	"
		2h 15m	217·5	22°9	"
		5h 20m	217·5	22°8	"
	este	2h 15m	217·4	22°8	"
Junius 3 reggel		8h. 0m	217,45	22°8	
		12h. 15m	$217,6_5$	23°1	
		2h. 0m	217,7	23°2	
		3h. 0	217,7	23°2	
		5h 15m	217·7	23°2	

Június 3 este	9h.	50m	217,65	t=23°2
	12h	20m	217·6	23°2
Június 4 reggel	7h.	0m	217,65	23°2

7h. 10m kor átfordítom.

Főkör 77° 20'

Június 4	10h	0m	203,1	t=23°2
	12h	0m	203·2	23°3
	1h.	10m	203,2	23°4
	3h	15m	$203{\cdot}2_5$	23°6
	6h	10m	203·2	23°6
	8h	15m	$203{\cdot}1_5$	23°5
	1h	45m	$203{\cdot}0_{(5)}$	23°5
Június 5 reggel.	7h.	25m	203,0	23°3
	10h	30m	203,05	23°4
	12h.	0m	203,15	23°6
	3h.	15m	203,1	23°9
	6h.	30m	203,0	23°7.
	7h.	45	203,0	23°7
	10h.	5m	203,0	23°5
	11h.	25m	203,0	23°3
Június 6 reggel	5h.	40m	202,9	23°3
	7h.	55m	202,85	23°4
	9h	45m	202,9	23°6
	10h	50m	202,95	23°8
	12h	55m	203,0	23°8
	2h	0m	203,0	24°1
	5h.	0m	202,95	24°0
	6h	40m	202,92	24°0
este	9h	30m	202,85	23°7
	10h.	35m	202,85	23°8
	1h	30m	202·8	23°8
Június 7 reggel v.	8h	12m	202,75	23°8
"	9h	35m	202,75	23°8

~~[illegible]~~ Junius 7	1h 5m	202,75	t=24°1

~~[illegible]~~ Junius 7	1h 5m	202,75	t=24°1
	4h 30m	202'75	24°
este	10h 15m	202,6	23°8
	1h 45m	202'5₅	23°8
Junius 8	r. 7h. 40m	202,4₅	23°7
	4h 20m	202'5	24°0
	7h 10m	202,4₅	24°1
	12h 30m	202'25	24°0
Junius 9	r. 8h. 0m	202,2	23°8

	Fokkör	Dátum	Állás	Temp.
1 állás	23°20'	Junius 9 d. e. 10h 30	210,9	23°9
2 állás	95°20'	Junius 9 d. 12h 30 ~~Junius 9 d. e. 10h. 30m~~	201,4 ~~210,9~~	24°,1 ~~23°9~~
3 állás	167°20'	d. u. 2h. 30	193,5₅	t=24°1
4 állás	239°20'	4h. 30m	190,1₅	t=24°1
5 állás	311°20'	6h. 30	213,7	t=24°1
1 állás	23°20	este 9h. 10	210,8₅	t=24°0
No 1 állás 59°20	59°20'	11h 30	204,0	t=24°0
No 2 állás	131°20	Junius 10 r. 5h 40m	199,0₅	t=23°9
No 3 állás	203°20'	Junius 10 r. 7h. 50	187,7	t=24°1
No 4 állás	275°20'	9h. 45m	201,6₅	t=24°0
No 5 állás	347°20'	11h 40	216,5₅	t=24°1
No 1	59°20'	1h 40	204·0	t=24°1
No 2	131°20'	3h 40m	199,2	t=24°2
No 3	203°20'	5h 40m		

Lengyel-féle magnetométer Főkör 1,31°20

Átmenet 196 m
8 m
200 m

20+4 4h. 32m 22 s
30+4 4h 32 m 33 s
40+10 4h 32 45 s

4h. 38m 224,9 x

Átmenet 206
204 m
202 m
200 m

550
(25+ 20/2
50+) 27,3

) 0,350

4h. 50m 197,6 x) 9,15
5h. 2 m 207,15 x egyenl. 204,7.

Átmenet ~~200 10+15 5h. 17m 17,5 s~~
205 20+5 22,5 s
210 25+5 27,5 s átkódolás

Átmenet 210 m 5h. 23m 20+ 14/2 27,0 s
Átmenet 204,7 m 5h. 23m 41 s. 205 m 25+ 10/2 40,0 s
200 m 45+ 15/2 52,5 s
5h. 28m 30 s 147,7 x

Átmenet 203 m 5h. 35m 30+ 8/2 34,0 s
Átmenet 204,7 m 5h. 35m 46 s 205 m " 40+ 16/2 48,0 s) 77,3
207 m 36m 55+ 15/2 2,5 s
5h. 40m 35 s. 225,0 x

) 0,354

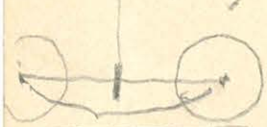
Átmenet 206 m 5h. 47m 20+ 6/2 23,0 s
Átmenet 204,7 m 5 47m 48 s. 205 m " 30+ 24/2 42,0 s) 27,25
204 m 48m 56+ 24/2 2,0 s

T = 722,0 s.

5 52m 40 s 197,65

) 0,351

Átmenet 204,7 m 5h. 59m 50 s. 204 m 5h 59m 10 s
205 m 6h. 0m 2 s) 9,6
Egyensúly egyenl. 204,7
6h. 4m 45 s 207,25



golyó tömege 13135 gr. kelvin számláló 22,025

1 oldal.	2 oldal	3 oldal (1 oldala)
181.7 (?)	219.8) 6,2	10 h 25 m 185,0
186.4	226.0) 0,34	
185.0) 1,4	) 2,1	h = 65,8 C.
185.5) 0,5) 0,36	223.9 egyenl. 224,4	
egyenl. 185,3	átkötve 8 h 30 m	

224,4,0
185,15
39,25

Mágnesi dőlés 4.

Leány [illegible] vittem ok 15 éden este [illegible], így meg-
forgattam Budapesten 1901 Junius 18 ikán reggel
tehát Junius 18 reggel [illegible] kezdve.

[illegible] Mágneses meridián 54° 0'

h dőlés [illegible] 65,8 [illegible].

Főkör 54° 0'

1901 ~~Junius~~ 18 d. u. 2h. 5m 210,4 $t = 23°2$ [illegible]
2h. 11 209,4 [illegible]
2h. 55m 203,8 . . .
4h. 20m 195,0

egyszer körül ~~[illegible]~~ forgattam.

6h. 10 175,4
7h. 14m 171,4
8h 26m 167,9
18 este . . . 8h 48 166,2

[illegible] (illetőleg a [illegible] órájának [illegible] valóban [illegible].)

18 este 10h. 40m -- 270,0

Junius 19ikén reggel 7h. 45. 253,0 $t = 23°2$

egyszer körülforgattam: 1,2,3,4,5,6,7,8,9,10.

a [illegible] körülforgatás [illegible] 7h. 45 és 9h. 20 között

9h. 45m 265,7 ×
" 57m 242,1 ×) 23,6
10h. 9m 249,8 ×) 7,7) 0,326. [illegible] 247,7.
1,22 11h. 10m 246,2 $t = 23°2$
1,13 12h. 9m 245,1 . . .
1,11 2h 10m 242,7
4h 35m 240,0 $t = 23,2$
1,01 6h. 45m 237,8 $t = 23°1$
7h. 38m 237,0 $t = 23°1$
20ikán reggel 8h. 10m 227,7 $t = 23°0$
9h. 10m 227,0 $t = 23°0$
10h. 40m 226,15

Körül forgattam 1 szer

délben 12 óra 40 m ... 224,8 t = 23°1

egy körülforgatással

2h 50m 223,5 t = 23°1

körülforgatva [illegible] [illegible]

4h. 50 m 220,9 t = 23°1

körülforgatva

6h. 45 m 219,65 t = 23°0

20 szor előre [illegible] körülforgatva [illegible] 7h. 30m kor.

8h. 0m	193,2 ×			
12m	227,0 ×	) 33,8	) 0,355	~~[illegible]~~
24m	215,0 ×	) 12		
36m ...	219,1 ×	) 4,1	) 0,342	egyenlő 218,1

9h. 40m 217,2 t = 23°0

este 11h. 5m 216,3 t = 22°8

Június ~~Május~~ 21 reggel 8h. 0m 212,1 t = 22°7

10h. 0m 211,35 t = 22°8

körülforgatva

12h 30m 210,8 t = 22°9

2h. 45m 210,1 t = 23°0

forgatva

4h. 45m 209,6 t =

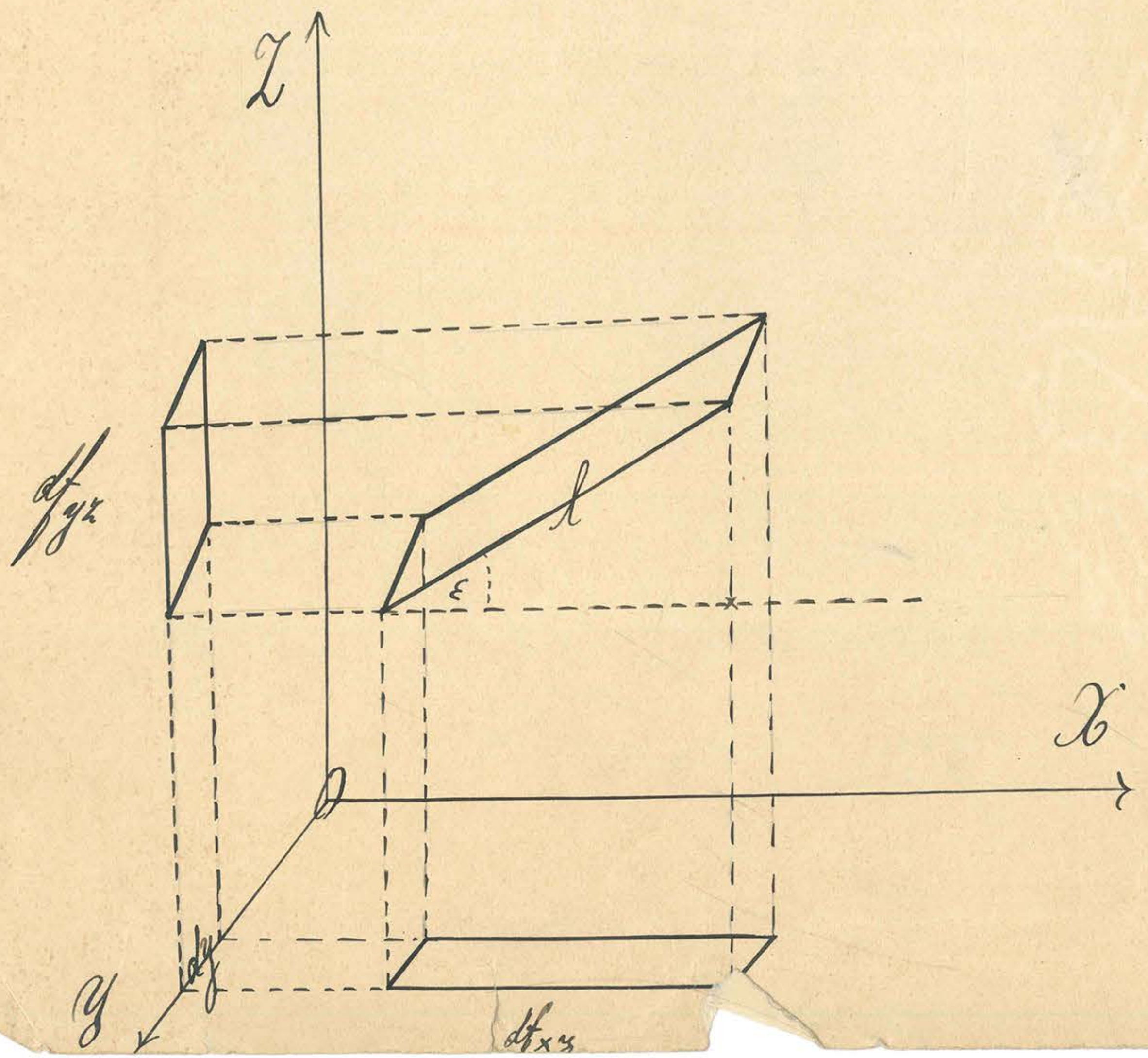
1901 X/3.

I.) Egy szalagra nézve:

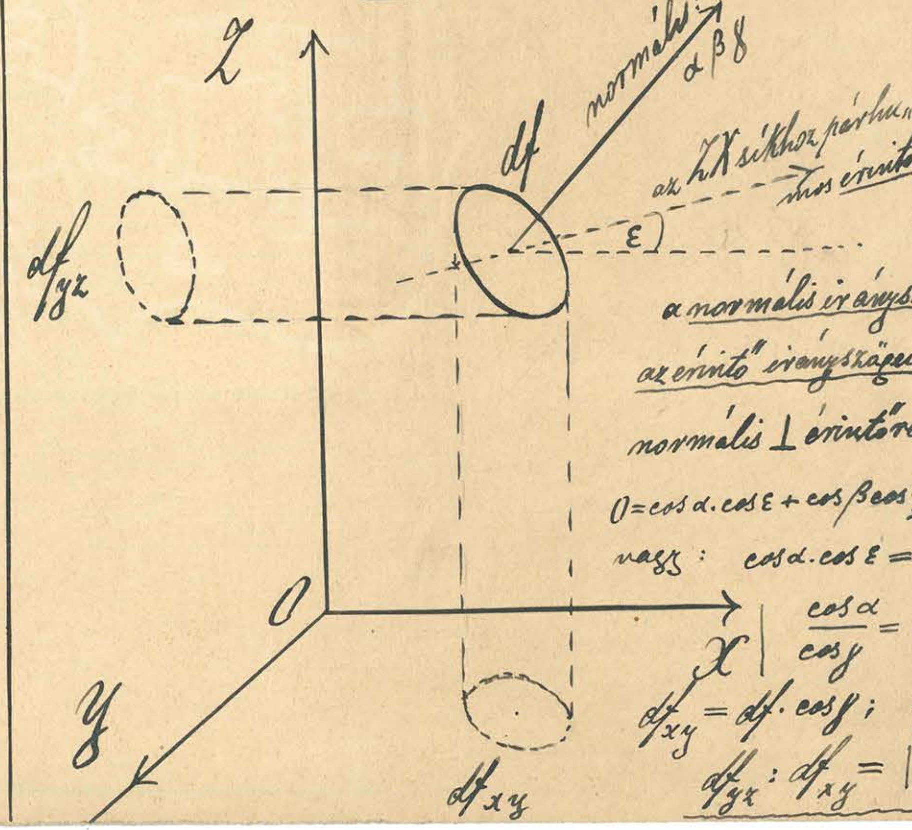
$$df_{xy} = dy . l . \cos \varepsilon ;$$

$$df_{yz} = dy . l . \sin \varepsilon$$

$$df_{yz} = df_{xy} . \operatorname{tg} \varepsilon .$$



II.) Általánosságban, tetszőleges felületelemre nézve:



a normális irányszögei: $\alpha ; \beta ; \gamma ;$

az „érintő" irányszögei: $\varepsilon ; \frac{\pi}{2} ; \frac{\pi}{2} - \varepsilon ;$

normális $\perp$ érintőre, ezek:

$0 = \cos \alpha . \cos \varepsilon + \cos \beta \cos \frac{\pi}{2} + \cos \gamma \cos (\frac{\pi}{2} - \varepsilon),$

vagy: $\cos \alpha . \cos \varepsilon = - \cos \gamma \sin \varepsilon ;$

$\left| \frac{\cos \alpha}{\cos \gamma} \right| = | \operatorname{tg} \varepsilon | ;$ ámde:

$df_{xy} = df . \cos \gamma ; \quad df_{yz} = df . \cos \alpha ;$

$df_{yz} : df_{xy} = | \operatorname{tg} \varepsilon |$, q.e.d.

Gravitációhoz.

Izosztatika.

1915. Juliusban eltevé

a Könyvtári asztalról

Gravitációhoz

~~Mágnes~~ Isostasiához tartozó

$a = R^2 \quad b = -2R\cos\vartheta$

$$\left(-r^2 + \tfrac{1}{2}Rr\cos\vartheta + \tfrac{1}{6}R^2\cos^2\vartheta - \tfrac{2}{3}R^2\right)\frac{1}{(\ )^{\frac{3}{2}}} + \left(-\tfrac{1}{2}R^3\cos^3\vartheta + \tfrac{3}{2}R^3\cos\vartheta\right)\frac{4r - 4R\cos\vartheta}{12R^2\sin^2\vartheta}\frac{1}{(\ )^{\frac{3}{2}}}$$

$$+\left(-\tfrac{1}{2}R^3\cos^3\vartheta + \tfrac{3}{2}R^3\cos\vartheta\right)\frac{2}{3}\frac{(r - R\cos\vartheta)}{R^4\sin^4\vartheta}\frac{1}{\sqrt{\ }}$$

$\frac{3R^2 - 3R^2\cos^2\vartheta}{}$

$\frac{r - R\cos\vartheta}{3R^2\sin^2\vartheta}$

$$\frac{1}{(\ )^{\frac{3}{2}}}\frac{1}{3R^2\sin^2\vartheta}\Big\{-\tfrac{1}{2}R^3r\cos^3\vartheta + \tfrac{3}{2}R^3r\cos\vartheta + \tfrac{1}{2}R^4\cos^4\vartheta - \tfrac{3}{2}R^4\cos^2\vartheta$$

$-3R^2r^2 - 2R^4 \qquad +\tfrac{3}{2}R^3r\cos\vartheta \qquad +\tfrac{1}{2}R^4\cos^2\vartheta \qquad 3R^4 - \tfrac{3}{2}$

$-\tfrac{3}{2}R^3r\cos^3\vartheta \qquad +3R^2r^2\cos^2\vartheta \qquad +3\left(r^2 + \tfrac{R^2}{2}\right)$

$-\tfrac{1}{2}R^4\cos^4\vartheta$

$+2R^4\cos^2\vartheta$

$$-3R^2r^2 - 2R^4 + 3R^3r\cos\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta + 3R^2r^2\cos^2\vartheta - 2R^3r\cos^3\vartheta - \cancel{\tfrac{1}{2}R^4\cos^4\vartheta}$$

$-\tfrac{3}{2}R^4 - \tfrac{1}{2}R^4$

$-\tfrac{1}{2}R^4$

$$-3R^2r^2\sin^2\vartheta - R^4(1+\sin^2\vartheta) + R^3r\cos\vartheta + 2R^3r\cos\vartheta\sin^2\vartheta$$

$+R^3r\cos\vartheta(1+2\sin^2\vartheta)$

$-\tfrac{3}{2}R^4\sin^2\vartheta - \tfrac{1}{2}R^4 - \tfrac{1}{2}R^4\cos^4\vartheta$

$-\tfrac{1}{2}R^4\cos^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$

$-\tfrac{1}{2}R^4 + \tfrac{1}{2}R^4\sin^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$

$-R^4 + R^4\sin^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$

$-R^4\cos^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$

$-\tfrac{1}{2}R^4\cos^2\vartheta - \tfrac{1}{2}R^4\cos^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$

$-\tfrac{1}{2}R^4\cos^2\vartheta - \tfrac{1}{2}R^4\cos^4\vartheta$

$$-3R^2r^2\sin^2\vartheta + R^3r\cos\vartheta + 2R^3r\cos\vartheta\sin^2\vartheta - 2R^4 + R^4\cos^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta$$

21 hun ... te

$$\int\frac{r^2\,dr}{(\ )^{\frac{3}{2}}} = \frac{1}{(\ )^{\frac{3}{2}}}\frac{1}{3R^2\sin^2\vartheta}\Big\{-3R^2r^2\sin^2\vartheta + R^3r\cos\vartheta + 2R^3r\cos\vartheta\sin^2\vartheta - 2R^4 + R^4\cos^2\vartheta + \tfrac{1}{2}R^4\cos^2\vartheta\sin^2\vartheta\Big\}$$

$$+\left(-\tfrac{1}{2}R^3\cos^3\vartheta + \tfrac{3}{2}R^3\cos\vartheta\right)\frac{2(r - R\cos\vartheta)}{3R^4\sin^4\vartheta}\frac{1}{\sqrt{\ }}$$

$$d_3 Z = f\sigma \frac{r^2 \sin\vartheta\, d\lambda\, d\vartheta\, dr\, (R - r\cos\vartheta)}{(R^2+r^2-2Rr\cos\vartheta)^{\frac{3}{2}}}$$

$$d_3 J = f\sigma \frac{r^3 \sin^2\vartheta\, d\lambda\, d\vartheta\, dr}{(R^2+r^2-2Rr\cos\vartheta)^{\frac{3}{2}}}$$

$$d_3 \frac{\partial Z}{\partial t} = 3f\sigma \frac{r^3 dr\, d\lambda\, \sin^2\vartheta\, (R - r\cos\vartheta)}{(R^2+r^2-2Rr\cos\vartheta)^{\frac{5}{2}}}$$

$$d_3 \frac{\partial J}{\partial t} = -f\sigma \frac{r^2 dr\, d\lambda\, \sin\vartheta}{(\qquad)^{\frac{3}{2}}} + 3\frac{r^4 dr\, d\lambda\, \sin^3\vartheta}{(\qquad)^{\frac{5}{2}}}$$

$a = R^2 \quad b = -2R\cos\vartheta \quad c = 1$

×
$$\int \frac{r^2 dr}{(R^2+r^2-2Rr\cos\vartheta)^{\frac{3}{2}}} = -\frac{r - 2r\cos^2\vartheta + R\cos\vartheta}{\sin^2\vartheta}\frac{1}{\sqrt{\ }} + \log\left(2r - 2R\cos\vartheta + 2\sqrt{\ }\right)$$

$$\int \frac{r^3 dr}{(\qquad)^{\frac{3}{2}}} = +\frac{2R^2+r^2-5Rr\cos\vartheta-(3R^2+r^2)\cos^2\vartheta+6Rr\cos^3\vartheta}{\sin^2\vartheta}\frac{1}{\sqrt{\ }} + 3R\cos\vartheta\log\left(2r-2R\cos\vartheta+2\sqrt{\ }\right)$$

$$d_2 Z = f\sigma \sin\vartheta\, d\lambda\, d\vartheta \left\{ \left[-Rr - (3R^2+r^2)\cos\vartheta + 6Rr\cos^2\vartheta\right]\frac{1}{\sqrt{\ }} + (R - 3R\cos^2\vartheta)\log\left(2r - 2R\cos\vartheta + 2\sqrt{\ }\right)\right\}_{r_1}^{r_2}$$

kipróbálni

×××
$$\int \frac{r^3 dr}{(\qquad)^{\frac{5}{2}}} = \frac{-3r^2\sin^2\vartheta - R^2(1+\sin^2\vartheta) + Rr\cos\vartheta(1+2\sin^2\vartheta)}{3\sin^2\vartheta}\frac{1}{(\qquad)^{\frac{3}{2}}} + \frac{r\cos\vartheta(2+\sin^2\vartheta) - R\cos^2\vartheta(2+\sin^2\vartheta)}{3R\sin^4\vartheta}\frac{1}{\sqrt{\ }}$$

××
$$\int \frac{r^2 dr}{(\quad)^{\frac{5}{2}}} = \frac{r - R\cos\vartheta - \cancel{2r}\sin^2\vartheta}{3\sin^2\vartheta}\frac{1}{(\quad)^{\frac{3}{2}}} + \frac{(r - R\cos\vartheta)(1+\cos^2\vartheta)}{3R^2\sin^4\vartheta}\frac{1}{\sqrt{\ }}$$

$$\int \frac{r^4 dr}{(\quad)^{\frac{5}{2}}}$$

$$\{(h_1 - h_2) + \sqrt{c^2 + h_2^2} - \sqrt{c^2 + h_1^2}\}$$

	$c = 5240$ mm	$h_2 = 0$	$h_1 = 400$	$\{\} = 38477$	$s\{\} = 102734$
	$c = 5240$	$h_2 = 400$	$h_1 = 114100$	$= 473424$	$s' - s\{\} = 4447$
1)	$c = 5240$	$h_2 = 0$	$h_1 = 400$	$= 38477$	$s\{\} = 102734$
2)	$c = 5240$	$h_2 = 400$	$h_1 = 61080$	$= 463094$	$s\{\} = 1236461$
3)	$c = 5240$	$h_2 = 400$	$h_1 = 50400$	$= 458364$	$s\{\} = 1223832$
4)	$c = 5240$	$h_2 = 50400$	$h_1 = 61080$	4740	$\sigma\{\} = 13130$

Látus Llaypord $= 107181$ $2\pi f = 0{,}0446514$

Új Új $= 102233$. $2\pi f = 0{,}0425902$

$2\pi f = 416{,}6 \cdot 10^{-9}$

$$\frac{1}{3}\left(r_2^2 + R r_2 - 2 R r_2 \sin^2\frac{\delta}{2} + R^2 - 12 R^2 \sin^2\frac{\delta}{2} + 12 R^2 \sin^4\frac{\delta}{2}\right)$$

$$r_2^2 + R^2 + R r_2 - 2R(6R + r_2)$$

$$\cos^2\delta = \left(1 - 2\sin^2\frac{\delta}{2}\right)^2 = 1 - 4\sin^2\frac{\delta}{2} + 4\sin^4\frac{\delta}{2}$$

$$\cancel{1 - 4\sin^2\frac{\delta}{2}}$$

$$\left(1 - 12\sin^2\frac{\delta}{2} + 12\sin^4\frac{\delta}{2}\right.$$

$R\delta$

$$r_2^3 = R^3 - 3R^2 h_2 + 3R h_2^2 - h^3 \qquad 2Rr \qquad -2Rh_2 -$$

$$\cos\delta = 1 - \frac{1}{2}\delta^2 \qquad c = R\delta.$$

$$-14 R^2 \sin^2\frac{\delta}{2}$$

$$-3{,}5 R^2 \sin^2\delta \qquad -14 r^2 \sin^2\frac{\delta}{2} \qquad \sin^2\frac{\delta}{2} = \frac{1}{4}\sin^2\delta$$

$$-\frac{1}{3}\left(R^2 + r_2^2 + R r_2 - 3{,}5\, c^2\right)\sqrt{(R - r_2)^2 + c^2}$$

$$P = 2\pi f\sigma \left\{ \frac{1}{3}\left(3(h_1 - h_2) - 3\frac{1}{R}(h_1^2 - h_2^2) + \frac{1}{R^2}(h_1^3 - h_2^3)\right)\right.$$

$$+ \frac{1}{3}\left(3 - 3\frac{r_2}{R} + \frac{h_2^2}{R^2} - 14\sin^2\frac{\delta}{2} + 2\frac{h_2}{R}\sin^2\frac{\delta}{2}\right)$$

$$\frac{2\pi f\sigma}{R^2}\left\{\frac{1}{3}(r_2^3 - r_1^3) + \frac{1}{3}\left(R^2 + r_2^2 + R r_2 - 12R^2 - 2R r_2\right)(R - r_2)\sin^2\frac{\delta}{2}\right.$$

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

$$\cancel{1 - 6\sin^2\frac{\delta}{2}}$$

$$1 - 2\sin^2\frac{\delta}{2} \qquad 1 - 2\sin^2\frac{\delta}{2} + 4\sin^4\frac{\delta}{2}$$

$$\cancel{3 - 12\sin^2\frac{\delta}{2}}$$

$$R^2\left(1 - 6\sin^2\frac{\delta}{2} + 12\sin^4\frac{\delta}{2}\right)$$

$$r_2^2 +$$

$$R^2 - 6R^2\sin^2\frac{\delta}{2} + 12R^2\sin^4\frac{\delta}{2}$$

$$-2R r_1 \sin^2\frac{\delta}{2}$$

$$r_2^2 + R r_1 - 2R(3R + r_2)\sin^2\frac{\delta}{2} + R^2 +$$

$$R^2 + r_2^2 + R r_2 - 6R$$

$c^2+h_2^2$	$c^2+h_1^2$	$\log(c^2+h_2^2)$	$\log(c^2+h_1^2)$	$\log\sqrt{c^2+h_2^2}$	$\log\sqrt{c^2+h_1^2}$	$\{h_1-h_2)+ +\sqrt{c^2+h_2^2} -\sqrt{c^2+h_1^2}\}$	$P=2\pi\int\sigma\{\ldots\}$
2745,76	2761,76	3,438663	3,441186	1,719332	1,720593	3,8477	
2761,76	1304626,76	3,441186	6,115487	1,720593	3,057744	47,3424	
2745,76	2761,76	3,438663	3,441186	1,719332	1,720593	3,8477	
2761,76	375822,40	3,441186	5,574982	1,720593	2,787491	46,3094	
2761,76	256761,76	3,441186	5,409530	1,720593	2,704765	45,8364	
256761,76	375822,40	5,409530	5,574982	2,704765	2,787491	0,4740	

$\cancel{\frac{5,5720199}{0,1877450}}$ $\frac{206629955}{0,44484831}$

$\frac{250730074246}{1331,118048}$ $\frac{252028777438}{603241485\text{-}6}$

Zone

A	+2 = +2			ϑ =
B	+4.16 = +64	+1		
C	+4.27 = +108	+8		
D	+6.20 = +120	— vn		
E	+8.8 = +64			+20.
F	+10.2 = +20.	+7		
G	0		+4	
H	0	+378		
I	0			
J	−16.1 = −16	+4		0,0102
K	−20.1 = −20			
L	−24.1,3 = −32			
M	−14.5,3 = −74	+1		
N	−16.4 = −64			+11
O	−28.2,6 = −70	−276		
18	−13			−0,0075
17	−13	−65		
16	−13			
15	−13			
14	−13			
13	−16.1,3			
12	−10.1,3			
11	−8.1,3			
10	−6.1,3	−65	−65	
9	−4.1,3			
8	4.1,3			
7	2.13	Négatives	−406	
6	18			
5	16			
4	12	63 × 0,13		
3	10			
2	6			
1	1			

$$\frac{P_r + \Delta P = P_e}{P = P_i}$$

−0,0008

−0,0028

−0,0008

−0,0036

$$\begin{array}{r} 189 \\ 63 \\ \hline 819 \end{array}$$

$2\pi f =$ $416{,}575 \cdot 10^{-9}$	H^2	h^2	c^2	H^2+c^2	h^2+c^2	$\sqrt{H^2+c^2}$	$\sqrt{h^2+c^2}$	$H+\sqrt{H^2+c^2}$
1 $\sigma = \pm 2{,}67$	16	0	8100	8116	8100	90,0889	90,0000	94,0889
2 $\sigma = +1{,}67$	36	16	8100	8136	8116	90,2009	90,0889	96,2009
3 $\sigma = +1{,}67$	64	36	32400	32464	32436	180,178	180,100	188,178
4 $\sigma = -0{,}2$	1391,29	424,36	32400 1391	33791,29	32824,36	183,824	181,175	221,124
5 $\sigma = -0{,}2$	11534,76 8100	1391,29	8100	19634,76	9491,29	140,125	97,4234	247,525

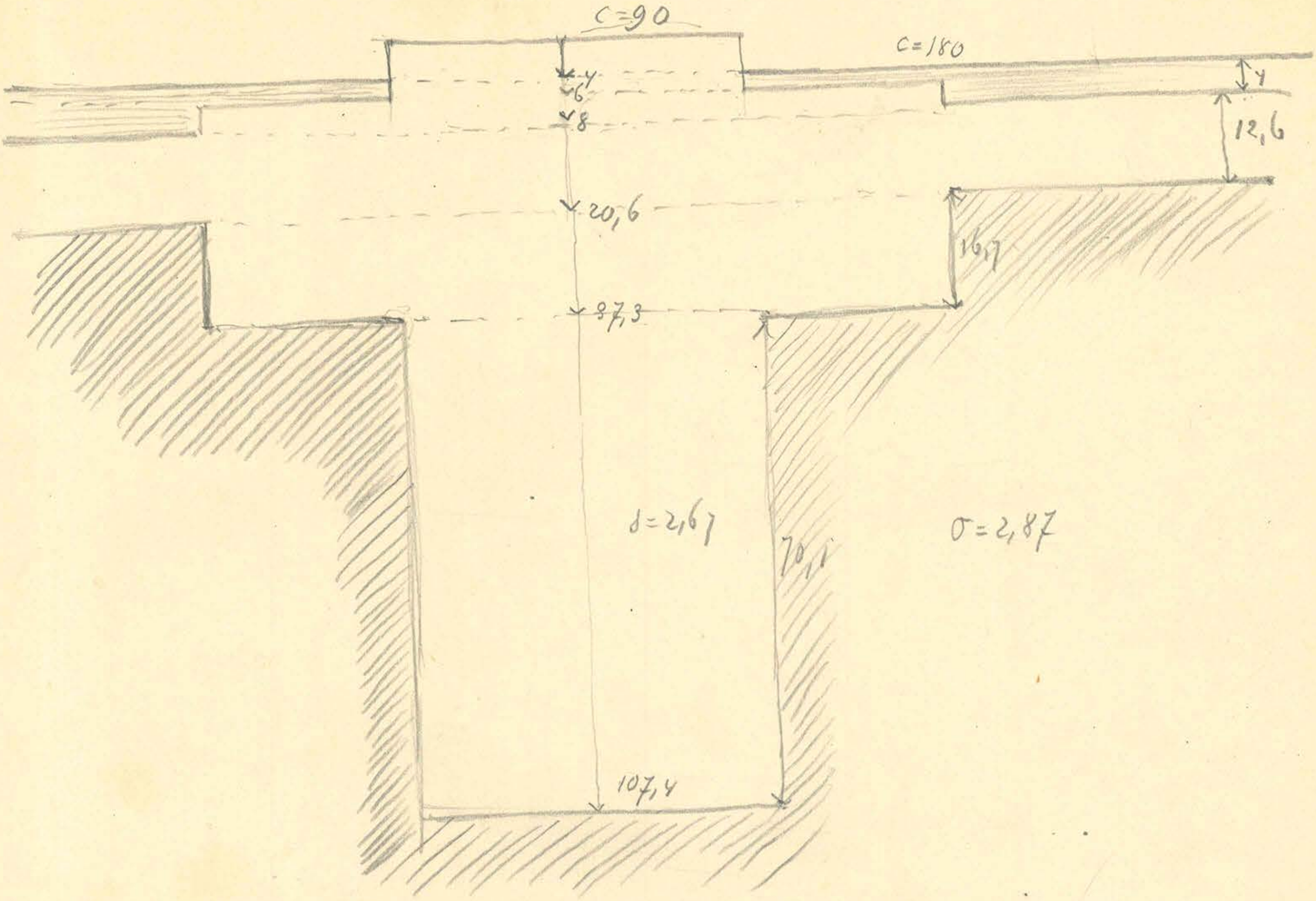
Hayford

1	16	0	8100	8116	8100	90,0890	90,0000	94,0890
2	64	16	8100	8164	8116	90,3550	90,0890	98,3550
3	13853,29	64	8100	21953,29	8164	148,167	90,355	265,867
4	64	36	32400	32464	32436	180,178	180,100	188,178
5	64	36	8100	8164	8136	90,3550	90,2000	98,2550
6	13853,29	64	32400	46253,29	32464	215,066	180,178	332,766
7	13853,29	64	8100	21953,29	8164	148,167	90,355	265,867

$H+\sqrt{H^2+c^2}$	$h+\sqrt{h^2+c^2}$	$\frac{c^2}{2}\lg\frac{H+\sqrt{H^2+c^2}}{h+\sqrt{h^2+c^2}}$	$\frac{H}{2}\sqrt{H^2+c^2}$	$\frac{h}{2}\sqrt{h^2+c^2}$	$\frac{V_r}{2\pi f\delta}$	V_r C.G.S. ergänzten	P_r.
94,0889	90,0000	179,9456	180,1778	0	352,1234	+3916511	+0,43501
96,2009	94,0889	89,9076	270,6027	180,1778	170,3325	+1184970	+0,13134
188,178	186,100	179,8702	720,712	540,300	346,2822	+2409017	+0,13371
221,124	201,775	1483,4308	3428,3176	1866,1025	2562,1759	−2134677	−0,11707
247,525	134,7234	2463,5907	7524,7125	1816,9464	3099,6168	−2582446	−0,22827
						$V=+2.793375$	$P=+0,35472$

$H+\sqrt{H^2+c^2}$	$h+\sqrt{h^2+c^2}$	$\frac{c^2}{2}\lg\frac{H+\sqrt{H^2+c^2}}{h+\sqrt{h^2+c^2}}$	$\frac{H}{2}\sqrt{H^2+c^2}$	$\frac{h}{2}\sqrt{h^2+c^2}$	$\frac{V_r}{2\pi f\delta}$	V_r C.G.S. ergänzten	P_r.
94,0890	90,0000	179,9454	180,1780	0	352,1234	+3.916509	+0,43501
98,3550	94,0890	179,5817	361,4200	180,1780	336,8237	+2.211420	+0,24516
265,867	98,355	4027,3980	8719,6280	361,4200	5490,9560	−3,541343	−0,33465
188,178	186,100	179,8708	720,7120	540,3000	346,2828	+2.452152	+0,13610
98,2550	96,2000	89,7209	361,4200	270,6000	166,5409	−1.179335	−0,13065
332,766	188,178	9234,9231	12656,6341	720,7120	14276,1952	−1.843007	−0,09658
265,867	98,255	4027,3980	8719,6280	361,4200	5490,9560	+708863	+0,06699
						$V=+2,725259$	$P=+0,32138$

[illegible] 50 kilométeres normális földkéreg 2,67 sűrűségű
~~2,8~~ 2,87 Magma sűrűség
0,2 Magma sűr.-többlet



$$V = 2{,}67\left|\begin{smallmatrix}c=90\\ H=4\\ h=0\end{smallmatrix}\right._{1} + 1{,}67\left|\begin{smallmatrix}c=90\\ H=6\\ h=4\end{smallmatrix}\right._{2} + 1{,}67\left|\begin{smallmatrix}c=180\\ H=8\\ h=6\end{smallmatrix}\right._{3} - 0{,}2\left|\begin{smallmatrix}c=180\\ H=37{,}3\\ h=20{,}6\end{smallmatrix}\right._{4} - 0{,}2\left|\begin{smallmatrix}c=90\\ H=107{,}4\\ h=37{,}3\end{smallmatrix}\right._{5}$$

Eötvös

$$\frac{V}{2\pi\sigma} = -\frac{H^2-h^2}{2} + \frac{H}{2}\sqrt{H^2+c^2} - \frac{h}{2}\sqrt{h^2+c^2} + \frac{c^2}{2}\log\frac{H+\sqrt{c^2+H^2}}{h+\sqrt{c^2+h^2}}$$

$$V = 2{,}67\left|\begin{smallmatrix}c=90\\ H=4\\ h=0\end{smallmatrix}\right. + 1{,}57607\left|\begin{smallmatrix}c=90\\ H=8\\ h=4\end{smallmatrix}\right. - 0{,}15482\left|\begin{smallmatrix}c=90\\ H=117{,}7\\ h=8\end{smallmatrix}\right. + 1{,}69990\left\{\left|\begin{smallmatrix}c=180\\ H=8\\ h=6\end{smallmatrix}\right. - \left|\begin{smallmatrix}c=90\\ H=8\\ h=6\end{smallmatrix}\right.\right\}$$
$$- 0{,}03099\left\{\left|\begin{smallmatrix}c=180\\ H=117{,}7\\ h=8\end{smallmatrix}\right. - \left|\begin{smallmatrix}c=90\\ H=117{,}7\\ h=8\end{smallmatrix}\right.\right\}$$

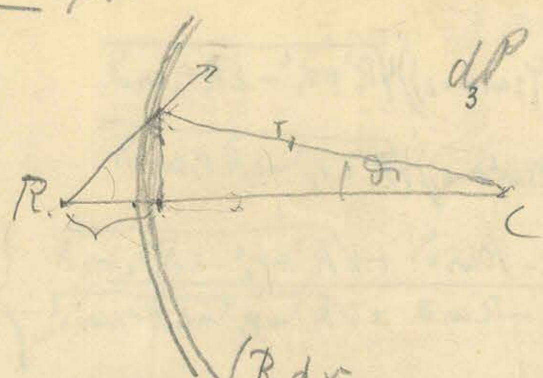
$$\frac{P}{2\pi\sigma} = (H-h) + \sqrt{c^2+h^2} - \sqrt{c^2+H^2}$$

	P	P'_H	P'_Σ
$\sin\frac{\delta}{2} = \frac{1}{10000}$	$0{,}044487(0{,}84684-0{,}00020)$	$0{,}044487(0{,}00831-0{,}00001)$	$0{,}044487(0{,}00025-0{,}00000_4)$
$\sin\frac{\delta}{2} = \frac{1}{1000}$	$0{,}044487(0{,}99983-0{,}00200)$	$0{,}044487(0{,}10438-0{,}00066)$	$0{,}044487(0{,}02573-0{,}00045)$
$\sin\frac{\delta}{2} = \frac{1}{100}$	$0{,}044487(1{,}02750-0{,}20482)$	$0{,}044487(0{,}64404-0{,}01837)$	$0{,}044487(0{,}62573-0{,}01871)$
$\sin\frac{\delta}{2} = \frac{1}{10}$	$0{,}044487(1{,}29415-0{,}195409)$	$0{,}044487(1{,}25326-0{,}20019)$	$0{,}044487(1{,}21820-0{,}20019)$
$\sin\frac{\delta}{2} = \frac{1}{\sqrt{2}}$	$0{,}044487(1{,}70734-0)$	$0{,}044487(1{,}7038-0)$	$0{,}044487(1{,}706-0)$
$\sin\frac{\delta}{2} = 1$	$0{,}044487(2{,}0-0)$		

Potentiel

	$\sigma = 2{,}67.$		$\sigma = -0{,}1$
$\sin\frac{\delta}{2} = \frac{1}{10}$	5.683446,21349		5.445299,54783

Isostasia 1914.



$$d_3 P = \frac{f\sigma\, r^2 \sin\vartheta\, d\lambda\, d\vartheta\, dr\,(R - r\cos\vartheta)}{(R^2+r^2-2Rr\cos\vartheta)^{\frac{3}{2}}}$$

$\cos\vartheta = x \qquad \sin\vartheta\, d\vartheta = -dx$

$$d_2 P = -2\pi f\sigma r^2 dr \left\{ \frac{R\,dx}{(R^2+r^2-2Rrx)^{\frac{3}{2}}} - \frac{rx\,dx}{(R^2+r^2-2Rrx)^{\frac{3}{2}}} \right\}$$

$$d_1 P = -2\pi f\sigma r^2 dr \left\{ \frac{1}{r}\frac{1}{\sqrt{R^2+r^2-2Rrx}} - \frac{1}{2R^2 r}\left(2R^2+2r^2-2Rrx\right)\frac{1}{\sqrt{R^2+r^2-2Rrx}} \right\}$$

$$d_1 P = -2\pi f\sigma r\, dr \left| \frac{\cancel{2R^2} - \cancel{2R^2} - 2r^2 + 2Rrx}{2R^2\sqrt{R^2+r^2-2Rrx}} \right.$$

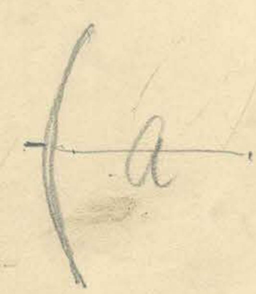
$$d_1 P = \frac{-2\pi f\sigma r^2 dr}{R^2} \left| \frac{-r + Rx}{\sqrt{R^2+r^2-2Rrx}} \right.$$

$-R + r$

$+2r^2 - 2R^2$

$$\Big|_{+1}^{-1} = \frac{-r+R}{R+r} - \frac{-r+R}{R-r} = \frac{-r^2-R^2-R^2+r^2}{R^2+r^2}$$

$= -2.$



$x = \cos\vartheta$

$$\frac{-r+R\cos\vartheta}{\sqrt{R^2+r^2-2Rr\cos\vartheta}} - \frac{\cancel{-r}+R}{\cancel{R}+r} \quad 1$$

$$d_1 P = \frac{2\pi f\sigma}{R^2}\left(r^2 dr - \frac{R\cos\vartheta\, r^2 dr}{\sqrt{R^2+r^2-2Rr\cos\vartheta}} + \frac{r^3 dr}{\sqrt{R^2+r^2-2Rr\cos\vartheta}} \right)$$

$$\int_{r_1}^{r_2} r^2 dr = \frac{1}{3} r_2^3 - \frac{1}{3} r_1^3$$

$$\int_{r_1}^{r_2} \frac{r^2 dr}{\sqrt{R^2+r^2-2Rr\cos\vartheta}} = \frac{1}{2}(r_2 + 3R\cos\vartheta)\sqrt{R^2+r_2^2-2Rr_2\cos\vartheta} - \frac{1}{2}(r_1+3R\cos\vartheta)\sqrt{R^2+r_1^2-2Rr_1\cos\vartheta}$$
$$+ \frac{R^2}{2}(3\cos^2\vartheta - 1)\log\frac{r_2 - R\cos\vartheta + \sqrt{R^2+r_2^2-2Rr_2\cos\vartheta}}{r_1 - R\cos\vartheta + \sqrt{R^2+r_1^2-2Rr_1\cos\vartheta}}$$

beste

$$\int_{r_1}^{r_2} \frac{r^3 dr}{\sqrt{R^2+r^2-2Rr\cos\vartheta}} = R\cos\vartheta\left(\frac{5}{6}r_2 + \frac{5}{2}R\cos\vartheta\right)\sqrt{R^2+r_2^2-2Rr_2\cos\vartheta} - R\cos\vartheta\left(\frac{5}{6}r_1 + \frac{5}{2}R\cos\vartheta\right)\sqrt{R^2+r_1^2-2Rr_1\cos\vartheta}$$
$$+ \frac{1}{3}(r_2^2 - 2R^2)\sqrt{R^2+r_2^2-2Rr_2\cos\vartheta} - \frac{1}{3}(r_1^2-2R^2)\sqrt{R^2+r_1^2-2Rr_1\cos\vartheta} + R\cos\vartheta\cdot\frac{R^2}{2}(5\cos^2\vartheta - 3)\log\frac{r_2 - R\cos\vartheta + \sqrt{R^2+r_2^2-2Rr_2\cos\vartheta}}{r_1 - R\cos\vartheta + \sqrt{R^2+r_1^2-2Rr_1\cos\vartheta}}$$

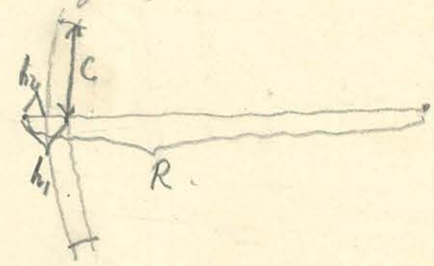
$$P = \frac{2\pi f\sigma}{R^2}\Big\{\frac{1}{3}(r_2^3 - r_1^3) + \frac{1}{3}\left(r_2^2 + Rr_2\cos\vartheta + R^2(3\cos^2\vartheta - 2)\right)\sqrt{R^2 + r_2^2 - 2Rr_2\cos\vartheta}$$

$$- \frac{1}{3}\left(r_1^2 + Rr_1\cos\vartheta + R^2(3\cos^2\vartheta - 2)\right)\sqrt{R^2 + r_1^2 - 2Rr_1\cos\vartheta}$$

$$- R^3\cos\vartheta\sin^2\vartheta \log\frac{r_2 - R\cos\vartheta + \sqrt{R^2 + r_2^2 - 2Rr_2\cos\vartheta}}{r_1 - R\cos\vartheta + \sqrt{R^2 + r_1^2 - 2Rr_1\cos\vartheta}}\Big\}$$

Ha ϑ végtelen kicsiny. $r_1 = R - h_1$, $r_2 = R - h_2$

és $\frac{h_1}{R}$, $\frac{h_2}{R}$ végtelen kicsinyek akkor.



$$P = 2\pi f\sigma\left\{(h_1 - h_2) + \sqrt{c^2 + h_2^2} - \sqrt{c^2 + h_1^2}\right\}$$

és ha $c = \infty$

$$P = 2\pi f\sigma(h_1 - h_2)$$

$$P = \frac{2\pi f\sigma}{R^2}\Big\{\frac{1}{3}(r_2^3 - r_1^3) + \frac{1}{3}\left(R^2 + r_2^2 + Rr_2 - 2R(6R + r_2)\sin^2\frac{\vartheta}{2} + 12R^2\sin^4\frac{\vartheta}{2}\right)\sqrt{(R - r_2)^2 + 4Rr_2\sin^2\frac{\vartheta}{2}}$$

$$- \frac{1}{3}\left(R^2 + r_1^2 + Rr_1 - 2R(6R + r_1)\sin^2\frac{\vartheta}{2} + 12R^2\sin^4\frac{\vartheta}{2}\right)\sqrt{(R - r_1)^2 + 4Rr_1\sin^2\frac{\vartheta}{2}}$$

$$- R^3\sin^2\vartheta\left(1 - 2\sin^2\frac{\vartheta}{2}\right)\log\frac{(R - r_2) - 2R\sin^2\frac{\vartheta}{2} - \sqrt{(R - r_2)^2 + 4Rr_2\sin^2\frac{\vartheta}{2}}}{(R - r_1) - 2R\sin^2\frac{\vartheta}{2} - \sqrt{(R - r_1)^2 + 4Rr_1\sin^2\frac{\vartheta}{2}}}$$

Lago Bianco 34 sz. állomás (35 méteren a hegy lábától.

	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi\partial\zeta}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\eta\partial\zeta}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi^2}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\eta^2}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\zeta^2}$	$\frac{10^9}{f\sigma}\left(\frac{\partial^2 U}{\partial\eta^2}-\frac{\partial^2 U}{\partial\xi^2}\right)$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi\partial\eta}$
Kartografikus rész	+0,3793	+0,1641	+2,4949	+0,2611	-2,7560	-2,2338	+0,9246
Grande Rosa ék	-0,1172	0	+0,5634	-0,2600	-0,3034	-0,8234	0
Cristallo ék	+1,2125	0	+2,3713	-0,6496	-1,7217	-3,0209	0
	+1,4746	+0,1641	+5,4296	-0,6485	-4,7811	-6,0781	+0,9246
Völgy hatása	-2,6462	0	+1,7345	0	-1,7345	-1,7345	0
	ha	$\sigma = 2,7$	és $\sigma-\sigma' = 0,4$.				
Összes	+193,8	+29,4	+1018,8	-116,1	-901,9	-1132,0	+165,5
Csupán a külső	+264,0	+29,4	+972,0	-116,1	-855,9	-1088,0	+165,5
	+122,7					-1140,5	
27	+109,5					-1002,6	
26	+148,0					-1037,6	

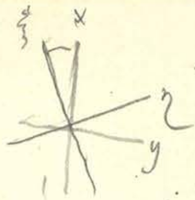
$f = 66,7 \cdot 10^{-9}$

Feltéve hogy $\frac{\partial^2 U}{\partial\xi^2}$ és $\frac{\partial^2 U}{\partial\xi\partial\zeta}$ változatlanok

$\frac{\partial^2 U}{\partial\eta^2}$ 0,4223-al kisebb mint a 33 állomáson

Grande Rosa alatt 37/g (35 méterre a hegy lábától)

	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi\partial\zeta}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\eta\partial\zeta}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi^2}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\eta^2}$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\zeta^2}$	$\frac{10^9}{f\sigma}\left(\frac{\partial^2 U}{\partial\eta^2}-\frac{\partial^2 U}{\partial\xi^2}\right)$	$\frac{10^9}{f\sigma}\frac{\partial^2 U}{\partial\xi\partial\eta}$
Kartografikus rész	-0,1299	+0,0670	+1,9198	+0,2540	-2,1738	-1,6658	+0,3761
Grande Rosa ék	-0,6935	0	+2,1128	-0,6032	-1,5096	-2,7160	0
Cristallo ék	+0,2886	0	+0,8456	-0,3079	-0,5377	-1,1535	0
	-0,6348	+0,0670	+4,8782	-0,6571	-4,2211	-5,5353	+0,3761
Völgy hatása	+2,3242	0	+0,7124	0	-0,7124	-0,7124	0
	ha $\sigma = 2,7$		és $\sigma-\sigma' = 0,4$				
Összes	-52,0	+12,0	+892,1	-117,6	-774,5	-1009,8	+67,3
Csupán a külső	-113,6	+12,0	+873,2	-117,6	-755,6	-990,9	+67,3
	(-25,5)					(-864,6)	



x y mutatja Dél Északi
x tengely ξ-vel képez + 36° szöget.
ξ tengely iránya Északnyugati

Lago Bianco 33 állomás Vonatkoztatva ξ η ζ tengelyrendszerre.

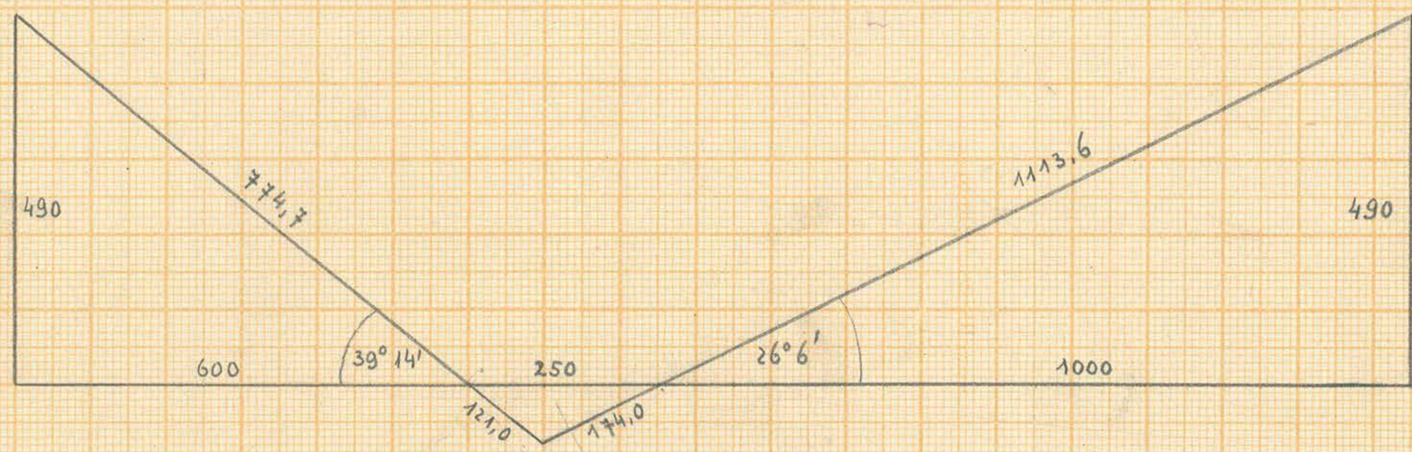
	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi\partial\zeta}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\eta\partial\zeta}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi^2}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\eta^2}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\zeta^2}$	$\frac{10^9}{f_0}\left(\frac{\partial^2 U}{\partial\eta^2}-\frac{\partial^2 U}{\partial\xi^2}\right)$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi\partial\eta}$
Kartografikus rész	+0,3793	+0,1641	+2,4949	+0,6834	−3,1783	−1,8715	+0,9246
Groda Rossa ék	−0,0962	0	+0,4802	−0,2253	−0,2549	−0,7054	0
Cristallo ék	±2,6865	0	+6,1446	−1,0719	−5,0727	−7,2165	0
	+2,9696	+0,1641	+9,1197	−0,6138	−8,5059	−9,7334	+0,9246
σ helyett (σ−σ')-vel számítandó topografikus hatás völgy	−4,7742	0	−2,2170	0	+2,2170	+2,2170	0
	ha vesszük σ = 2,7			σ−σ' = 0,4.			
Összes	+405,0	+29,4	+1573,7	−109,9	−1463,8	−1683,6	+165,5
Csupán a külső	+531,6	+29,4	+1632,5	−109,9	−1522,6	−1742,4	+165,5
	(+204,8)					(1487)	

Groda Rossa alatt 36 állomás (8 méter a hegy aljától)

	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi\partial\zeta}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\eta\partial\zeta}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi^2}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\eta^2}$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\zeta^2}$	$\frac{10^9}{f_0}\left(\frac{\partial^2 U}{\partial\eta^2}-\frac{\partial^2 U}{\partial\xi^2}\right)$	$\frac{10^9}{f_0}\frac{\partial^2 U}{\partial\xi\partial\eta}$
Kartografikus rész	−0,1299	+0,0670	+1,9198	+0,3494	−2,2691	−1,5704	+0,3761
Groda Rossa ék	−1,1578	0	+3,3006	−0,5078	−2,7929	−3,8084	0
Cristallo ék	+0,2492	0	+0,7665	−0,2827	−0,4838	−1,0492	0
	−1,0385	+0,0670	+5,9869	−0,4411	−5,5458	−6,4280	+0,3761
Völgyi hatás	+3,1174	0	−0,9045	0	+0,9045	+0,9045	0
	ha vesszük σ = 2,7			σ−σ' = 0,4			
Összes	−103,2	+12,0	+1047,7	−79,0	−968,8	−1126,7	+67,3
Csupán a külső	−185,9	+12,0	+1071,7	−79,0	−992,8	−1150,7	+67,3
	(−16)					−1020,4	

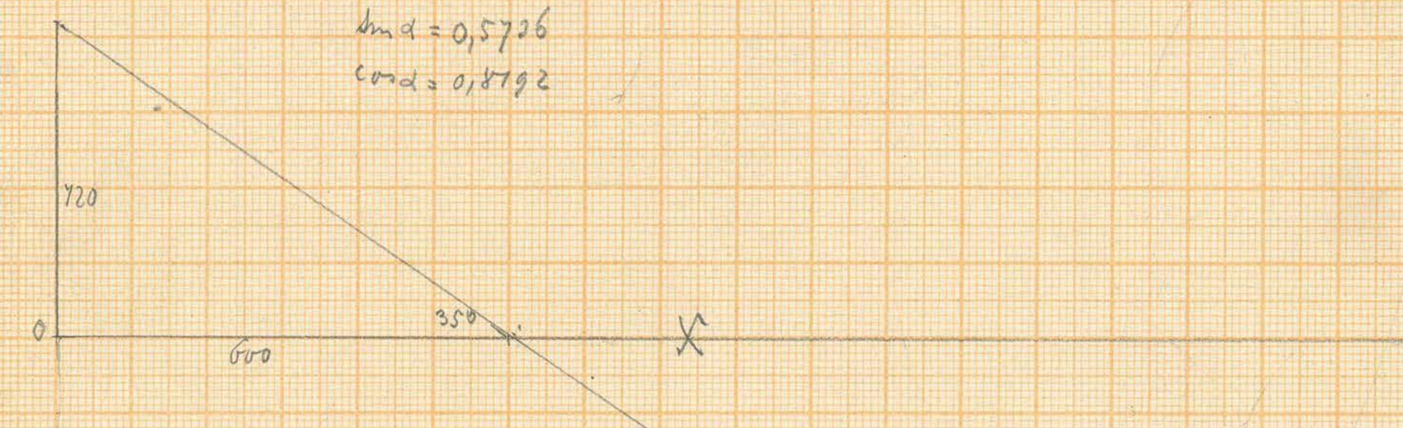
$\sin\alpha = 0,6326$ $\sin\alpha' = 0,4398$

$\cos\alpha = 0,7746$ $\cos\alpha' = 0,8980$



$\sin\alpha = 0,5736$

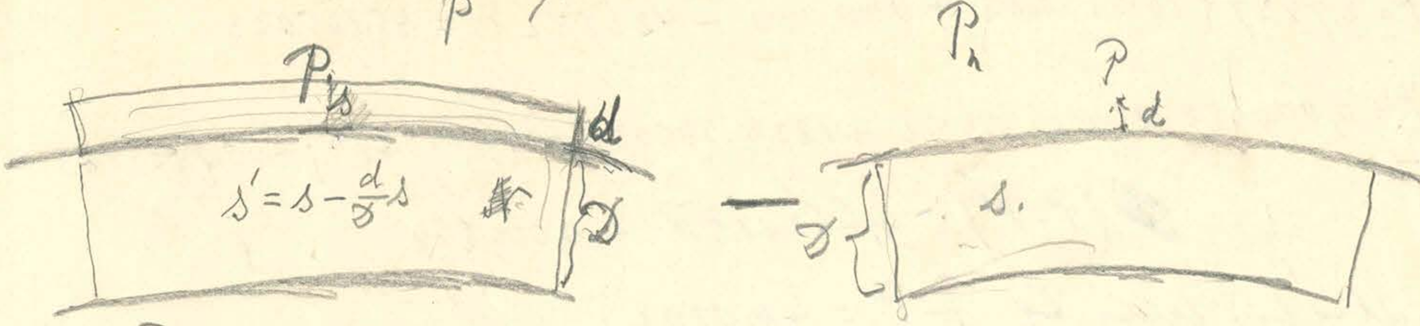
$\cos\alpha = 0,8192$



33 iM. $\left\{ \begin{array}{l} \dfrac{\partial^2 u}{\partial x \partial z} = +1,9904 \\[2ex] \dfrac{\partial^2 u}{\partial x^2} = +5,7333 \end{array} \right.$

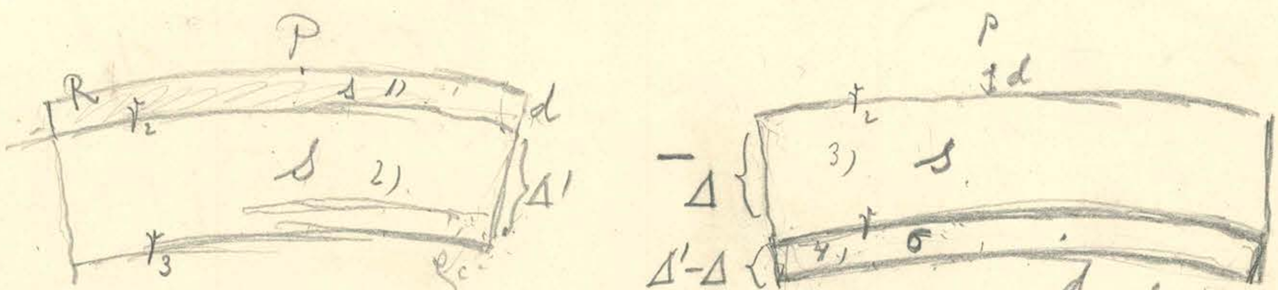
34 iM. $\left\{ \begin{array}{l} \dfrac{\partial^2 u}{\partial x \partial z} = +0,9077 \\[2ex] \dfrac{\partial^2 u}{\partial x^2} = +2,1774 \end{array} \right.$

Slayford.



$\Delta = 11\,370\,000$ c.

$s = 2{,}67$. $\qquad s' - s = 0{,}00939314$



$\Delta' = \Delta + \frac{s}{\sigma - s} d \qquad \sigma = s + \frac{d}{\Delta' - \Delta} s$

$s = 2{,}67$ és ha $\Delta = 50$ km. $\quad \sigma - s = 0{,}1 \quad \Delta' - \Delta = 26{,}7\Delta \quad \sigma = 2{,}77$

Amerikai. $\quad \underline{\delta = 25^{\circ}} \qquad d = 41000$

Slayford-nak a felső $\underline{d}$ vastagság van $P = 0{,}053801$

az első Δ vastagság tehát $P' = 0{,}052286$

$P - P'$ $\qquad \pm 0{,}001575$

~~Slayford lebbésiből~~ $= -0{,}0008$

$$P = \frac{100000\ 2\pi\ 2{,}67}{R^2} (16\,213\,523 + 9\,361\,774 - 5\,966\,300) = C.\ 19\,608\,997$$

$$P' = C\ (15\,925\,616 + 9\,220\,375 - 6\,089\,401) = C.\ 19\,056\,590$$

$$P - P' = C\ (287\,907 + 141\,399 + 123\,101) = C.\ 552\,407.$$

$$P - P' = +0{,}001515$$

Slayford lebbésiből ~~eredmény~~ ($P - P' = +0{,}0008$ kívül

Llayford $\delta = 1° 29' 58''$

$10^9 P = 2{,}7437 \{16.213523 + 660000 - 426742\} = 45.125033$

$10^9 P' = 0{,}00965242 \{4526.856132 + 1236.280000 - 86.613200\} = 54.793148$

$(P - P') = -9{,}668115 \cdot 10^{-3} = -0{,}009668$

Llayford táblázatából $P - P' = +0{,}0102$

$$\mathcal{P} = 0{,}044\,484\,831 \Bigg\{ 1 + \left(2{,}500\overset{1571}{\cancel{3011}} - 11{,}6680717 \sin^2\frac{\vartheta}{2} + 10{,}0012043 \sin^4\frac{\vartheta}{2}\right)\sqrt{162.154756 \sin^2\frac{\vartheta}{2}}$$

$$-\left(2{,}500\overset{0000}{\cancel{1440}} - 11{,}6679670 \sin^2\frac{\vartheta}{2} + 10{,}0012043 \sin^4\frac{\vartheta}{2}\right)\sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}$$

$$-36656{,}049584 \sin^2\vartheta\left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log(\mathrm{Br.}) \frac{-12734 \sin^2\frac{\vartheta}{2} - \sqrt{162.154756 \sin^2\frac{\vartheta}{2}}}{0{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}} \Bigg\}$$

$$\mathcal{P}' = 0{,}044\,484\,831 \Bigg\{ 1 + \left(0{,}092905082 - 0{,}436512287 \sin^2\frac{\vartheta}{2} + 0{,}374576970 \sin^4\frac{\vartheta}{2}\right)\sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}}$$

$$-\left(0{,}092746009 - 0{,}436405724 \sin^2\frac{\vartheta}{2} + 0{,}374576970 \sin^4\frac{\vartheta}{2}\right)\sqrt{3753{,}824926 + 160.594370 \sin^2\frac{\vartheta}{2}}$$

$$-1372{,}8858 \sin^2\vartheta\left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log(\mathrm{Br.}) \frac{50{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}}}{61{,}268466 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{3753{,}824926 + 160.594370 \sin^2\frac{\vartheta}{2}}} \Bigg\}$$

3,308812

1,654406
0,968040 − 2

0,622446

3,404861
1,702431
968040 − 2

0,670471

3,574473

1,787237
0967295 − 2

0,754532

5,68240
4,19224

1,48916

5,68240
4,68240

1

0,0035818364
= 1,00358

4,114571
0,944265 − 2
2,057286

0,601551

$r_1 < R$

$\frac{R^2 + r_1^2 + Rr_1}{R_2^3 - r_1^3}(R - r_1)$

$R^2 + \cancel{r_1^2 R} + \cancel{R^2 r_1} - R^2 r_1 - r_1^0 - \cancel{R r_1^2}$

$\frac{3R^2}{r_2^3 - r_1^3}$

r

40533595,56
2801,

0,44

~~2,500~~

$\boxed{2,5001571}$

2,500 ...

258061.192294
2801.304

258061.189493
258109832863

48.643370

$r_2^0 - r_1^0 ==$

$A\sqrt{1+\frac{\Delta}{x^2}}$

39.762230|8329
210729.886578
525

$(1+x)^{\frac{1}{5}} = 1 + \frac{1}{5}x$

57000 : 120000

$A(1-$

$630573(1+$

57000 : 250000 : 0,0000002

3x

$\cancel{R = r_2} = 6367$ $\quad r_1 = 6366{,}6$ $\quad 3R = 19101$

$\frac{1}{3} r_2 = 2122{,}3333$ $\quad \frac{R}{2} = 3183{,}5$ $\quad \frac{R^2 + Rr_2 - 2r_2^2}{6R} = 0$

$\frac{1}{3} r_1 = 2122{,}2$ $\quad \frac{R}{2} = 3183{,}5$ $\quad \frac{R^2 + Rr_1 - 2r_1}{} = \frac{7639}{6R} = \frac{7639}{38202} = 0{,}19996305\cancel{0} \times$

$\cancel{799852}$

$\frac{r_2^3 - r_1^3}{3R} = 848{,}880006$ $\quad \frac{1}{2}(r_2^2 - r_1^2) = 2546{,}50000$ $\quad + \cancel{\tfrac{1}{2}R^2 \ 3183{,}5}$

$848{,}880006$

$1697{,}619994$ $\quad \frac{1}{2}R^2 = 20{,}269345$

38202 $\quad 853312$ $\quad 46{,}672.194$

$\frac{2}{6}$

$\left(-\frac{R}{6} - \frac{r}{6} + \frac{1}{3}\frac{r^2}{R}\right)(R - r)$

$-\frac{R^2}{6} - \cancel{\frac{rR}{6}} + \frac{1}{3}r^2 + \cancel{\frac{rR}{6}} + \frac{r^2}{6} - \frac{r^3}{3R}$

$-\frac{R^2}{6} + \frac{2}{3}r^2 - \frac{r^3}{3R}$

$\frac{1}{2}(r_2^2 - r_1^2) - \frac{r_2^3 - r_1^3}{3R} + \frac{r_2^3 - r_1^3}{3R} - \frac{1}{2}(r_2^2 - r_1^2)$

$\frac{2+1}{6}$

$R = 6367$

$R^2 = 40.538689$

$R^3 = 258109.832863$

→ $6R = 38202$

$2R = 12734$

$4R = 25468$

$r_2^3 - r_1^3 = 1298.777979$

$\frac{1}{3}(r_2^3 - r_1^3) = 432.925993$

6369.0

$r_2 = 6316,6$

$r_2^2 = 39.899435,56$

$r_2^3 = 252028.774658,$

$Rr_2 = 40.217792 \times 4$

$R^2 + r_2^2 + Rr_2 = 120.655917$

$R^2 + r_1^2 + Rr_1 = 120.449520$

6367.0

$r_1 = 6305,730878$

$r_1^2 = 39.762242,183215$

$r_1^3 = 250729.996679$

$Rr_1 = 40.148589$

19101

6

$R - r_2 = 50,4$ 2540,16

61,269122

252,028.771121,0
25.07296
774658,296

2).

$R = 6367$ $\quad r_2 = 6366{,}6$ $\quad r_1 = 6305{,}731534$

$R^2 = 40.538689$ $\quad r_2^2 = 40.533596$ $\quad r_1^2 = 39.762249{,}750092$

$R^3 = 258109.832863$ $\quad r_2^3 = 258061.192294$ $\quad r_1^3 = 250730.074246$

$Rr_2 = 40.536142$ $\quad Rr_1 = 40.148592{,}4605$

$6R = 38202$

$2R = 12734$

$4R = 25468$

$r_2^3 - r_1^3 = 7331{,}118048$

$\frac{1}{3}(r_2^3 - r_1^3) = 2443{,}706016$

$R^2 + r_2^2 + Rr_2 = 121.608427$ $\quad 2R(6R+r_2) = 567.536552$

$R^2 + r_1^2 + Rr_1 = 120.449531{,}2106$ $\quad 2R(6R+r_1) = 566.761459{,}248$

$2\pi f = 416{,}574834 \cdot 10^{-9}$ $\quad 12R^2 = 486.464268$

$\frac{2\pi f}{R^2}\frac{1}{3}(r_2^3 - r_1^3) = 1{,}02759819 \; 10^{-14} \cdot \frac{1}{3}(r_2^3 - r_1^3) = 0{,}000025114786$ (2,5711 C.G.S.)

$\dfrac{\frac{1}{3}(R^2 + r_2^2 + Rr_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}014596892$ $\quad \dfrac{\frac{2}{3}R(6R+r_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}068122496$

$\dfrac{\frac{1}{3}(R^2 + r_1^2 + Rr_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}014457787$ $\quad \dfrac{\frac{2}{3}R(6R+r_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}068029460$

$\dfrac{\frac{1}{3}\,12R^2}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}058091205$ $\quad \dfrac{R^3}{\frac{1}{3}(r_2^3 - r_1^3)} = 105{,}622294$ $(243{,}205884954$

$R - r_2 = 0{,}4$ $\quad (R - r_2)^2 = 0{,}16$ $\quad 4Rr_2 = 162.144568$

$R - r_1 = 61{,}268466$ $\quad (R - r_1)^2 = 3753{,}824925993$ $\quad 4Rr_1 = 160.594370$

$\frac{2\pi f}{R^3}\frac{1}{3}(r_2^3 - r_1^3)\,s = 0{,}00006704764 9$ (6,7047649 C.S.S.)

$R = 6367$ $\qquad r_1 = 6366{,}6$ $\qquad r_2 = 6367$

$R^2 = 40{,}538689$ $\qquad r_1^2 = 40.533596$ $\qquad r_2^2 = 40.538689$

$R^3 = 258109.832863$ $\qquad r_1^3 = 258061.\cancel{192294}\ 189493$ $\qquad r_2^3 = 258109.832863$

$Rr_1 = 40.536142$ $\qquad Rr_2 = 40.538689$

$r_2^3 - r_1^3 = 48.64\cancel{0569}\ 3370$

$\frac{1}{3}(r_2^3 - r_1^3) = 16.21\cancel{35523}\ 4457$ $\qquad R^2 + r_2^2 + Rr_2 = 121.616067$ $\qquad 2R(6R + r_2) = 567.541646$

$R^2 + r_1^2 + Rr_1 = 121.608427$ $\qquad 2R(6R + r_1) = 567.536552$

$2\pi f = 416{,}574834\ 10^{-9}$ $\qquad 12R^2 = 486.464268$ $\qquad 2R = 12734$

$$\frac{2\pi f}{R^2}\,\frac{1}{3}(r_2^3 - r_1^3) = 2\pi f\ 0{,}39995783 = 16{,}660987\ 10^{-4} = 0{,}0016\cancel{660987}\ 19468$$

$$\frac{1}{3}\,\frac{R^2 + r_2^2 + Rr_2}{\frac{1}{3}(r_2^3 - r_1^3)} = 2{,}5003011 \qquad \frac{\frac{2}{3}R(6R + r_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 11{,}6680717$$

$\frac{6367 \times 2}{12734}$

$$\frac{1}{3}\,\frac{(R^2 + r_1^2 + Rr_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 2{,}5001440 \qquad \frac{\frac{2}{3}R(6R + r_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 11{,}6679670$$

$$\frac{\frac{1}{3}\,12R^2}{\frac{1}{3}(r_2^3 - r_1^3)} = 10{,}0012043 \qquad \frac{R^3}{\frac{1}{3}(r_2^3 - r_1^3)} = \cancel{15911{,}0164}\ 15918{,}4999$$

$(\cancel{36656{,}049574}\ 36653{,}9381000$

$2'3$

$R - r_2 = 0$ $\qquad (R - r_2)^2 = 0$ $\qquad 4Rr_2 = 162154756$

$R - r_1 = 0{,}4$ $\qquad (R - r_1)^2 = 0{,}16$ $\qquad 4Rr_1 = 162144568$

258

432 $\quad 0,$

$$\frac{2\pi f}{R^2}\,\frac{1}{3}(r_2^3 - r_1^3)\,2.67 = 0{,}004448484$$

0,59

$$\frac{258{,}000}{432} = 596{,}19852$$

Felső:

1).

$$P = 0{,}044485 \Big\{ 1 + \left(2{,}5003011 - 11{,}6680717 \sin^2\frac{\vartheta}{2} + 10{,}0012043 \sin^4\frac{\vartheta}{2}\right)\sqrt{162.154756 \sin^2\frac{\vartheta}{2}}$$
$$- \left(2{,}5001440 - 11{,}6679670 \sin^2\frac{\vartheta}{2} + 10{,}0012043 \sin^4\frac{\vartheta}{2}\right)\sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}$$
$$- 36656{,}049584 \sin^2\vartheta \left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log(Br.) \frac{-12734 \sin^2\frac{\vartheta}{2} - \sqrt{162.154756 \sin^2\frac{\vartheta}{2}}}{0{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}} \Big\}$$

Alsó:

2).

$$P' = 6{,}7047649 \Big\{ 1 + \left(0{,}016587978 - 0{,}077414735 \sin^2\frac{\vartheta}{2} + 0{,}066356082 \sin^4\frac{\vartheta}{2}\right)\sqrt{0{,}16 + 162.144568 \sin^2\frac{\vartheta}{2}}$$
$$- \left(0{,}016429899 - 0{,}077309008 \sin^2\frac{\vartheta}{2} + 0{,}066356082 \sin^4\frac{\vartheta}{2}\right)\sqrt{3753{,}824926 + 160.594370 \sin^2\frac{\vartheta}{2}}$$
$$- 243{,}205884954 \sin^2\vartheta \left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log(Br.) \frac{0{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0{,}16 + 162.144568 \sin^2\frac{\vartheta}{2}}}{61{,}268466 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{3753{,}824926 + 160.594370 \sin^2\frac{\vartheta}{2}}} \Big\}$$

0,25111 4786

Felső:

3).

$$P = 5{,}5170199 \Big\{ 1 + \left(0{,}020159162 - 0{,}094081153 \sin^2\frac{\vartheta}{2} + 0{,}080641712 \sin^4\frac{\vartheta}{2}\right)\sqrt{0{,}16 + 162.144568 \sin^2\frac{\vartheta}{2}}$$

0,206629955

$$- \left(0{,}020001296 - 0{,}093975607 \sin^2\frac{\vartheta}{2} + 0{,}080641712 \sin^4\frac{\vartheta}{2}\right)\sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}}$$

$$- 295{,}565051744 \sin^2\vartheta\left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log(Br.) \frac{0{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0{,}16 + 162.144568 \sin^2\frac{\vartheta}{2}}}{50{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}}} \Big\}$$

$2R = 19101$

3).

$R = 6367$

$R^2 = 40.538689$

$R^3 = 258109.832863$

$6R = 38202$

$2R = 12734$

$4R = 25468$

$r_2 = 6366,6$

$r_2^2 = 40.533596$

$r_2^3 = 258061.192294$

$Rr_2 = 40.536142$

$r_1 = 6316,6$

$r_1^2 = \cancel{39.899436}$ $39,899435,56$

$r_1^3 = 252028.777438$ $\cancel{252028}.774658$

$Rr_1 = 40.217792$

$r_2^3 - r_1^3 = 6032.414856$

$\frac{1}{3}(r_2^3 - r_1^3) = 2010.804952$

$R^2 + r_2^2 + Rr_2 = 121.608427$

$R^2 + r_1^2 + Rr_1 = 120.656117$

$2R(6R + r_2) = 567,536552$

$2R(6R + r_1) = 566.899852$

$\frac{2\pi f}{R^2} \frac{1}{3}(r_2^3 - r_1^3) = \underline{1,02759819.10^{-14}} \frac{1}{3}(r_2^3 - r_1^3) = 0,0000206629955$ $(2,06629955)$

$\frac{1}{3} \frac{R^2 + r_2^2 + Rr_2}{\frac{1}{3}(r_2^3 - r_1^3)} = 0,020159162$

$\frac{\frac{2}{3}R(6R + r_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0,094081153$

$\frac{\frac{1}{3}(R^2 + r_1^2 + Rr_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0,020001296$

$\frac{\frac{2}{3}R(6R + r_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0,093975607$

$\frac{\frac{1}{3} 12R^2}{\frac{1}{3}(r_2^3 - r_1^3)} = 0,080641712$

$\frac{R^3}{\frac{1}{3}(r_2^3 - r_1^3)} = 128,361444$ $(295,565057744$

$R - r_2 = 0,4$

$R - r_1 = 50,4$

$(R - r_2)^2 = 0,16$

$(R - r_1)^2 = \cancel{2036,16}$ $2540,16$

$4Rr_2 = 162,144568$

$4Rr_1 = 160,871169$

504
504

$\frac{2\pi f}{R^2} \frac{1}{3}(r_2^3 - r_1^3) d = 0,0000557701993$

0958558 42

$$\begin{array}{r} 252028.771121 \\ + \quad 3537 \\ \hline 774658 \end{array}$$

120 1298 = 0,0
1200

$R = 6367$

$R^2 = 40.538689$

$R^3 = 258109.832863$

$r_1 = 6252{,}9$

$r_1^2 = 39.098758$

$r_1^3 = 244480.623898$

$Rr_1 = 39.812214$

$r_2 = 6366{,}6$

$r_2^2 = 40.533596$

$r_2^3 = 258061.\cancel{192294}\ 189493$

$Rr_2 = 40.536142$

$\frac{1}{3}(r_2^3 - r_1^3) = \cancel{4526.856132}\ 4526{,}855198$; $R^2 + r_2^2 + Rr_2 = 121.608427$ $\quad 2R(6R+r_2) = 567.536552$

$r_2^3 - r_1^3 = 13580{,}565595$ $\quad R^2 + r_1^2 + Rr_1 = 119.449661$ $\quad 2R(6R+r_1) = 566.088697$

$2\pi f = 416{,}574834\ 10^{-9}$

$12R^2 = 486.464268$

$$\frac{2\pi f}{R^2}\,\frac{1}{3}(r_2^3 - r_1^3) = 2\pi f\ 111{,}667551 = 46517{,}891\ 10^{-9} = 0{,}0000\cancel{4{,}651789}\ 4{,}651788255$$

$$\frac{\frac{1}{3}(R^2 + r_2^2 + Rr_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}0089545906\ ; \qquad \frac{\frac{2}{3}R(6R+r_2)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}041790339$$

$$\frac{\frac{1}{3}(R^2 + r_1^2 + Rr_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}0087956707\ ; \qquad \frac{\frac{2}{3}R(6R+r_1)}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}0416837275$$

$$\frac{\frac{1}{3}\,12R^2}{\frac{1}{3}(r_2^3 - r_1^3)} = 0{,}0358206128 \qquad \frac{R^3}{\frac{1}{3}(r_2^3 - r_1^3)} = 57{,}0174\cancel{59}\ 04$$

$4Rr_2 = 162.144568$

$4Rr_1 = 159.248856$

$R - r_2 = 0{,}4 \qquad (R - r_2)^2 = 0{,}16$

$R - r_1 = 114{,}1 \qquad (R - r_1)^2 = 13018{,}81$

$$\binom{n}{2} = \frac{\frac{1}{2}(1 - \frac{1}{2})}{2}$$

$$\frac{2\pi f}{R^2}\,\frac{1}{3}(r_2^3 - r_1^3)\,\underbrace{\frac{0{,}4}{113{,}7}\,2{,}67}_{0{,}00939314} = 0{,}0436949266$$

Alsó:

$$\varrho = 0{,}0436949\left\{1 + \left(0{,}008954591 - 0{,}041790339\sin^2\frac{\vartheta}{2} + 0{,}035820613\sin^4\frac{\vartheta}{2}\right)\cdot\right.$$

$$\begin{array}{r} 114{,}1 \\ 2{,}18017540 6 \\ \hline 111{,}919824594 \end{array}$$

$r = 6316{,}6$

$r^2 = 39.899436$

$r^3 = 252028.777428$

$0{,}000171209 \qquad 0{,}0000029312 5$

Felső:

$$10^9 P = 2{,}7437 \Big\{ 16.213523 + \left(13.512896 + 13.512896\cos\vartheta + 13.512896\left(3\cos^2\vartheta - 2\right)\right)\sqrt{81.077378 - 81.077378\cos\vartheta}$$

$$- \left(13.511199 + 13.512047\cos\vartheta + 13.512896\left(3\cos^2\vartheta - 2\right)\right)\sqrt{81.072285 - 81.072285\cos\vartheta}$$

$$- 594323.694558\cos\vartheta\sin^2\vartheta \log(Br.) \frac{6367 - 6367\cos\vartheta + \sqrt{81.077378 - 81.077378\cos\vartheta}}{6366{,}6 - 6367\cos\vartheta + \sqrt{81.072285 - 81.072285\cos\vartheta}} \Big\}$$

Alsó:

$$10^9 P' = 0{,}0096524189 \Big\{ 4526.856132 + \left(13.511199 + 13.512047\cos\vartheta + 13.512896\left(3\cos^2\vartheta - 2\right)\right)\sqrt{81.072285 - 81.072285\cos\vartheta}$$

$$- \left(13.032919 + 13.270738\cos\vartheta + 13.512896\left(3\cos^2\vartheta - 2\right)\right)\sqrt{79.637447 - 79.624429\cos\vartheta}$$

$$- 594323.694558\cos\vartheta\sin^2\vartheta \log(Br.) \frac{6366.6 - 6367\cos\vartheta + \sqrt{81.072285 - 81.072285\cos\vartheta}}{6252{,}9 - 6367\cos\vartheta + \sqrt{79.637447 - 79.624429\cos\vartheta}} \Big\}$$

$r_2 = R = 6367.10^5$ $r_1 = 6366,6.10^5$ $s = 2,67$ $f = 66,3\ 10^{-9}$ $\sin f = 416,574834\ 10^{-9}$ Hayford

Felső:

$$P = \overset{0,044487398}{\cancel{0,044485}} \Big\{ 1 + \Big(2,500\overset{157103}{\cancel{3011}} - 11,668\overset{7399812}{\cancel{0717}} \sin^2\frac{\vartheta}{2} + 10,\overset{000628410}{\cancel{0012043}} \sin^4\frac{\vartheta}{2}\Big)\sqrt{162.154756 \sin^2\frac{\vartheta}{2}}$$

$s = 2,67$

$$- \Big(2,500\overset{000000}{1440} - 11,667\overset{295091}{\cancel{9670}} \sin^2\frac{\vartheta}{2} + 10,\overset{000628410}{\cancel{0012043}} \sin^4\frac{\vartheta}{2}\Big)\sqrt{0,16 + 162.14456\overset{9}{8} \sin^2\frac{\vartheta}{2}}$$

$f = 66,3\ 10^{-9}$

$\cancel{\frac{f}{R^2} = 1,0275981\ 10^{-14}}$

$$- 3665\cancel{6},\overset{3,938100000}{\cancel{049584}} \sin^2\vartheta \Big(1 - 2\sin^2\frac{\vartheta}{2}\Big) \log(Br) \frac{-12734 \sin^2\frac{\vartheta}{2} - \sqrt{162.154756 \sin^2\frac{\vartheta}{2}}}{0,4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0,16 + 162.14456\overset{9}{8} \sin^2\frac{\vartheta}{2}}} \Big\}$$

$\cancel{\sin f = 416,574834}$ (10^{-9}) Hayford $r_2 = 6366,6\ 10^{+5}$ $r_1 = 6252,9\ 10^5$ $s = 0,009424707.$

Alsó: Hayford

$$P' = 0,0444\overset{7398}{\cancel{85}} \Big\{ 1 + \Big(0,00895459\overset{2}{\cancel{7}} - 0,0417903\overset{46}{\cancel{39}} \sin^2\frac{\vartheta}{2} + 0,03582061\overset{8}{\cancel{7}} \sin^4\frac{\vartheta}{2}\Big)\sqrt{0,16 + 162.14456\overset{9}{8} \sin^2\frac{\vartheta}{2}}$$

$$- \Big(0,00879563\overset{2}{\cancel{7}} - 0,0416837\overset{34}{\cancel{28}} \sin^2\frac{\vartheta}{2} + 0,03582061\overset{8}{\cancel{7}} \sin^4\frac{\vartheta}{2}\Big)\sqrt{13018,81 + 159.248856 \sin^2\frac{\vartheta}{2}}$$

$s =$

$$- 13\cancel{7},288\overset{26422}{\cancel{404}} \sin^2\vartheta \Big(1 - 2\sin^2\frac{\vartheta}{2}\Big) \log(Br) \frac{0,4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0,16 + 162.14456\overset{9}{8} \sin^2\frac{\vartheta}{2}}}{114,1 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{13018,81 + 159.248856 \sin^2\frac{\vartheta}{2}}} \Big\}$$

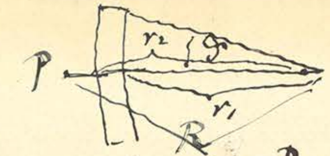
Alsó Eötvös $r_2 = 6316,6.10^5$ $r_1 = 6305,730878.10^5$ $s = 0,1$

$$P' = 0,044487398 \Big\{ 1 + \Big(0,092899569 - 0,436487107 \sin^2\frac{\vartheta}{2} + 0,374555365 \sin^4\frac{\vartheta}{2}\Big)\sqrt{2540,16 + 160.871169 \sin^2\frac{\vartheta}{2}}$$

$$- \Big(0,092740653 - 0,436380542 \sin^2\frac{\vartheta}{2} + 0,374555365 \sin^4\frac{\vartheta}{2}\Big)\sqrt{3753,905311 + 160.594356 \sin^2\frac{\vartheta}{2}}$$

$$- 1372,806712152 \sin^2\vartheta \Big(1 - 2\sin^2\frac{\vartheta}{2}\Big) \log Br. \frac{50,4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{2540,16 + 160.871169 \sin^2\frac{\vartheta}{2}}}{61,269122 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{3753,905311 + 160.594356 \sin^2\frac{\vartheta}{2}}} \Big\}$$

Körhatáru gömbhéj darab Potenciálja tengelyének külső pontjában.



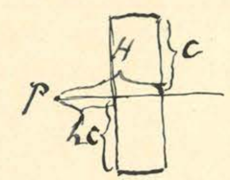
$$\frac{V}{2\pi f\sigma} = \frac{1}{3R}\left(R^2-2Rr_2\cos\vartheta+r_2^2\right)^{\frac{3}{2}} + \frac{1}{2}\cos\vartheta\left(r_2-R\cos\vartheta\right)\sqrt{R^2-2Rr_2\cos\vartheta+r_2^2} - r_2^2\left(\frac{1}{2}-\frac{r_2}{3R}\right) + \frac{R^2}{2}\cos\vartheta\sin^2\vartheta\,\log\frac{r_2-R\cos\vartheta+\sqrt{R^2-2Rr_2\cos\vartheta+r_2^2}}{r_1-R\cos\vartheta+\sqrt{R^2-2Rr_1\cos\vartheta+r_1^2}}$$

$$-\frac{1}{3R}\left(R^2-2Rr_1\cos\vartheta+r_1^2\right)^{\frac{3}{2}} - \frac{1}{2}\cos\vartheta\left(r_1-R\cos\vartheta\right)\sqrt{R^2-2Rr_1\cos\vartheta+r_1^2} + r_1^2\left(\frac{1}{2}-\frac{r_1}{3R}\right)$$

$$\frac{V}{2\pi f\sigma} = \left(\frac{1}{3}r_2\sin^2\frac{\vartheta}{2}+\frac{R}{2}\sin^2\vartheta-\frac{R^2+Rr_2-2r_2^2}{6R}\right)\sqrt{(R-r_2)^2+4Rr_2\sin^2\frac{\vartheta}{2}} + \frac{r_2^3-r_1^3}{3R} - \frac{1}{2}\left(r_2^2-r_1^2\right) + \frac{1}{2}R^2\sin^2\vartheta\left(1-2\sin^2\frac{\vartheta}{2}\right)\log\frac{(R-r_2)-2R\sin^2\frac{\vartheta}{2}-\sqrt{(R-r_2)^2+4Rr_2\sin^2\frac{\vartheta}{2}}}{(R-r_1)-2R\sin^2\frac{\vartheta}{2}-\sqrt{(R-r_1)^2+4Rr_1\sin^2\frac{\vartheta}{2}}}$$

$$-\left(\frac{1}{3}r_1\sin^2\frac{\vartheta}{2}+\frac{R}{2}\sin^2\vartheta-\frac{R^2+Rr_1-2r_1^2}{6R}\right)\sqrt{(R-r_1)^2+4Rr_1\sin^2\frac{\vartheta}{2}}$$

Körkorong Potenciálja



$H - h = D$

$$\frac{V}{2\pi f\sigma} = -\frac{H^2-h^2}{2} + \frac{H}{2}\sqrt{H^2+c^2} - \frac{h}{2}\sqrt{h^2+c^2} + \frac{c^2}{2}\log\frac{H+\sqrt{c^2+H^2}}{h+\sqrt{c^2+h^2}}$$

$$\frac{P}{2\pi f\sigma} = (H-h) + \sqrt{c^2+h^2} - \sqrt{c^2+H^2}$$

Felső

$r_2 = R = 6367 \cdot 10^5 \qquad r_1 = 6366{,}6 \cdot 10^5 \qquad f = 66{,}3 \cdot 10^{-9} \qquad 2\pi f = 416{,}574834 \cdot 10^{-9}$

Ha a felsőre $\sigma = 2{,}67$
az alsóra $\sigma = 0{,}1$
akkor is [illegible]

$$\frac{V}{4165{,}748346\,\sigma} = \left(2122{,}33333 \sin^2\frac{\vartheta}{2} + 3183{,}5 \sin^2\vartheta - 0\right)\sqrt{162.154756 \sin^2\frac{\vartheta}{2}} - 0{,}079985$$

$$-\left(2122{,}20000 \sin^2\frac{\vartheta}{2} + 3183{,}5 \sin^2\vartheta - 0{,}199963\right)\sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}$$

$$+ 20.269345 \sin^2\vartheta \left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log^{+)} \frac{-12734 \sin^2\frac{\vartheta}{2} - \sqrt{162.154756 \sin^2\frac{\vartheta}{2}}}{0{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{0{,}16 + 162.144569 \sin^2\frac{\vartheta}{2}}}$$

Alsó Eötvös

$r_2 = 6316{,}6 \cdot 10^5 \qquad r_1 = 6305{,}730878 \cdot 10^5$

$$\frac{V}{4165{,}748346} = \left(2105{,}533333 \sin^2\frac{\vartheta}{2} + 3183{,}5 \sin^2\vartheta - 25{,}067012\right)\sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}} - 601{,}5345$$

$$-\left(2101{,}910293 \sin^2\frac{\vartheta}{2} + 3183{,}5 \sin^2\vartheta - 30{,}438040\right)\sqrt{3753{,}905311 + 160.594356 \sin^2\frac{\vartheta}{2}} +$$

$$+ 20.269345 \sin^2\vartheta \left(1 - 2\sin^2\frac{\vartheta}{2}\right) \log^{+)} \frac{50{,}4 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{2540{,}16 + 160.871169 \sin^2\frac{\vartheta}{2}}}{61{,}269122 - 12734 \sin^2\frac{\vartheta}{2} - \sqrt{3753{,}905311 + 160.594356 \sin^2\frac{\vartheta}{2}}}$$

+) log. naturalis