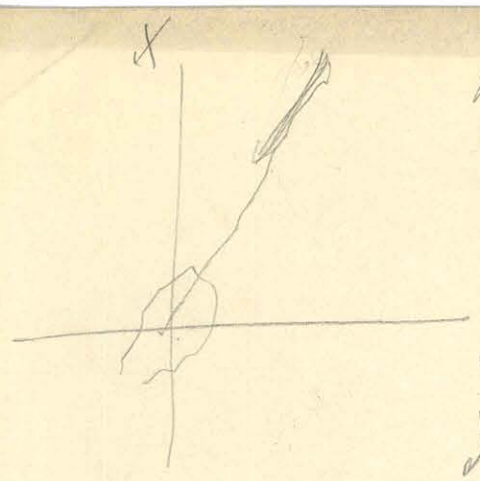
Ms 5102/3-4. Eötvös Loránd jegyzetei. Mágnesség

1915 Juliusban eltérő

a Könyvtári [illegible]

Mágnesesanyag vizsgálat



Mérőmarkolat A B.

X y

$$A y - B X = F.$$

$$X = J \cos\alpha \qquad y = J \sin\alpha$$

$$X = H + J\cos\alpha \qquad y = J \sin\alpha.$$

$$A = M\cos\mu + V_k X + G\left(J + H\cos\alpha\right)\cos(\alpha-\gamma)\cos\gamma + L\left(J + H\cos\alpha\right)\cos 2(\alpha-\lambda)\cos\lambda$$

$$B = M\sin\mu + V_k y + G\left(J + H\cos\alpha\right)\cos(\alpha-\gamma)\sin\gamma + L\left(J + H\cos\alpha\right)\cos 2(\alpha-\lambda)\sin\lambda.$$

általános

$$A = M\cos\mu + V_k(H + J\cos\alpha) + G(J + H\cos\alpha)\cos(\alpha-\gamma)\cos\gamma + L(J + H\cos\alpha)\cos 2(\alpha-\lambda)\cos\lambda$$

$$B = M\sin\mu + V_k J\sin\alpha + G(J + H\cos\alpha)\cos(\alpha-\gamma)\sin\gamma + L(J + H\cos\alpha)\cos 2(\alpha-\lambda)\sin\lambda$$

ha $H = 0$. akkor.

$$F = JM\cos\mu\sin\alpha + V_k J^2\sin\alpha\cos\alpha + GJ^2\cos(\alpha-\gamma)\cos\gamma\sin\alpha + LJ^2\cos 2(\alpha-\lambda)\cos\lambda\sin\alpha$$
$$- JM\sin\mu\cos\alpha - V_k J^2\sin\alpha\cos\alpha - GJ^2\cos(\alpha-\gamma)\sin\gamma\cos\alpha - LJ^2\cos 2(\alpha-\lambda)\sin\lambda\cos\alpha$$

$$F = JM\left(\sin(\alpha-\mu) + \frac{1}{2}GJ\sin 2(\alpha-\gamma) + LJ\cos 2(\alpha-\lambda)\sin(\alpha-\lambda)\right) = \tau\varepsilon$$
$$= \tau\frac{n-n_0}{2L}$$

$J = 2{,}0004\,i$ i angeben $\tau = 0{,}494$

$2L = 1852$

$\alpha_1 = 0 \quad - JM \sin\mu \quad \cdots \quad -\frac{1}{2} S J^2 \sin 2\gamma - L J^2 \cos 2\lambda \sin\lambda$

$\alpha_2 = 45 \quad -\frac{1}{\sqrt{2}} JM \sin\mu + \frac{1}{\sqrt{2}} JM \cos\mu + \frac{1}{2} S J^2 \cos 2\gamma - \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \sin\lambda + \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \cos\lambda$

$\alpha_3 = 90 \quad \cdots \quad + JM \cos\mu + \frac{1}{2} S J^2 \sin 2\gamma \quad \cdots \quad - L J^2 \cos 2\lambda \cos\lambda$

$\alpha_4 = 135 \quad + \frac{1}{\sqrt{2}} JM \sin\mu + \frac{1}{\sqrt{2}} JM \cos\mu - \frac{1}{2} S J^2 \cos 2\gamma - \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \sin\lambda - \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \cos\lambda$

$\alpha_5 = 180 \quad + JM \sin\mu \quad \cdots \quad -\frac{1}{2} S J^2 \sin 2\gamma + L J^2 \cos 2\lambda \sin\lambda$

$\alpha_6 = 225 \quad + \frac{1}{\sqrt{2}} JM \sin\mu - \frac{1}{\sqrt{2}} JM \cos\mu + \frac{1}{2} S J^2 \cos 2\gamma + \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \sin\lambda - \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \cos\lambda$

$\alpha_7 = 270 \quad \cdots \quad - JM \cos\mu + \frac{1}{2} S J^2 \sin 2\gamma \quad \cdots \quad + L J^2 \cos 2\lambda \cos\lambda$

$\alpha_8 = 315 \quad - \frac{1}{\sqrt{2}} JM \sin\mu - \frac{1}{\sqrt{2}} JM \cos\mu - \frac{1}{2} S J^2 \cos 2\gamma + \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \sin\lambda + \frac{1}{\sqrt{2}} L J^2 \sin 2\lambda \cos\lambda$

<u>Akkor egyenrangú aktív ellenállás végű árnyolás</u>

$$S J^2 \sin 2\gamma = -\tau(\varepsilon_1 + \varepsilon_5) = +\tau(\varepsilon_3 + \varepsilon_7)$$

$$S J^2 \cos 2\gamma = +\tau(\varepsilon_2 + \varepsilon_6) = -\tau(\varepsilon_4 + \varepsilon_8)$$

$$2 JM \sin\mu + 2 L J^2 \cos 2\lambda \sin\lambda = +\tau(\varepsilon_5 - \varepsilon_1)$$

$$+\sqrt{2} JM \sin\mu - \sqrt{2} JM \cos\mu + \sqrt{2} L J^2 \sin 2\lambda \sin\lambda - \sqrt{2} L J^2 \sin 2\lambda \cos\lambda = +\tau(\varepsilon_6 - \varepsilon_2)$$

$$-2 JM \cos\mu + 2 L J^2 \cos 2\lambda \cos\lambda = +\tau(\varepsilon_7 - \varepsilon_3)$$

$$-\sqrt{2} JM \sin\mu - \sqrt{2} JM \cos\mu + \sqrt{2} L J^2 \sin 2\lambda \sin\lambda + \sqrt{2} L J^2 \sin 2\lambda \cos\lambda = +\tau(\varepsilon_8 - \varepsilon_4)$$

$$A\,\mathcal{Y} - B\,X$$

$$X = J\cos\alpha \qquad Y = J\sin\alpha$$

$$A = M\cos$$

$$A = M\cos\mu + VkJ\cos\alpha + \mathcal{G}J\cos(\alpha-\gamma)\cos\gamma$$

$$B = M\sin\mu + VkJ\sin\alpha + \mathcal{G}J\cos(\alpha-\gamma)\sin\gamma$$

$$MJ\sin\alpha\cos\mu + VkJ^2\sin\alpha\cos\alpha + \mathcal{G}J^2\cos(\alpha-\gamma)\cos\gamma\sin\alpha$$
$$- MJ\cos\alpha\sin\mu - VkJ^2\sin\alpha\cos\alpha - \mathcal{G}J^2\cos(\alpha-\gamma)\sin\gamma\cos\alpha$$

$$MJ\sin(\alpha-\mu) + \mathcal{G}J^2\cos(\alpha-\gamma)\sin(\alpha-\gamma) = \tau\varepsilon$$

$$MJ\sin(\alpha-\mu) + \tfrac{1}{2}\mathcal{G}J^2\sin 2(\alpha-\gamma) = \tau\varepsilon$$

$$MJ \sin(\alpha - \mu) + \frac{1}{2} G J^2 \sin 2(\alpha - \gamma) = \tau \varepsilon$$

1) $\alpha = 0$ $\quad - MJ \sin\mu + \frac{1}{2} G J^2 \sin 2\gamma = \tau \varepsilon_1$

2) $\alpha = 45$ $\quad -\frac{1}{\sqrt{2}} MJ \sin\mu + \frac{1}{\sqrt{2}} MJ \cos\mu - \frac{1}{2} G J^2 \sin 2\gamma + \frac{1}{2} G J^2 \cos 2\gamma = \tau \varepsilon_2$

3) $\alpha = 90$ $\quad + MJ \cos\mu - \frac{1}{2} G J^2 \sin 2\gamma = \tau \varepsilon_3$

4) $\alpha = 145$ $\quad + \frac{1}{\sqrt{2}} MJ \sin\mu - \frac{1}{\sqrt{2}} MJ \cos\mu + \frac{1}{2} G J^2 \cos 2\gamma - \frac{1}{2} G J^2 \cos 2\gamma = \tau \varepsilon_4$

5) $\alpha = 180$ $\quad + MJ \sin\mu + \frac{1}{2} G J^2 \sin 2\gamma = \tau \varepsilon_5$

6) $\alpha = 225$ $\quad + \frac{1}{\sqrt{2}} MJ \sin\mu - \frac{1}{\sqrt{2}} MJ \cos\mu$

7) $\alpha = 270$ $\quad - MJ \cos\mu - \frac{1}{2} G J^2 \sin 2\gamma = \tau \varepsilon_7$

8

Skálodtávol 1958 cm Üresen:

A tekercs széle 20 cm. távolságban van az eszközöl.

$\varphi = 0°$

1). áram nélkül:

187·2
186·25 187·15 186·70
187·10 186·28 186·69
186·30

2). valósalkozó áram: (4 Ampère)

186,2
188.1 186,25 187·18
186,3 188,10 187·20
188.1

3) Egyirányu áram (+irány) (4A.)

187·0
188·8 187·03 187·92
187·05 188·80 187·93
188·8

4) Egyirányu áram (− irány) (4A.)

187·95
187·20 187·95 187·58
187·95 187·25 187·60
187·30

$\varphi = 45°$

1).

186,2
6,9 186,23 186,57
6,25 186,90 186,58
6,90

2) ~

187·3
6,7 187,30 187·00
7,3 6,70 187·00
6,7

3). +

186,5
9,3 186,6 187·95
6,7 189·13 187·92
8,95

4) −

185,95
9·55 185·98 187·77
6·00 189·48 187·74
9·40

$\varphi = 90°$

1)

186,05
6,80 186,08 186,44
6.10 186,75 186,43
6,70

2) ~

184.1
7.9 184,20 186,05
4,3 7,85 186,08
7.8

3) +

186,7
4,5 186,4 185,45
6,1 4,8 185,45
5,1

186,8
4,7 186,85 185,78
6,9 4,75 185,83
4,8

$\varphi = 135°$

1).

187·30	187·28	186·29
5·30	5·38	186·32
7·25		
5·45		

2) ~

186,9		
4,9	186,85	185·88
6,8	4,93	185·87
4,95		

Meglöktem a távcsövet.

1).

185,75		
6 35	185,78	186,07
5 80	6,33	186,07
6 00		

2) ~

183.9		
7.1	183,95	185,53
4.0	7,05	185,53
7.0		

3) +

188,8		
80,2	188,60	184,40
88,4	80,40	184,40
80,6		

4) −

187.6		
2,4	187,4	184,90
7,2	2,5	184,85
2,6		

$\varphi = 180°$

1).

187.0		
5,8	187,0	186,40
7,0	5,8	186,40
5,8		

2) ~

186,95		
5,90	186,95	186,43
6,95	5,90	186,43
5,90		

3) +

187,30		
5,25	187,28	186,27
7,25	185,33	186,29
5,40		

4) −

185,6		
7,05	185,60	186,33
5,60	187,05	186,33
7,05		

$\varphi = 225°$

1) ü.

186,8		
5,9	186,78	186,34
6,75	185,95	186,35
6,00		

2) ~

187,20		
6.00	187.13	186,57
7.05	186,10	186,58
6.20		

3). +

188,0		
6,6	188,0	187,30
8,0	6,63	187,32
6,65		

4) −

186,10		
8,05	186,15	187·10
6,20	188,03	187.12
8,00		

$\varphi = 270°$

1). ü

188,0
4,8 187,90 186,35
7,8 4,85 186,33
4,9

2) ~

186,3
5,0 186,45 185,73
6,6 5,10 5,85
5,2

3) +

183,2
8,2 3,5 185,85
3,8 8,08 185,94
7,95

4). −

187,4
4,2 187,33 185,77
7,25 184,25 185,75
4,20

$\varphi = 315°$

1).

187,2
5,3 187,15 186,23
7,1 5,25 186,23
5,4

2) ~

186,6
5,9 186,5 186,20
6,4 5,9 186,15
5,9

3) +

184,9
6,6 184,95 185,78
5,0 6,50 185,75
6,4

4) −

187,20
184,00 187,23 185,62
7,25 3,95 185,60
3,90

$\varphi = 0°$

1) ü.

186,90
6,10 186,90 186,50
6,90 186,13 186,52
6,15

2) ~

187,2
6,8 187,18 186,99
7,15 186,80 186,98
6,80

3) +

186,4
88,7 186,50 187,60
6,6 188,70 187,65
8,7

4) −

186,6
8,3 186,65 187,48
6,2 188,25 187,48
8,2

Távolság = 20 cm

2 Stupère

$\varphi = 315°$

1). 2̈

187,9
5,2 187,80 186,50
7,7 185,80 186,50
5,4

2) ~

184,95-
7,90 185,00 186,45-
5,05- 187,88 186,47
7,85-

3) +

185,3
187,2 185,5 186,35-
5,7 187,2 186,45
7,2

4 —

184,65-
7,90 184,73 186,32
4,80 187,85- 186,33
7,80

Távolság = 15 cm

4 Stupère

$\varphi = 315°$

1) 2̈

185,1
188,0 185,20 186,60
185,3 187,98 186,64
7,95-

2) ~

185,7
7,25- 185,70 186,48
5,70 187,25- 186,48
7,25-

3) +

184,35-
6,80 184,35 185,58
4,35- 186,78 185,57
6,75-

4). —

186,1
4,7 186,08 185,39
6,05- 184,68 185,37
4,65-

Vasdrótok párhuzamosan a meridiánnal jún. 4

0·2 Ampère

$\varphi = 0$

1) ñ:

257·70
257·70 255·55 253·63
255·40 251·78 253·59
257·85 255·25 253·60
255·20

2) ∾

253·9
247·1 253·83 250·47
253·75 247·15 250·45
247·20 253·68 250·44
253·60

3). +

240,60
259,25 240,68 249,97
240,75 258,83 249,79
258,40 240,88 249,64
241,00

4) −

257·1
245,4 256,58 250,99
256.05 245,65 250,85
245,90 255,68 250,79
255,20

$\varphi = 45^\circ$

1) ñ

260,75
246,70 260,50 253·60
260,25 246,85 253·58
247,00 260,10 253·55
259.95

2) ∾

313·0
294,95 312,85 303·90
312,70 295,20 304·00
295,65 312,25 303·95
311,80

3) +

303·5
305·05 303·33 304·19
305·15 305·00 304·08
304·95 303·08 304·02
305·00

4) −

302,4
307·8 302,30 305·05
302·2 307·93 305·07
308·05 302.20 305·13
302.20

$\varphi = 90^\circ$

1) ñ:

257·75
249.10 257·60 253·35
257·45 249·20 253·33
249·20 257·03 253·32
257·20

2) ∾

258,2
252,4 258,15 255·28
258,1 252.50 253·30
252,6 258,03 253·32
257,95

3) +

256·1
257,4 256,15 253,78
256,20 257,45 253,83
257,50 256,15 253,83
256,10

4) −

253,2
260,15 253,40 256,78
253,60 260,20 256,90
260,25 253,63 256,94
253,65

φ = 135°

1) ū

256,95
250,00 256,88 253,44
256,80 250,05 253,43
250,10

2) ~

208,6
203,0 208,33 205,67
208,05 203,03 205,54
203,05 208,08 205,57
208,10

3) +

199,25
205,20 199,28 202,24
199,30 205,05 202,18
204,90 199,20 202,05
199,00

4) —

204,0
208,0 204,0 206,0
204,0 208,05 206,03
208,1

φ = 180°

1) ū

252,00
254,70 252,03 253,37
252,05 254,73 253,39
254,75

2) ~

248,3
252,3 248,4 250,35
248,5 252,25 250,38
252,2 248,60 250,40
248,7

3) +

253,80
247,20 253,80 250,50
253,80 247,50 250,65
247,80 253,40 250,60
253,00

4) —

252,15
248,15 252,10 250,13
252,05 248,20 250,13
248,25

φ = 225°

1) ū

250,1
256,7 250,20 253,45
250,3 256,65 253,48
256,6

2) ~

311,2
296,3 311,0 303,65
310,8 296,65 303,73
297,0 310,48 303,74
310,15

3) +

320,1
294,95 320,15 307,55
320,20 294,98 307,59
295,00

4) —

291,0
312,8 291,10 301,95
291,2 312,35 301,78
311,9

$\varphi = 270°$

1)

250,8
256,1 250,8 253,45
250,8 256,08 253,44
256,05

2) ~

252,8
257,95 252,40 250,43
253,00 257,88 250,44
257,80 253,05 250,43
253,10

3) +

261,3
253,3 261,20 257,25
261,1 253,45 257,28
253,60

4) —

247,8
259,1 247,75 253,43
247,7 259,03 253,37
258,95

$315°$

1) ~

250,00
257,05 250,10 253,58
250,20 256,98 253,59
256,90

2) ~

208,3
202,9 208,25 205,58
208,2 202,95 205,58
207,0 208,13 205,57
208,05

3) +

200,1
206,8 200,15 203,48
200,2 206,40 203,30
206,0 200,40 203,20
200,6 206,15 203,38
206,3

4) —

201,35
205,80 201,63 203,72
201,90 205,58 203,74
205,35 202,15 203,75
202,40

Vasdrótdarabok // a meridiánnal jún. 4

0·4 Ampère

$\varphi = 0$

1) ν̈

254·3
257·7 254·35 256·03
254·4 257·60 256·00
257·5

2) ∿

248,25
245,95 248,23 247,09
248,20 245,98 247·09
246,00

3) +

242·2
257·25 242·25 246·75
242·30 257·25 246·78
257·25

4) −

250·25
244·20 250·25 247·23
250·25 244·20 247·23
244·20

$\varphi = 45°$

1). ν̈ :

262·25
249·75 262·08 255·92
261·90 249·88 255·89
250·00

2) ∿

452·95
460·40 452·38 456·39
457·80 461·00 456·40
461·60 451·53 456·57
457·25 461·68 456·47
461·75

3) +

462.0
457·5 462·35 459·93
462·7 456·80 459·75
456·1 462·55 459·33
462·4

4) −

468·1
454·6 466·95 460·78
465·8 454·65 460·23
454·7 466·10 460·40
466·4 454,95 460·68
455·2

Meglökjem a távcsövet

$\varphi = 90°$

1) ν̈ :

252·2
254·9 252·23 253·57
252·25 254·85 253·55
254·80

2) ∿

254·05
272·60 254·40 264·00
254·75 273·25 264·00
272·90 255·03 263·97
255·20

3) +

257,25
263·90 257·48 257·69
251·70 263·83 257·77
263·75 251·88 257·82
252·05

4) −

278·15
259·90 277·98 268·94
277·80 259·55 268·68
259·20 277·75 268·48
277·70 259·45 268·58
259·70

$\varphi = 135°$

1).

264.0
242.8 263.78 253.29
261.45 243.05 253.25
245.20 263.18 253.24
262.90

2) ∾

a tekercs ládája miatt nem észlelhető

3). +

nem észlelhető

4) −

nem észlelhető

$\varphi = 180°$

1) ∾:

257.1
255.95 251.15 253.55
257.20 255.95 253.58
255.95

2) ∾

255.7
257.6 255.88 243.89
256.05 257.63 243.84
257.25 236.33 243.84
256.60

3) +

247.00
259.65 246,60 243.13
246.20 239.95 243.08
240,25

4) −

244.3
241.8 244.43 243.12
244.55 241.90 243.23
242.00 244.78 243.39
245.00 241.65 243.33
241.20

$\varphi = 225°$

1) ∾

257.95
249.25 257.88 253.62
257.80 249.53 253.67
249.70 257.68 253.69
257.55

2)

nem észlelhető

3) +

nem észlelhető.

4) −

455 körül

$\varphi = 270°$

1). 2̄

253.05̄
254.20 253.08 253.64
253.10 254.15̄ 253.63
254.10

2) ∼

273.0
258.9 272.90 265.90
272.8 259.08 265.95
259.25̄

3). +

261.25̄
274.20 260.03 267.62
260.80 274.05̄ 267.43
270.90 260.75̄ 267.33
260.70

4) −

268,95̄
256.80 269.33 263.07
269.70 256.85 263.28
256,90 269.70 263.30
269,70 256.90 263.30
256,90 269.40 263.15
269.10

$\varphi = 315°$

1) 2̄

259.3
247.9 259.25̄ 253.58
259.2 247.65̄ 253.43
247.4 259.00 253.20
258.8

2). ∼

60,25̄
45,70 60.03 52.87
59.80 46.45̄ 53.13
47.10 60,20 53.70
60.60 47.10 53.85̄
47.00

3) +

57.3
47.7 57.6 49.65
57.9 47.8 49.85̄
48.9 57.9 49.90
57.9

4) —

62.5̄
46.9 62.55̄ 54.73
62.6 46.85̄ 54.73
46.8 62.70 54.75̄
62.8

50 gr. os darab, felirás elején

Tekercs vége 20 cm.re.

Áram intenzitás 4 A.

$\varphi = 0°$

1) Áram nélkül

252,95
248,00 252,95 250,48
252,95 248,05 250,50
248,10

2) Váltakozó áram

255,95
257,30 255,93 253,62
255,90 251,33 253,62
257,35

3) Áram iránya +

314,75
334,90 315,23 325,07
315,70 334,65 325,18
334,40

4) Áram iránya −

178,4
181,5 178,4 179,95
178,4 181,4 179,90
181,3

$\varphi = 45°$

1) ü

246,8
252,95 246,83 249,89
246,85 252,98 249,92
253,00

2) ∿

0,25
9,00 0,65 4,83
1,05 10,10 5,58
11,20 −1,03 5,12
−3,00

3) +

226,05
228,70 226,08 227,39
226,10 228,70 227,40
228,70

4) −

271,7
268,95 271,48 270,22
271,25 268,95 270,10
268,95 271,18 270,07
271,10

$\varphi = 90°$

1) ü

253,8
246,3 253,78 250,04
253,75 246,33 250,04
246,35

2) ∿

346,8
165,3 345,8 255,55
344,8 166,3 255,55
167,3

3) +

154,15
149,95 153,93 151,94
153,70 150,15 151,93
150,35

4) −

338,2
349,1 338,13 343,62
338,05 348,53 343,29
347,95 338,05 343,00
338,05 347,55 342,80
347,15

$\varphi = 135°$

1) $\tilde{u}$

166,95
332,10 167,63 249,87
168,00 331,45 249,88
330,80

2) $\sim$

490,6
454,8 492,15 473,48
490,7 453,80 473,75
452,8 492,25 472,55
490,8

3) $+$

116,90
148,95 117,48 133,22
118,05 148,88 133,47
148,80 118,98 133,89
119,90

4) $-$

363,0
379,4 362,5 370,95
362,0 378,7 370,35
378,0 362,55 370,18
362,7

$\varphi = 180°$

1) $\tilde{u}$

243,35
257,00 243,43 250,22
243,50 256,98 250,24
256,95

2) $\sim$

252,55
262,25 252,68 257,47
252,80 262,13 257,47
262,00

3) $+$)

177,8
186,0 178,03 182,02
178,25 186,05 182,15
186,10

4) $-$

323,25
329,95 323,28 326,62
323,00 329,95 326,63
329,95

$\varphi = 225°$

1) $\tilde{u}$

258,9
241,7 258,6 250,25
258,7 241,8 250,25
241,9

2) $\sim$

0,9
6,25 2,20 4,23
3,5 7,13 5,32
8,00 0,15 4,08
−3,2

3) $+$)

270,95
261,65 270,95 266,30
270,95 261,83 266,38
262,00

4) $-$

241,00
227,00 240,80 233,90
240,60 227,25 233,98
227,70

$\varphi = 270°$

1). $\tilde{u}$

245,90		
254,90	245,90	250,40
245,90	254,83	250,37
254,75		

2) $\sim$

154,8		
247,0	155,8	251,40
156,8	346,05	251,43
345,1		

3) +

288,75		
393,95	290,73	342,34
292,70	392,58	342,64
391,20	294,25	342,73
295,80		

4) −

154,20		
145,00	154,10	149,55
154,00	145,23	149,62
145,45		

$\varphi = 315°$

1). $\ddot{u}$

231,25		
269,00	231,48	250,24
231,70	268,85	250,28
268,70		

2). $\sim$

497,9		
505,5	498,10	507,00
498,3	506,95	507,63
508,0	496,80	507,40
495,3		

3). +

354,3		
384,6	354,78	369,69
355,25	384,15	369,20
383,70		

4) −

108,8		
143,5	109,45	126,48
110,1	142,70	126,40
141,9		

Hosszu Turmalyn

A tekercs vége 20 cm. távolságban az esőkötől. 4 Amperes

$\varphi = 0$

1). Áram nélkül

194·8
306·0 195·8 250·90
196·8 304·95 250·88
303·9

2) Váltakozó árammal

216,0
285,9 216,65 251·28
217,0 285·30 257·30
284·7

3) + irányu árammal

203,2
299.6 204·15 251·88
205.1 298·70 251·90
297·8

4) − irányú árammal

209·2
293·2 210·05 251·63
210·9 292·45 251·68
291·7

$\varphi = 45°$

1) ü:

278,55
220,70 277·98 250·84
277·40 224·23 250·82
224·75

2) ∿

233,4
271.0 233,73 252,07
234.05 270,65 252,35
270,30

3) +

229,2
277,05 229,7 253·38
230,2 276,58 253·39
276,10

4) −

274,3
232,25 274,0 253·13
273,7 232,7 253·20
233,15

$\varphi = 90°$

1) ü:

237,2
263,85 237,50 250·68
237,80 263,58 250,69
263,30

2) ∿

259,10
241,90 258,95 250,43
258,80 242,05 250.43
242,20

3) +

237,75
262,05 237,93 249·99
238,10 261,88 249,99
261,70

4) −

261,30
239,15 261,10 250,13
260,90 239,35 250,13
239,55

$\varphi = 135^\circ$

1). $\bar{u}$:

257,05⁻
244,00 256,93 250,47
256,80 244,13 250,47
244,25

2) $\sim$

244,90
252,70 244,95⁻ 248,83
245,00 252,60 248,80
252,50

3) +

254,65⁻
241,20 254,45⁻ 247,83
254,25⁻ 241,25 247,75⁻
241,30

4) −

257,70
244,40 251,50 247,95⁻
257,30 244,45⁻ 247,88
244,50

$\varphi = 180^\circ$

1). $\bar{u}$:

254,9
247,0 254,83 250,92
254,75 247,05 250,90
247,10

2) $\sim$

248,0
253,35⁻ 248,05⁻ 250,70
248,10 253,28 250,69
253,20

3). +

247,0
254,3 247,10 250,90
247,2 254,25 250,73
254,2

4).

254,05⁻
247,60 254,03 250,82
254,00 247,68 250,84
247,75⁻

$\varphi = 225^\circ$

1). $\bar{u}$:

253,2
248,8 253,18 250,99
253,05 248,85 250,95⁻
248,90

2) $\sim$

250,60
253,95⁻ 250,68 252,32
250,75⁻ 253,88 252,32
253,80

3) +

255,65⁻
250,30 255,58 252,94
255,50 250,38 252,94
250,45⁻

4) −

250,2
255,55⁻ 250,28 252,92
250,25⁻ 255,48 252,92
255,40

$\varphi = 270°$

1) $\vec{u}$

252,05
248,40 252,03 250,22
252.00 248,45 250,23
248,60

2) $\vec{v}$

257,2
249,2 257,15 250,18
257,1 249,23 250,17
249,25

3) +

248,1
257,9 248,15 250,03
248,2 257,80 250,00
257,7

4) −

248,2
257.8 248,20 250,02
248,25 257,75 250,00
257.70

$\varphi = 315°$

1). $\vec{u}$

257,15
249,55 257,13 250,34
257,10 249,55 250,33
249.55

2) $\vec{v}$

247,1
257,0 247,10 249,07
247,15 250,90 249,03
250,80

3). +

247,2
249.8 247,20 248,50
247,2 249.80 248,50
249.8

4) −

249,75
247,50 249,70 248,50
249,65 247,30 248,48
247,30

Ro Sárga reilap, lapjával a meridiánra ⊥-en

$\varphi = 0°$

1) üresen

269.0
270.1 269.05 271.08
269.1 270.05 271.08
270.0

2) + irány

268,8
275,9 268,83 272,37
268,85 275,85 272,35
275,8

3) − irány

269,25
274,70 269.28 271,99
269.20 274.65 271,98
274.60

$\varphi = 45°$

1) h

268,5
270.6 268,6 271,10
268,7 270.53 271,12
270.45

2) +

270,2
274,4 270,25 272,33
270,0 274.35 272,33
274.2

3) − irány

270.65
270,70 270.68 272.19
270.70 270,75 272,23
270,80

$\varphi = 90°$

1) hrcs

268,2
270.5 268,25 270,88
268,0 273,43 270,87
270.35

2) +

272,9
267,45 272,80 270,13
272,70 267,48 270,09
267,50

3) −

272.65
268,00 272,53 270,27
272,40 268,00 270,20
268,00 272,25 270,18
272,20

$\varphi = 135^{-0}$

1). $\ddot{u}$:

272,15
269,80 272,10 270,95-
272,05- 269,85- 270,95-
269,90

2) +

271,95-
266,80 271,85- 269,33
271,75 266,85 269,20
266,90

3) −

272,00
266,90 271,98 269,44
271,95- 266,95 269,45-
267,00

$\varphi = 180^{\circ}$

1). $\ddot{u}$:

272,00
269,20 272,90 271,10
272,80 269,20 271,05-
269,20 272,80 271,05-
272,80

2) +

269,70
272,65- 269,70 271,18
269,70 272,65 271,18
272,65

3) −

270,10
272,20 270,10 271,20
270,10 272,28 271,19
272,25-

$\varphi = 225^{-0}$

1) $\ddot{u}$.

Somoskői kő ✠ junius 5-én

↑-al északra. 2 Ampère.

$\varphi = 0$

1). üres

254.7
258,4 257.68 256.54
254.65 258.00 256.48
258,20

2) +

139,8
132,7 139.85 136.28
139.9 132,7 136.30
132.7

4) ~

262,25
249.50 262,20 255.87
262,20 249,73 255.97
249.95 262,65 256.00
261.90

3) −

444.0
446.1 443,25 444,68
442.5 446,20 444.35
446,2 443,00 444.65
442.5

$\varphi = 45^\circ$

1). üres

253.80
259,45 253.90 256,68
254.00 259,20 256,67
259.00

4) ~

252,4
264,25 252,55 258.40
252,70 264,10 258.42
264.00

8) +

426,2
425,4 426,60 431,00
426,9 425,25 431.08
425,1

3) −

−8,9
+2,1 −8,85 −3,38
−8,8 +1.00 −3,90
−0,1 −7,8 −3,95
−6.8

$\varphi = 90^\circ$

1) ≈

260,05
252,95 260,00 256,48
259,95 250.00 256,48
250.05

1 Ampère

$\varphi = 0$

1)
253,25
260,15 253,25 256,75
253,25 260,08 256,69
260 00

2)
258,7
254,1 258,65 256,38 +0,35
258,6 254,15 256,38
254,2

3) +
195,7
190,0 195,7 192,85
195,7 190,0 192,85
190,0

4)
338,6
333,2 338,45 335,83
338,0 333,40 335,85
333,6 338,10 335,85
337,9

$\varphi = 45°$

1)
259,35
253,90 259,25 256,58
259,15 253,95 252,54
253,95

2) ~
260,0
253,75 260,00 256,88
260,00 253,83 256,92 +0,4
253,90

3) +
249,55
243,90 249,58 246,74
249,60 243,80 246,70
243,70

4)
143,4
149,95 143,78 146,87
144,15 149,88 147,02 +0,35
149,80 144,20 147,00
144,25

$\varphi = 90°$

1)
248,25
264,40 248,40 256,40
248,55 264,30 256,43
264,20

2) ~
249,25
264,00 249,53 256,79
249,40 263,85 256,83 +0,4
263,70

3) + 457,0
442,7 457,4 450,05
457,5 442,75 450,13
442,8

4) –
40,70
52,80 41,08 46,94
41,45 52,50 46,98
52,20 41,73 46,87
42,00

$\varphi = 135°$

1).

252,2
260,2 252,40 256,30
252,60 260,20 256,40
260,20 252,75 256,48
252,90

2) ~

252,25
259,40 252,45 255,93
252,65 259,35 256,00
259,30 252,68 255,99
252,70

-0,4

3) + 1 Ampère

467,7
450,3 467,85 459,08
468,0 450,45 459,23
450,6

4) – 1 Amperel nem elérhető, Ezen ezt

0,75 Ampère

115,9
107,5 116,30 111,90
116,7 107,65 112,18
107,8

$\varphi = 180°$

1) 248,9
264,1 249,0 256,55
249,10 263,95 256,53
263,80

2) ~

259,55
252,90 259,45 256,17
259,20 252,95 256,13
253,00

-0,4

3) +

337,85
353,80 337,85 345,83
337,85 353,75 345,80
353,70

4) –

164,8
200,7 165,03 182,87
165,25 200,35 182,80
200,00

$\varphi = 225°$

1)

254,00
259,00 254,05 256,58
254,10 258,90 256,50
258,80

2) ~

254,80
258,00 254,95 256,48
255,10 258,00 256,55
258,00

0

3) +

152,2
158,0 157,73 154,87
151,25 157,98 154,62
157,95 151,28 154,62
151,20

4) –

343,0
336,2 342,98 339,59
342,95 336,23 339,59
336,25

$\varphi = 270°$

1) 2⁻

258,6
255,1 258,48 256,79
258,35 255,10 256,83
255,1 258,22 25,72
258,20

2) ∾

253,95
260,00 253,98 256,99
254,00 260,00 257,00 +0,3
260,00

3) . +

34,8
43,3 34,85 39,08
34,9 43,15 39,03
43,0

4) —

457,75
488,90 457,78 458,34
457,80 458,95 458,38
459,00

$\varphi = 315°$

1)

259,00
254,25 258,88 256,57
258,75 254,38 256,57
254,50

2) ∾

254,75
258,20 254,75 256,53
254,75 258,15 256,45
258,00 254,88 256,44
255,00

3) +

60,00
71,20 60,05 65,63
60,10 71,58 65,84
71,95 60,10 66,03
60,10 71,98 66,04
72,00

4) —

456,25
476,25 456,93 466,64
457,50 476,18 466,84
476,00 457,85 466,93
458,20

Somoskői kő. ✡ jún. 8.

Demagnetizálva

2 Ampère

$\varphi = 0°$

1) Áram nélkül:

254·8
263·7 254·9 259·30
255·0 263·65 259·33
263·6

2) + irányú

237·05
229·60 237·03 233·32
237·00 229·70 233·35
229·80

3) − irányú

285·8
290·6 285·78 288·19
285·75 290·60 288·18
290·60 285·75 288·18
285·75

$\varphi = 45°$

1). ü:

257·25
261·80 257·25 259·53
257·25 261·75 259·50
261·70

2) +

333·0
340·2 332·9 336·55
332·8 340·13 336·47
340·05 332·85 336·45
332·90

3) −

179·3
176·5 179·25 177·88
179·2 176·70 177·95
176·9 179·15 178·03
179·1

$\varphi = 90°$

1). ü:

257·7
260·9 257·7 259·30
257·7 260·85 259·28
260·8

2) +

391·9
384·95 391·65 388·30
391·40 384·63 388·02
384·30 391·30 387·80
391·20

3) −

124·2
134·95 124·5 129·73
124·80 124·68 129·74
124·40 125·00 129·70
125·20

$\varphi = 135°$

1). $\ddot{u}$:

262.7
255.5 262.68 259.09
262.65 255.60 259.10
255.70

2) +

366.35
372.55 366.53 369.54
366.70 372.68 369.69
372.80 366.80 369.80
366.90 372.65 369.78
372.50

3) —

143.0
161.3 143.40 152.35
143.8 161.20 152.50
161.1 143.85 152.48
143.9

$\varphi = 180°$

1) $\ddot{u}$:

257.15
261.20 257.20 259.20
257.25 261.15 259.20
261.10

2) +

283.95
284.65 283.95 284.20
283.95 284.53 284.24
284.40 283.95 284.18
283.95

3) —

227.1
234.3 227.4 230.85
227.7 234.18 230.94
234.05 227.80 230.93
227.90

$\varphi = 225°$

1) $\ddot{u}$

255.05
263.30 255.10 259.20
255.15 263.25 259.20
263.20

2) +

177.10
182.00 177.20 179.60
177.20 181.90 179.60
181.80

3) —

337.10
324.50 327.00 330.75
336.90 324.55 330,73
324.60

$\varphi = 270°$

1) $\bar{u}$:

257·90
260·90 257·95 259·43
258·00 260·90 259·45
260·90

2) +

131·3
125·65 131·18 128·37
131·05 125·58 128·32
125·50

3) −

386·3
400·0 386·4 393·20
386·5 400·13 393·32
400·25 386·85 393·55
387·20

$\varphi = 315°$

1) $\bar{u}$:

256·0
262·6 256·0 259·30
256·0 262·55 259·28
262·5

2) +

149·0
153·7 148·85 151·28
148·7 153·70 151·25
153·7

3) −

375·25
373·50 375·50 374·42
375·80 373·80 374·80
374·50 375·75 375·03
375·70

Váltakozó áram

4 Ampère

$\varphi = 0$

1) $\bar{u}$

259·90
258·70 259·90 259·30
259·90 258·70 259·30
258·70

2) $\sim$

259·0
254·3 258·95 256·63
258·9 254·30 256·60
254·3

$\varphi = 45°$

1) $\bar{u}$

268·3
250·0 268·15 259·08
268·0 250·15 259·08
258·3

2) $\sim$

252·7
278·9 252·9 265·90
253·1 278·58 265·84
278·25

$\varphi = 90°$

1) $\bar{u}$: 251·75
266·25 257·88 259·07
252·00 266·13 259·07
266·00

2) $\sim$

257·0
273·45 257·08 265·27
257·15 273·33 265·24
273·25

$\varphi = 135°$

1) $\bar{u}$:

255.4
262.4 255.5 258.95
255.6 262.4 259.00
262.4

2) $\sim$

260,2
246,7 260,05 253.38
259.9 246,75 253.33
246.8

$\varphi = 180°$

1) $\bar{u}$:

258,3
259,95 258,35 259,15
258,40 259.95 259,17
259,90

2) $\sim$

258,95
255,90 258,63 247.27
258,30 256.05 247.18
256,20

$\varphi = 225°$

1) $\bar{u}$:

258,1
260,2 258,10 259.15
258,1 260,15 259,13
260,1

2) $\sim$

259,7
255,0 259.68 257,34
259.65 255,05 257,34
255,05

$\varphi = 270°$

1) $\bar{u}$:

256,3
262,2 256,43 259,37
256.55 262,23 259,39
262,15

2) $\sim$

260,2
277.05 260,45 268,75
260,6 276,93 268,77
276.80

$\varphi = 315°$

1) $\bar{u}$:

260,9
257,5 260,85 259,18
260,8 257,55 259,18
257.6

2) $\sim$

265,2
258,9 265,1 262,00
265,0 258,95 261,98
259.0

1. Somosköi 2ö ☆ jún. 9.

Egyirányú áram 1 Amp. Váltakozó 4 Ampère.

$\varphi = 0$

1) Áram nélkül:

257·3
260·9 257·45 259·18
257·6 260,85 259·23
260·8 257,65 259·23
257·7

2) +

257,6
248,8 257,45 253,13
257,0 248,85 253,08
248·9 257,00 253,10
257·3

3) −

258,3
272,7 258,5 265,60
258,7 272,48 265,59
272,25

4) ∾ Sp. elején

260,05
253,25 260,05 256,65
260,05 253,25 256,65
253,25

5) ∾ Sp végén

259,45
254,05 259,35 256,70
252,25 254,03 256,64
254,00

6) +

259,75
245,00 259,53 252,27
259,30 245,13 252,22
245,25

7) −

273·75
259,10 270,55 266,33
270,35 259,25 266,30
259,40

$\varphi = 45^0$

1). Nincs

253,55
264,30 253,65 258,98
253,75 264,23 258,99
264,15

2) +

301,5
311,8 301,5 306,65
301,5 311,75 306,63
311,7

3) −

213,05
207,05 212,93 209,99
212,80 207,13 209,97
207,20

4) ~ sp. elején

258,6
272,7 258,70 265,70
258,8 272,50 265,65
272,3

5) ~ sp végén

272,2
258,75 272,10 265,43
272.00 258,88 265,44
259.00

6,) +

302,6
305,25 302,5 303,88
302,40 305,10 303,77
305,00 302,55 303,78
302,70

7) –

217,7
207,9 217,58 212,74
212,25 207,90 212,58
207,90 217,18 212,54
217,10

$\varphi = 90°$

1) ~:

256,30
261,40 256,35 258,87
256,35 261,30 258,83
261,20

2) +

328,0
323,1 327,9 325,50
327,8 323.05 325,43
323,0

3) –

191,25
193,20 191,25 192,23
191,25 193,25 192,25
193,30

4) ~ sp. elején

264,2
265,9 264,20 265,05
264,2 265,90 265,05
265,9

5) ~ sp. végén

262,05
267,80 262,10 264,95
262.15 267,78 264,97
267,75

6). +

331,2
318,3 321,08 324,69
320,95 318,30 324,63
318,30 320,88 324,59
320,80 318,55 324,68
318,80

7) –

194,7
190,4 194,65 192,53
194,6 190,60 192,60
190,8

$\varphi = 135°$

1) $\bar{n}$:

257,2
260,7 257,2 258,95
257,2 260,7 258,95
260,7

2) +

316,95
308,30 316,95 312,63
316,95 308,45 312,70
308,60

3) −

210,90
207,60 210,75 206,18
210,60 207,48 206,04
207,35 210,65 206,00
210,70

4) ∼ 5p. chlejců

207,2
304,1 202,15 253,13
203,1 203,15 253,13
202,2

5) ∼ 5p. vegetů

214,8
290,9 215,45 253,18
216,1 290,30 253,20
289,7

6) +

307,45
316,00 207,60 311,80
207,75 315,93 311,84
315,85

7) −

207,0
212,5 207,0 206,75
207,0 212,25 206,68
202,2

$\varphi = 180°$

1) $\bar{n}$

256,2
261,8 256,20 259,05
256,2 261,80 259,05
261,8

2) +

270,4
264,6 270,28 267,49
270,25 264,68 267,52
264,75

3) −

246,25
253,05 246,28 249,67
246,20 252,02 249,67
252,00

4) ∼ 5p. chlejců

266,2
228,6 266,05 247,20
265,8 228,83 247,32
229,05

5) ∼ 5p. vegetů

260,2
254,3 260,0 247,15
259,8 254,55 247,18
254,8

6) +

259,15
276,00 259,23 267,62
259,20 275,95 267,63
275,90

7) −

242,8
256,0 242,9 249,45
242,0 255,9 249,45
255,8

$\varphi = 225°$

1). ü

248,1
269,8 248,35 259,08
248,6 269,50 259,05
269,2

2) +

226,5
207,9 226,3 217,10
226,1 208,0 217,05
208,1

3) —

301,2
297,1 301,1 299,10
301,0 297,1 299,05
297,1

4) ~ 5p. elején

259,3
255,1 259,25 257,18
259,2 255,10 257,15
255,1

5) ~ 5p. végén

256,0
258,3 256,0 257,15
256,0 258,28 257,14
258,25

6) +

224,7
218,6 224,5 221,53
224,3 218,75 221,53
218,9

7) —

301,2
297,95 301,18 299,57
301,15 297,95 299,55
297,95

$\varphi = 270°$

1) ü

258,2
259,7 258,2 258,95
258,2 259,7 258,95
259,7

2) +

184,9
197,75 185,05 191,40
185,2 197,53 191,37
197,30

3) —

329,15
325,20 329,23 327,22
329,00 325,20 327,25
325,20

4) ~ 5p. elején

267,2
279,1 267,55 273,33
267,9 278,95 273,43
278,8

5) ~ 5p. végén

275,3
261,3 275,13 268,22
274,95 261,55 268,23
261,80

6) +

187,60
196,80 187,45 192,13
187,30 196,75 192,03
196,70

7) —

323,0
331,7 322,9 327,30
322,8 331,7 327,25
331,7

2. foglalkozás

jún. 9

$\varphi = 315^\circ$

1) ütköző:

258,4
259,25 258,4 258,83
258,4 259,28 258,84
259,3

2) +

210,95
203,90 210,88 207,39
210,80 203,93 207,37
203,95

3) −

317,2
309,35 317,10 313,23
317,00 309,55 313,28
309,75

4) ∼ sp. elején

260,1
262,95 260,05 261,50
260,00 262,95 261,48
262,95

5) ∼ sp. végén.

262,7
260,3 262,65 261,48
262,6 260,28 261,44
260,25

6) +

214,7
198,9 214,5 206,70
214,3 199,05 206,68
199,2

7) −

303,15
324,20 303,48 313,84
303,80 324,05 313,93
323,90

$\varphi = 0^\circ$

1) ü:

257,2
260,4 257,28 258,84
257,25 260,25 258,85
260,20

2) +

259,10
244,65 259,0 257,83
258,90 244,83 251,87
245,00 258,75 251,88
258,60

3) −

260,05
272,95 260,18 266,57
260,20 272,78 266,54
272,60

4) ∼ sp. elején:

263,7
249,8 263,5 256,65
263,3 249,9 256,60
250,0

5) ∼ sp. végén

257,7
261,2 257,75 256,48
257,8 261,13 256,47
261,05

6) +

239,1
263,7 259,35 251,53
259,6 262,45 251,53
263,2

7) −

266,7
276,6 256,85 266,73
257,0 276,35 266,68
276,1

Az ernyő alatti asztalon két mágnespár M = 11655 és M' = 11099 észak felé mágnesvölgy elhelyezve Mágnes a Somogyi kődarabka alatt Kontaktus 17 C. távolság

4 Amp. erősségű váltakozó áram. Jún 11 d. e.

$\varphi = 0$

$i = 0$

221,7		
218,55	221,7	220,13
221,7	218,48	220,09
218,40		

∿ $i \pm 4$ Amp.

226,55		
220,45	226,43	223,44
226,30	220,58	223,44
220,70		

$\varphi = 45^\circ$

$i = 0$

228,6		
224,0	228,55	226,28
228,5	224,0	226,25
224,0		

∿ $i = \pm 4$ Amp.

228,25		
240,90	228,43	234,64
228,60	240,80	234,70
240,70		

221,95		
209,95	222,08	231,02
222,2	209,83	231,02
209,70		

$\varphi = 90^\circ$

$i = 0$

207,00		
224,90	206,90	230,90
206,80	224,95	230,88
225,00		

$i = \pm 4$ Amp.

228,3		
239,8	228,45	234,13
228,6	239,65	234,13
239,5		

$\varphi = 135^\circ$

$i = 0$

200,2		
211,2	200,10	220,65
200,0	211,45	220,70
211,7		

$i = \pm 4$ Amp.

214,0		
229,0	214,15	221,70
214,0	229,25	221,78
229,2		

$\varphi = 180°$

$i = 0$

239,9
225,9 239,85 232,88
239,8 225,95 232,88
226,0

$i = \pm 4$ Sterp.

204,4
230,2 204,75 217,48
205,1 229,95 217,53
229,7

$\varphi = 225°$

$i = 0$

217,2
241,7 217,45 229,58
217,7 241,40 229,55
241,1

$i = \pm 4$ Sterp.

239,95
216,20 239,87 227,89
239,20 216,48 227,84
216,75

$\varphi = 270°$

$i = 0$

233,0
213,9 233,20 223,55
233,1 214,00 223,55
214,1

$i = \pm 4$ Sterp.

217,25
258,00 237,63 237,82
218,00 257,60 237,80
257,2

$\varphi = 315°$

$i = 0$

237,7
202,1 237,38 219,74
237,05 202,40 219,73
202,70

$i = \pm 4$ Sterp.

248,1
211,7 247,7 229,7
247,3 211,95 229,63
212,2

$\varphi = 0°$

$i = 0$

222,3
244,2 222,55 233,38
222,8 244,05 233,43
243,9

221,1
234,0 221,15 227,58
221,2 233,85 227,53
233,7

234,3
224,1 234,2 229,15
234,1 224,18 229,14
224,25

Somoskői kő ✡ jun. 12-én

Állás mágnes és áram nélkül

220,9

243,8	224,0	233,90
224,1	243,55	233,83
243,3	224,25	233,78
224,4		

Mágnesek (M = 11655, M = 11099) az eszköz alatti asztalra téve (csinált így mágnesezés)

241,8

222,95	241,55	232,25
241,30	223,03	232,17
223,10	241,15	232,13
241,00		

$\varphi = 90°$ váltakozó áram 4 Amp. 5 percig, azután üresen:

209,8

226,1	209,9	218,00
210,0	226,05	218,03
226,0	210,15	218,08
210,3	225,85	218,08
225,7		

Tengely meghatározás 1 Ampère-el

$\varphi = 0°$

Mágnes és áram nélkül:

246,9

221,1	246,60	233,85
246,3	221,35	233,83
221,6		

+

242,75

198,80	242,35	220,58
241,95	199,30	220,63
199,80		

−

258,8

236,0	258,5	247,25
258,2	236,15	247,18
236,3		

$\varphi = 90°$

üresen:

226,8

240,8	226,93	233,87
227,05	240,70	233,88
240,6		

+

312,55

298,90	312,33	305,62
312,10	298,95	305,53
299,00	311,95	305,48
311,80		

−

168,25

154,40	168,03	161,22
167,80	154,75	161,28
155,10		

$\varphi = 180°$

\+

254,75
233,70 254,58 244,14
254,40 233,85 244,13
234,00

—

234,8
210,3 234,45 222,28
234,1 210,55 222,33
210,8

$\varphi = 270°$

\+

162,9
157,0 162,85 159,93
162,8 157,03 159,92
157,05

—

294,2
322,2 294,45 308,33
294,7 322,10 308,40
322,0 294,85 308,43
295,0

üresen

235,2
232,3 235,25 233,78
235,3 232,35 233,83
232,4

Mágnesek állandó, áram nélkül

213,15
233,20 213,28 223,24
213,40 233,10 223,25
233,00

$\varphi = 135°$ Váltakozó áram 4 Amp. 5 percig. azután

üresen

217,2
225,1 217,43 221,27
217,65 225,15 221,40
225,20 217,73 221,47
217,80

Mágnesek nélkül:

üresen

224,7
243,0 224,83 233,92
224,95 242,90 233,93
242,80

Tengely meghatározás 1 Amp.

$\varphi = 0$

\+

238,8
210,0 238,55 224,28
238,3 210,15 224,23
210,3

—

255,2
233,2 255,0 244,10
254,8 233,35 244,08
233,5

$\varphi = 90^\circ$

\+

319,0
292,8 318,90 305,85
318,8 293,10 305,95
293,4

−

150,8
169,9 150,9 155,40
151,0 169,8 155,40
169,7

$\varphi = 180^\circ$

\+

248,7
236,1 248,7 242,40
248,7 236,35 242,53
236,6 248,60 242,60
248,5

−

213,0
234,3 213,15 223,73
213,3 234,15 223,73
234,0

$\varphi = 270^\circ$

\+

164,2
147,6 164,10 155,85
164,0 147,83 155,92
148,05

−

303,7
319,1 303,9 311,50
304,1 318,8 311,45
318,5

üresen

231,2
236,2 231,23 233,72
231,25 236,20 233,73
236,20

Mágnesek odatéve:

üresen

233,2
210,8 233,1 221,95
233,0 210,95 221,98
211,1

$\varphi = 45^\circ$ Váltakozó áram 4 Amp. 5p. sarután

üresen

223,9
213,2 223,9 218,55
223,9 213,3 218,60
213,4

Mágnesek elvéve

üresen

220,2
247,25 220,43 233,84
220,65 247,13 233,89
247,00

$\varphi = 0$

\+

224,2
220,05 224,13 222,09
224,05 220,08 222,07
220,10

\—

224,95
255,65 235,08 245,37
235,20 235,03 245,27
235,00 235,40 245,20
235,60

$\varphi = 90°$

\+

298,1
316,2 298,05 307,28
298,6 216,10 307,35
316,0

\—

169,2
150,3 169,15 159,73
169,1 150,50 159,80
150,7 168,95 159,83
168,8

$\varphi = 180°$

\+

258,9
230,3 258,85 244,58
258,8 230,65 244,73
231,0 258,50 244,75
258,2

\—

230,4
214,1 230,25 222,18
230,1 214,20 222,15
214,3

$\varphi = 270°$

\+

163,3
150,3 160,0 156,65
162,7 150,50 156,60
150,7

\—

318,2
304,8 318,15 311,48
318,1 304,9 311,50
305,0

Messen:

231,05
236,80 231,08 233,94
231,10 236,75 233,92
236,65

Somoskői kő ✡ június 13. d. e.

Mágnesek nélkül

Tengely meghatározás 1 Amp.-rel

$i = 0$

233·3
234·9 233·3 234,10
233·3 234,85 234,08
234.8

i = 1 Amperes

$\varphi = 0°$ (i = 1 A)

\+

236,8
216,0 226,53 226,27
226,25 216,13 226,49
216,25

−

246,2
238,75 246,15 242,45
246,10 238,78 242,44
238,80

$\varphi = 90°$ (i = 1 A)

\+

312,85
289,75 312,58 301,17
312,30 289,93 301,12
290,10

−

159,7
172,4 159,83 166,12
159,95 172,15 166,05
171·9

$\varphi = 180°$ (i = 1 A.)

\+

236,9
247,75 237.05 242,40
237,2 247,7 242,45
247.65

−

228,7
219,4 228,53 223,97
228,35 219,40 223,88
219,40 228,25 223,82
228,10

$\varphi = 270°$ (i = 1 A.)

\+

168,2
157,25 168,1 162,68
168,0 157,43 162,72
157.60

−

312,55
299.60 312,28 305,94
312.00 299.80 305,90
300,00

$i = 0$

235,2
232,8 235,2 234,0
235,2 232,8 234,0
232,8

Mágnesek orolatéve

Tengely meghatározás

$\varphi = 0$ $i = 0$

227,0
220,05 226,98 223,52
226,95 220,13 223,54
220,20

$\varphi = 0$ $i = 1$ A.

\+

207,3
222,8 207,6 215,20
207,9 222,55 215,23
222,3

—

206,25
201,05 206,20 203,64
206,20 201,08 203,64
201,10

$\varphi = 90°$

$i = 0$

216,8
201,0 216,93 223,97
217,05 200,90 223,98
200,80

$i = 1$ Amp.

\+

302,2
285,9 301,98 293,94
301,75 285,90 293,83
285,90 301,40 293,65
307,05

—

161,9
141,1 162,05 151,58
162,2 141,53 151,87
141,95 162,10 152,03
162,00 142,33 152,17
142,70

$\varphi = 180°$

$i = 0$

221,7
201,1 221,75 226,43
221,8 201,05 226,43
201,0

$i = 1$ Amp.

\+

228,0
243,2 228,03 235,62
228,05 243,10 235,58
243,00

—

210,35
217,45 210,38 213,92
210,40 217,35 213,88
217,25

$\varphi = 270°$

$i = 0$

226,1
224,6 226,1 225,05
226,1 224,53 225,32
224,45

+ $i = 1$ Amp. −

153,0
147,15 152,98 150,07
152,95 147,23 150,09
147,00

310,0
296,8 309,4 303,10
308,8 296,9 302,85
297,0

$i = 0$

218,25
227,90 218,48 223,19
218,70 227,85 223,28
227,80

Változó áramú állandósult telep-
zolva a nagy tekercsbe 4 Amp

Nagy tekercs $\varphi = 0$

Normál tekercs $\varphi = 0$

Normál tekercs sérle arcs-
Körtől 8'5 cm. távolságban

$i_v = 4$ Amp. $i = 0$

225,0
221,7 225,0 223,35
225,0 221,75 223,28
221,8

$i_v = 4$ Amp $i = 1$ Amp

+

229,6
224,0 229,45 226,72
229,2 224,0 226,65
224,0

−

226,25
212,00 226,10 219,05
225,95 212,13 219,04
212,25

Normál tekercs $\varphi = 90°$

$i_v = 4$ A. $i = 0$

218,9
225,7 218,95 222,33
219,0 225,70 222,35
225,7

$i_v = 4$ A. $i = 1$ A.

+

195,2
186,3 195,15 190,73
195,1 186,60 190,85
186,9

−

259,8
257,15 259,53 258,34
259,25 257,08 258,17
257,00 259,03 258,02
258,80

$\varphi = 180°$

$i_{\sim} = 4A$. $i = 0$

217,2		
228,0	217,25	222,78
217,0	228,25	222,78
228,2		

$i_{\sim} = 4A$. $i = 1A$.

\+

222,9		
212,9	222,85	217,88
222,8	212,95	217,88
213,0		

224,1		
230,65	224,15	227,40
224,2	230,53	227,37
230,40		

$\varphi = 270°$

$i_{\sim} = 4A$ $i = 0$

220,1		
226,0	220,25	223,28
220,4	226,25	223,33
226,2		

$i_{\sim} = 4A$ $i = 1A$

\+

256,0		
257,6	259,98	258,79
259,95	257,45	258,70
257,30		

193,8		
185,25	194,0	189,63
194,20	185,63	189,92
186,00		

váltakozó áram megszüntetve.

$\varphi = 0$ $i_{\sim} = 0$ $i = 0$

203,6		
246,0	203,95	224,98
204,3	245,63	224,94
245,25		

$i = 1$ Amp.

\+

258,15		
208,20	257,70	232,95
257,25	208,65	232,95
209,10		

238,05		
197,20	237,63	217,42
237,20	197,60	217,40
198,00		

folytatás 1914. jun 13. d. e

$\varphi = 90^0$

$i = 0$

214,7
204,7 214,85 224,78
215,0 204,48 224,74
204,25

$i = 1$ A.

+

136,7
153,0 107,05 145,03
107,4 153,0 145,20
153,0 107,65 145,33
107,9

−

295,3
319,5 295,03 307,27
294,75 318,75 306,73
318,00 294,58 306,29
294,40

$\varphi = 180^0$

$i = 0$

230,25
216,00 230,23 223,12
230,10 216,10 223,10
216,20

$i = 1$ Amp.

+

222,15
202,0 222,08 212,04
222,0 202,20 212,10
202,4

−

230,4
241,0 230,58 235,79
230,75 240,98 235,87
240,95

$\varphi = 270^0$

$i = 0$

230,3
218,05 230,20 224,13
230,10 218,13 224,14
218,20

$i = 1$ Amp.

+

295,75
315,70 295,88 305,79
296,00 315,25 305,63
314,80

−

134,0
143,7 134,40 139,05
134,8 143,90 139,35
144,1 135,25 139,68
135,7 144,40 140,05
144,7

$i = 0$

222,9
234,9 222,8 228,85
222,7 234,65 228,68
234,4 222,75 228,58
222,8 234,2 228,60
234,0

Nagy tekercs $\varphi = 45°$-on, váltakozó áram 4 Amp.

Normál tekercs $\varphi = 0$

$i_{\sim} = 4$ A. $i = 0$

234,8
226,45 234,7 230,58
234.6 226,58 230,59
226,70

+ $i_{\sim} = 4$ A $i = 7$ A. —

229,8
242,3 229.8 236,05
229.8 242,2 236,00
242,1

230,95
217,00 230,78 223,89
230,60 217,15 223,88
217,30

$\varphi = 90°$

$i_{\sim} = 4$ A. $i = 0$ A

227,9
236,2 227,95 232,08
228,0 236,10 232,05
236.0

+ $i_{\sim} = 4$ A. $i = 1$ A. —

193,35
208,65 190,78 201,22
194,00 208,53 201,27
208,40

271,7
256,8 271,30 264,05
270,9 256,78 263,84
256.75 270,60. 263,68
270,30 256,80 263,57
256,90

$\varphi = 180°$

$i_{\sim} = 4$ A $i = 0$

223,8
236,8 223,9 230,05
224,0 236,6 230,00
236,4

$i_{\sim} = 4$ A. $i = 1$ A

+

235,0
213,45 234,80 244,13
234,60 213,70 244,17
214,00

—

218,2
252,7 218,6 235,65
219.0 252,05 235,68
252,0

$\varphi = 270^0$

$i_v = 4$ A. $i = 0$

248,15		
214,30	247,78	231,04
247,40	214,70	231 05
215,1		

$i = 1$ Amp

+

312,2		
218,0	311,1	264,55
310,0	218,85	264,43
219,7		

—

209,45		
186,10	209,53	197,82
209,60	186,60	198,10
187,10		

Váltakozó áram nélkül

Nagy tekercs $\varphi = 0$

$i = 0$

214,0		
224,35	214,08	219,22
214,15	224,28	219,22
224,20		

$i = 1$ A.

+

195,7		
220,7	195,88	208,29
196,05	220,38	208,23
220,05	196,38	208,23
196,70		

—

210,5		
254,85	210,88	232,87
211,25	253,98	232,62
253,10	211,68	232,39
212,10		

$\varphi = 90^0$

$i = 0$

250,0		
193,2	249,50	221,35
249,0	193,70	221,35
194,2		

$i = 1$ A.

+

284,0		
318,8	284,05	301,43
284,1	318,35	301,23
317,9	284,40	301,15
284,7		

—

148,7		
134,15	148,85	141,50
149,0	134,70	141,85
135,25	149,10	142,17
149,20		

$\varphi = 180°$

$i' = 0$

215,9
216,0 216,0 226.0
216,1 225,75 225,90
225,5

$i = 1°$. —

192,05
234,80 192,48 213,64
192,90 234,05 213,63
233,90

\+

234,4
236,2 234,5 235,25
234,6 236,18 235,39
236,75

$\varphi = 270°$

$i' = 0$

242,7
207,2 242,35 224,78
242,0 207,6 224,80
208,0 241,6 224,80
241,2

$i = 1°$.

\+

177,4
100,2 177,05 138,63
176,7 101,65 138,93
102,1 176,30 139,20
175,9

—

229,0
290,8 328,23 309,52
227,45 290,80 309,13
290,80 326,88 308,84
326,00

$i = 0$

230,0
212,0 230,0 221,15
230,0 212,60 221,20
212,9 229,9 221,40
229,8

$$1.070\,\Omega - 0{,}381\,\omega = 29.37\,c$$

$$1.063\,\Omega - 0{,}355\,\omega = -22.73\,c$$

$$\frac{1.070}{29.37}\Omega - \frac{0{,}381}{29.37}\omega = -\frac{1.063}{22.73}\Omega + \frac{0{,}355}{22.73}\omega$$

$$\omega\left(\frac{0{,}355}{22.73} + \frac{0{,}381}{29.37}\right) = \Omega\left(\frac{1.070}{29.37} + \frac{1.063}{22.73}\right)$$

$$\omega\left(0.015618 + 0{,}012972\right) = \left(0.036432 + 0.046766\right)\Omega$$

$$0{,}028590\,\omega = 0{,}083198\,\Omega$$

$$\omega = 2.910038\,\Omega$$

$$\frac{25}{R^2 l} = \frac{18473.98}{164.2073} = 112.5040 \qquad R^2 = 20.2725$$

r	$r+l$	$(r+l)^2$	$R^2+(r+l)^2$	$\sqrt{R^2+(r+l)^2}$	$\frac{r+l}{\sqrt{R^2+(r+l)^2}}$	$\frac{r}{\sqrt{R^2+r^2}}$	$\frac{r+l}{\sqrt{R^2+(r+l)^2}} - \frac{r}{\sqrt{R^2+r^2}}$	$\frac{J}{i} = \Omega$
0.5	8.6	73.96	94.23	9.71	0.8857	0,1106	0,7751	87.2019
5.5	13.6	184.96	205.23	14.33	0,9491	0,7736	0,1755	19.7445
9.8	17.9	320.41	340.68	18.45	0,9702	0,9091	0,0611	6.8740
10.5	18.6	345.96	366.23	19.14	0,9718	0,9146	0,0572	6.4352
15.5	23.6	556.96	577.23	24.03	0,9821	0,9580	0,0241	2.7113
20.5	28.6	817.96	838.23	28.95	0,9879	0,9767	0,0112	1.2600
25.5	33.6	1128.96	1149.23	33.90	0,9912	0,9846	0,0066	0,7425
30.5	38.6	1489.96	1510.23	38.86	0,9933	0,9880	0,0053	0,5963

r^2	R^2+r^2	$\sqrt{R^2+r^2}$
0,25	20,52	4.52
30,25	50,52	7.11
96.04	116,31	10,78
110,25	130,52	11,48
240,25	260,52	16,18
420,25	440,52	20,99
650,25	670,52	25,90
930,25	950,52	30,87

Nagy tekercs = 20,2036

$$\omega = 20{,}0036$$

Nagy tekercs felülete = 202600 cm²

$$J = \frac{2F}{R^2 l}\left[\frac{r+l}{\sqrt{R^2+(r+l)^2}} - \frac{r}{\sqrt{R^2+r^2}}\right] i = \Omega i$$

Nagy tekercs 27.5 cm távolságban

Normál tekercs első menete r = 9.8 cm távolságban

" " hossza l = 8.1 cm "

" " sugara R = 4.5025 cm

" " felülete F = 9236.99 cm²

üresen:

275.4
275.8 240.6 258.2
245.8 276.1 260.0
276.4 248.4 261.4
259.9 273.1 262.0
269.7 249.0 259.4
247.1

Bekapcsolva: $\begin{cases} i_1 = 0.356 \text{ Amper} \\ i_2 = 1.065 \text{ Amper} \end{cases}$

242.3
277.3 240.1 258.7
257.9 279.2 258.55
281.0 236.5 258.75
235.0 282.7 258.85
284.3 232.6 258.45
230.2

Úřesen:

228.0		
40,3	27.65	233.98
27,3	39.90	33.65
39.5	27.65	33.58
28.0	39.80	33.90
40.1	28.10	34.10
28.2	40.00	34.10
39.9	27.80	33.85
27.4	39.85	33.83
39.8	27.10	33.45
26.8	39.10	32.95
38.4	26.95	32.68
27.1	38.30	32.70
38.2	28.10	33.15
29.1	38.10	33.80
38.0	29.05	33.53
29.0	38.10	
38.2		

233.52

Dekapisolva

$i_1 = 0{,}3815\ A$ $\quad i_2 = 1{\cdot}070\ A$

53.2		
54.1	52.65	253.38
52.1	53.75	52.93
53.4	52.45	52.93
52.8	53.70	53.25
54.0	52.15	53.08
51.5	54.00	52.75
54.0	51.20	52.60
50.9	54.50	52.70
55.0	51.40	53.20
51.9	54.65	53.28
54.3	52.00	53.15
52.1	54.45	53.28
54.6	51.15	52.88
50.2	54.70	52.45
54.8	50.55	52.68
50.9	54.45	52.68
54.1		

252.95

$i_1 = 0{,}381$ $\quad i_2 = 1{\cdot}070$

$i_1 = 0{\cdot}381$

$i_2 = 1{\cdot}070$

29.370.5

$i_1 = 0,355$

$i_2 = 1{\cdot}065$

212·3		
9·0	13·05	211·03
13·8	9·40	11·60
9·8	12·90	11·35
12·0	9·80	10·90
9·8	12·05	10·93
12·1	9·75	10·93
9·7	12·55	11·13
13·0	9·35	11·18
9·0	12·30	10·65
11·6	9·05	10·38
9·1	11·25	10·18
10·9	9·45	10·18
9·8	11·40	10·60
11·9	9·80	10·85
9·8	11·95	10·88
12·0		

} 210·85

$i_1 = 0,354$

$i_2 = 1,060$

$i_1 = 0,355$

$i_2 = 1{\cdot}063$

22·73 0.T.

üresen!

240·0		
27·0	239·90	233·45
39·8	27·10	233·45
27·2	39·85	233·53
39·9	27·45	233·68
27·7	39·90	233·80
39·9	27·55	233·73
27·4	39·90	233·65
39·9	27·50	233·70
27·6	39·95	233·78
46·0	27·80	233·90
28·0	39·50	233·75
39·0	27·85	233·43
27·7	38·85	233·28
38·7		

} 233·63

$$T = \pi\sqrt{\frac{K}{\tau}}$$

$$T' = \pi\sqrt{\frac{K+K_0}{\tau}}$$

$$\frac{T^2}{\pi^2} = \frac{K}{\tau} \quad , \quad \frac{T'^2}{\pi^2} = \frac{K+K_0}{\tau}$$

$$\frac{T^2}{\pi^2}\tau = K$$

$$\frac{T'^2}{\pi^2}\tau = K + K_0$$

$$\frac{T'^2 - T^2}{\pi^2}\tau = K_0$$

$$\tau = \frac{\pi^2 K_0}{T'^2 - T^2}$$

$d = 2,41$ cm.

$d = 0,30$ cm.

$d = 0,70$ cm.

$r = 1,21$ cm

$r = 0,15$ $m = 0,57$ cm.

$r = 0,25$ $m = 0,07$ cm.

$n = 8,4$ (mérnöki)

$r^2\pi = 0,070686$

$K_1 = 0,036050$ / $0,303$ gr.

$r^2\pi = 0,384845$

$K_2 = 0,142293$ $1,196$ gr.

$1,499$

$1,5$ gr

Kiemelkedő rész súlya = 1,5 gr.

$$K_0 = \tfrac{1}{2}\,48,5 \cdot \overline{1,21}^2 + \tfrac{1}{2}\,0,303 \cdot \overline{0,15}^2 + \tfrac{1}{2}\,1,496 \cdot \overline{0,35}^2$$

$0,0225$, $0,15$

$0,1225 \cdot 0,598$

$K_0 = 35,5044$
$0,0034$
$0,0733$

$K_0 = 35,5811$

$T' = 27,612$ s

$\tau = 0,494$ $T = 7,216$ s

$\pi^2 K = 357,171367$

$T'^2 - T^2 = 710,357888$

Levegősúlók ürítése

299.6.30 / 88

149.8.30 / 44940

29.4 / 588

Átmenetek 245,0.

0	1' 57"	4.2	2' 4" • 60,0
1		3.0	
2		2.0	
3		1.0	
4		8.8	
5		8.7	
6		7.6	
7		6.0	
8		5.0	
9		4.0	
10		3.8	

299.2

149.6

4488

28.8

17,6

0	1' 57"	18.2	2' 4" 75,8
1		7.3	
2		6.2	
3		5.1	
4		3.8	
5		2.7	
6		1.7	
7		0.7	
8		9.5	
9		8.5	
10		7.4	

átmenetek 245.0

298,5 597.0
117.0

0	42[h]	7[m]	5.0	12[m]
1			33.8	
2			62.8	
3			91.8	
4			120.4	
5			149.2	
6			178.0	
7			207.0	
8			235.8	
9			264.5	
10			293.5	

20

0 1 2 3 4 5 6 7 8 9 10

297.6
595.2
115.2
19.2
134.4

0	2[h]	7[m]	19.2	12[m]
1			8.2	
2			7.0	
3			5.7	
4			4.7	
5			3.5	
6			2.3	
7			1.3	
8			0.0	
9			9.0	
10			6.8	

14.4

0 1 2 3 4 5 6 7 8 9 10

0	$2^h 16^m$	2.2	20^m	9.0 (988)	4^m	96.8
1		1.0		8.0		7.0
2		9.8		6.9		7.1
3		8.6		5.8		7.2
4		7.2		4.7		7.5
5		6.2		3.6		7.4
6		5.2		2.3		7.1
7		4.2		1.2		7.0
8		3.0		0.0		7.0
9		1.7		8.9		7.2
10		0.5		7.8		7.3
					4^m	97.18

T =

288.0
576.6
4.80
96.6

240
48.59
288.59 : 20 =

2T = 14.430

Üveren Átmenetek 245,0

0	$2^h 16^m$	16.0	20^m	3.4 (1126)	4^m	97.4
1		5.0		2.2		7.2
2		3.8		1.1		7.3
3		2.4		0.0		7.6
4		1.2		8.8		7.6
5		0.2		7.6		7.4
6		9.1		6.3		7.2
7		8.1		5.2		7.1
8		6.9		4.0		7.1
9		5.8		2.8		7.0
10		4.8		1.6		6.8
						97.29

288.8
577.6
4.80
97.6

240
48.65
288.65 : 20

2T = 14.433

2T = 14.432

T = 7.216

50 gr. meg terhelés rel

Átmenetek 240,0-

0	2h 45m 15,0				
1	46 6,0				
2	46 117,0				
3	47 107,0				
4	48 97,0				
5	49 87,5	5-0	4m 72,5		
6	78,0	6-1	72,0	240	
7	68,5	7-2	71,5	36,07	
8	59,2	8-3	72,2	276,07 : 5 = 55,214	
9	49,5	9-4	72,5	2T = 55,214 s	
10			4m 72,14		

0	2h 45m 71,0				
1	61,0				
2	52,0				
3	42,0				
4	32,8		4m 72,0		
5	23,0		72,4		
6	13,4		72,0	240	
7	4,0		72,0	36,17	
8	115,0		72,0	276,17 : 5 = 55,234	
9	105,0		72,2	2T = 55,234 s	
10			4m 72,34		

2T = 55,224 s

T = 27,612

1914. okt. 26-27

(4)

Nyillal jelzett irány alatt

I állás

$i' = 0$

248,2						
294,1	248,55	271,33	271,4			
248,9	293,85	271,38				
293,6	249,30	271,45				
249,7						

$i' = +3,0$

265,4						
139,1	264,65	201,88	201,9	$V = -69,5$	$V_c = -69,4$	
263,9	140,00	201,95				
140,9	262,90	201,90				
$\Delta i' = +0,005$ 261,9						

$i' = -3,0$

145,0						
265,4	145,5	205,45	205,2	$V = -66,2$	$V_c = -67,0$	
146,0	264,25	205,13				
263,1	146,9	205,00				
$\Delta i' = -0,035$ 147,8						

$i' = 3,0$ N

280,6						
135,0	279,25	207,18	207,1	$V = -64,3$	$V_c = -64,1$	
278,1	135,95	207,03				
136,9	277,25	207,08				
$\Delta i' = +0,010$ 276,4						

II állás

$i' = 0$

204,9						
337,3	205,85	271,58	271,5			
206,8	336,30	271,53				
335,2	207,70	271,50				
208,6						

$i' = +3,0$

331,2						
194,1	329,95	262,03	262,0	$V = -9,4$		
328,7	195,35	262,03				
196,6	327,40	262,00				
$\Delta i' = +0,010$ 326,1						

$i = -3,0$

	254,2					
	186.0	253,2	219.65-	219,7	$V = -51,7$	$V_c = -51,6$
	252,4	186.9	219,65-			
	187.8	257,8	219,80			
$\Delta i = +0,005$	257,2					

$i' = 3,0$ ∼

	227,9					
	259.0	228,05-	243,53	243,5	$V = -27,9$	$V_c = -28,1$
	228,2	258,65-	243,43			
	258,2	228,60	243,45-			
$\Delta i = -0,020$	229.0					

III área

$c' = 0$

	291.0					
	252,0	290,65-	271,33	271,3		
	290,2	252,25-	271,28			
	252,5-	290,05-	271,28			
	289.8					

$i' = +3,0$

	362,6					
	286,2	262,90	374,60	374,8	$V = +103,5$	$V_c = +103,3$
	262,2	286,45	274,83			
	286.6	363,05-	274,85			
$\Delta i' = +0,005$	362,9					

$i' = -3,0$

	419,9					
	284,0	419.5-	401,75-	402,0	$V = +130,7$	
	419,1	284.5-	401,80			
$\Delta i' = 0$	285,0	419.6	402,20			
	420,1					

$i' = 3,0$

	260,8					
	400,0	260,85-	380,45	380,6	$V = +109,3$	$V_c = 109,6$
	260,9	400,40	380,65-			
	400,8	260,90	380,85-			
$\Delta i' = -0,010$	260,9					

Nyíllal nyugat felé

I állás

$i' = 0$

226,0					
312,1	226.6	269.35			
227,2	311,55	269.38	269,4		
311.0	227,8	269.40			
228,4					

$i' = +3.0$ R

402,4					
280,2	401,95	341,08			
401.5	281.55	341,53	341,4	$V = +71,9$	
$\Delta i' = 0$ 282.9	400,30	341,60			
399,1					

$i' = -3.0$ A

423,2					
297.8	422,7	360.25			
422,2	299,35	360,78	360,7	$V = +91,2$	$V_c = +90,9$
$\Delta i' = +0,010$ 300,9	421,50	361,20			
420,8					

$i' = 3.0$ A N

303,6					
384,7	304,20	344,45			
304.8	284,15	344,48	344,5	$V = +75,0$	$V_c = +74,6$
383.6	305,25	344,48			
$\Delta i' = +0,015$ 305,9					

II állás

$i' = 0$

345,7					
194,7	344,6	269.65			
343.5	195,75	269.63	269,6		
196.8	342,40	269.60			
341,3					

$i' = +3.0$

260,9					
344,0	261,40	302,70			
261.9	343,22	302,62	302,6	$V = +33,1$	$V_c = +32,9$
342.65	262,60	302,63			
$\Delta i' = +0,015$ 263,3					

$i' = -3,0$

	329,2					
	257,3	328,6	289,95			
	328,0	257,95	289,98	290,0	$V = +20,5$	$V_c = +20,5$
	252,6	327,55	290,08			
$\Delta i' = +0,005$	327,1					

$i' = 3,0 \sim$

	278,4					
	313,1	278,65	295,88			
	278,9	312,95	295,93	295,9	$V = +26,4$	$V_c = +26,4$
	312,8	279,00	295,90			
$\Delta i' = -0,005$	279,1					

III alrés

$\Sigma' = 0$

	300,2					
	238,9	299,80	269,35			
	299,4	239,50	269,45	269,4		
	240,1	299,00	269,55			
	298,6					

$i' = +3,0$

	186,6					
	114,7	186,0	150,25			
	185,4	115,20	150,30	150,3	$V = -119,2$	
$\Delta i' = 0$	115,7	184,68	150,19			
	183,95					

$i' = -3,0$

	122,2					
	173,2	122,15	147,68			
	122,1	172,50	147,30	147,4	$V = -122,1$	$V_c = -122,5$
	171,8	122,75	147,28			
	123,4					

$\Delta i' = -0,010$

$i' = 3,0 \sim$

	120,15					
	185,95	120,58	153,27			
	121,00	185,28	153,14	153,1	$V = -116,4$	$V_c = -115,8$
	184,60	121,20	152,90			
$\Delta i' = +0,015$	121,40					

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(3)

Trott lap alul

Nyíllal jelölt irány csavar.

I állás:

$i' = 0$

359,1
174,7 357,55 266,13
356,0 176,30 266,15 } 266,2
177,9 354,45 266,18
352,9

$i' = +3,0$ A

208,80
177,95 208,75 193,35
208,70 178,23 193,52 } 193,5 V = -72,7
178,70 208,30 193,50
$\Delta i' = 0$ 207,90

$i' = -3,0$ A

230,95
180,05 229,95 205,00
228,95 180,68 204,82 } 204,8 V = -61,4 V_0 = 61,7
181,20 228,13 204,72
$\Delta i' = -0,015$ 227,20

$i' = 3,0$ A ~

295,1
113,6 293,40 203,50
291,7 115,20 203,50 } 203,5 V = -62,7 V_0 = -62,5
117,0 290,25 203,63
$\Delta i' = +0,010$ 288,8

II állás:

$i' = 0$

384,15
150,70 382,08 266,39
380,00 152,72 266,37 } 266,4
154,75 378,03 266,39
376,05

$i' = +3,0$

308,3
143,6 306,63 225,13
304,95 145,45 225,20 } 225,2 V = -41,0 V_0 = -41,2
147,30 302,98 225,14
$\Delta i' = -0,015$ 301,00

$i' = -3,0$ R

164,1					
206,4	165,70	236,05			
167,2	205,03	236,17	236,1	$V = -30,1$	$V_c = -30,1$
202,65	168,65	236,15			
$\Delta i' = -0,005$	170,00				

$i' = 3,0$ N

259,9					
207,45	259,35	233,40			
258,80	208,13	233,47	233,5	$V = -32,7$	$V_c = -32,8$
208,80	258,20	233,55			
$\Delta i' = -0,010$	257,80				

III állás

$i' = 0$

304,0					
228,9	203,25	266,13			
202,7	229,50	266,10	266,1		
230,1	302,05	266,08			
201,4					

$i' = +2,0$

373,9					
411,9	274,45	393,18			
275,0	412,10	393,55	393,5	$+127,4$	$V_c = +128,7$
412,2	275,00	393,65			
$\Delta i' = -0,030$	275,0				

$i' = -2,0$

245,0					
405,4	246,20	375,80			
247,1	404,85	375,98	376,0	$+109,9$	$V_c = +108,7$
404,2	248,20	376,25			
$\Delta i' = +0,035$	249,2				

$i' = 3,0$ N

322,4					
430,0	323,55	376,78			
324,7	429,05	376,88	376,8	$+110,7$	$V_c = +111,1$
428,1	325,35	376,70			
$\Delta i' = -0,010$	326,0				

Nyíllal jelzett irány keleten

I állás

$i' = 0$

286,1
253,7 285,90 269,80 } 269,8
285,7 253,85 269,78
254,0 285,50 269,75
285,3

$i' = +3,0$

434,7
283,8 433,80 358,80 } 359,2 $V = +89,4$ $V_c = +89,0$
432,9 285,45 359,18
287,1 432,30 359,70
$\Delta i = +0,015$ 431,7

$i' = -3,0$

331,2
314,3 321,15 322,70 } 323,1 $V = +53,3$ $V_c = +53,7$
321,1 315,1 323,10
315,9 331,05 313,48
$\Delta i = -0,025$ 321,0

$i' = 3,0$ ∾

342,4
328,0 342,25 335,13 } 355,0 $V = +85,2$ $V_c = 85,5$
342,1 327,90 335,00
327,8 342,05 334,90
$\Delta i = -0,010$ 342,0

II állás

$i' = 0$

316,6
223,7 315,95 269,83 } 269,8
315,3 224,35 269,83
225,0 314,65 269,85
314,0

$i' = +3,0$

245,6
344,5 246,25 295,34 } 295,3 $V = +25,5$
246,9 343,80 295,35
343,1 247,50 295,30
$\Delta i = 0$ 248,1

$i' = -3,0$ N

282,3					
341,7	282,70	312,20	312,2	$V = +42,4$	$V_c = +42,1$
283,1	341,35	312,23			
341,0	283,60	312,20			
$\Delta i' = +0,020$ 284,1					

$i' = 3,0$ N

345,7					
262,6	345,15	303,88	303,8	$V = +34,0$	
344,6	263,20	303,90			
263,8	343,75	303,78			
$\Delta i' = 0$ 342,9					

III állás

$i' = 0$

311,9					
228,3	311,25	269,83	269,8		
310,8	228,85	269,83			
229,4	310,25	269,83			
309,7					

$i' = +3,0$

152,1					
136,0	152,2	144,10	143,8	$V = -126,0$	$V_c = -125,6$
152,3	135,8	144,05			
$\Delta i' = +0,010$ 135,6	151,00	143,30			
149,75					

$i' = -3,0$

184,05					
132,20	182,38	157,29	156,5	$V = -113,3$	$V_c = -112,9$
180,70	131,90	156,30			
$\Delta i' = +0,010$ 131,60	180,25	155,93			
179,80					

$i' = 3,0$ N

164,5					
146,6	164,15	155,38	155,1	$V = -114,7$	
163,8	146,20	155,00			
145,8	163,75	154,78			
$\Delta i' = 0$ 163,7					

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(2)

Nyillal jelek irány alatt

$i' = 0$

257.6
283,1 251,80 267,45
252.0 282,90 267,45 } 267,5
282,7 252,20 267,45
252,4

$i' = +3,0$

296.0
254.3 295,80 275,05
295,6 254.68 275,12 } 275,1 $V = +7,6$
255,05 295,20 275,18
295,00

$\Delta i = -0,010$

$i' = -3,0$

256,3
290,4 256,65 273,53
257.0 290,20 273,60 } 273,6 $V = +6,1$
290,0 257.33 273,67
257.65

$\Delta i' = 0$

$i' = 3,0$ ~

291.6
255,4 291,35 273,38
291,1 255,70 273,40 } 273,4 $V = +5,9$
256,0 290,90 273,45
290,7

$\Delta i' = \pm 0,005$

II állás

$i' = 0$

324.5
211,4 323,70 267.55
322,9 212,20 367,55 } 267,5
213.0 322,05 267,53
321,2

$i' = +3,0$ ~

258,3
23,4 256,20 134,80
254,1 25,25 134,68 } 134,7 $V = -132,8$
27,1 252,25 134,68
250,4

$\Delta i' = +0,005$

$i = -3.0$

	255,7					
	85,3	253,90	169,60	169,4	$V = -98,1$	
$\Delta i = 0$	252,1	86,45	169,28			
	87,6	257,10	169,35			
	250,1					

$i = 3.0\ \sim$

	89,7					
	252,4	91,35	161,88	162,2	$V = -105,3$	$V_c = -105,5$
	93,0	251,60	162,30			
$\Delta i = +0,005$	250,8	93,85	162,33			
	94,7.					

III állás

$i = 0$

241,8				
292,7	242,05	267,38	267,4	
242,3	292,90	267,30		
291,9	242,63	267,27		
242,95				

$i = +3.0\ \sim$

334,7					
434,2	336,20	385,21	385,6	$V = +118,2$	
337,7	433,70	385,70			
433,1	338,40	385,75			
339,1					

$\Delta i = 0$

$i = -3.0\ \sim$

417,3					
310,8	416,5	363,65	364,0	$V = +96,6$	$V_c = +96,4$
415,7	312,25	363,98			
313,7	414,85	364,28			
414,0					

$+0,005$

$i = 3.0\ \sim$

329,7					
403,5	330,40	366,95	367,2	$V = +99,8$	$+100,1$
331,1	402,35	367,23			
402,2	331,50	366,35			
331,9					

$\Delta i = -0,010$

Nyéllal jelzett irány nyugatra

I állás

$i' = 0$

391,8
142,8 389.90 266,35 } 266,3
288,0 144,50 266,25
146,2 286,30 266,25
284,6

$i' = +3,0$ A

370,3
95,0 367,65 231,33 } 231,2 $V = -35,1$ $V_i = -34,8$ kisülő $v = -15,9$
365,0 97,40 231,20
99,8 362,55 231,18
360,1

$\Delta i = +0,015$

$i' = -3,0$ A

241,3
333,9 242,05 287,98 } 287,8 $V = +21,5$ $V_i = +21,8$ $v = +7,4$
242,8 332,90 287,85
331,9 243,50 287,70
244,2

$\Delta i = -0,015$

$i' = 3,0$ V

208,0
316,0 208,85 262,43 } 262,4 $V = -3,9$
209,7 315,15 262,43
314,3 210,45 262,38
211,2

$\Delta i = -0$

II állás

$i' = 0$

311,6
221,6 310,85 266,23 } 266,2
310,1 222,25 266,18
222,9 309,50 266,20
308,9

$i' = +3,0$ A

344,1
372,8 344,05 358,43 } 358,15 $V = +92,3$ $V_i = +92,4$
344,0 372,95 358,48
372,1 344,15 358,63
344,3

$\Delta i = -0,005$

$i' = -3.0\,\mathcal{R}$

	362,7					
	348,1	362,50	355,32	354,9	$V = +88,6$	$V_c = +89,8$
	362,05	347,70	354,98			
	347,0	361,83	354,57			
$-0,040$	361,00					

$i' = 3.0\,\sim$

	345,8					
	361,9	345,75	353,83	353,6	$V = +87,0$	$V_c = 87,6$
	345,7	361,45	353,58			
	361,0	345,14	353,28			
$\Delta i' = -0,010$	345,4					

III állás

$i' = 0$

	297,1					
	256,0	296,65	266,00	266,0		
	296,2	256,45	266,00			
	256,9	295,75	266,00			
	295,0					

$i' = +3.0\,\mathcal{R}$

	200,1					
	170,0	198,0	184,00	182,3	$V = -84,0$	$V_c = -82,3$
	195,9	169,60	182,75			
	169,2	194,40	181,20			
	192,9	169,15	181,03			
$\Delta i' = +0,060$	169,1					

$i' = -3,0\,\mathcal{R}$

	194,3					
	138,9	193,25	166,08	165,7	$V = -100,6$	$V_c = -101,1$
	192,2	139,00	165,60			
	139,1	191,85	165,48			
$\Delta i' = -0,015$	191,5					

$i' = 3,0\,\sim$

	95,7					
	258,0	96,65	177,33	177,3	$V = -89,0$	$V = -89,1$
	97,6	257,55	177,58			
	257,1	99,15	178,13			
$\Delta i' = -0,005$	100,7					

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Lap függélyesen az 1 sö vertikális bau
irott lap élein, corrigált nyil felül.

I állás

$i = 0$

268,8
236,7 268,50 252,60
268,2 236,95 252,58
237,2 267,95 252,58
267,7

$i' = +3,0$

296,0
272,2 295,65 283,93
295,3 272,55 283,93
272,9 295,00 283,95
294,7

$\Delta i' = +0,000$

$i' = -3,0$

278,9
261,2 278,85 269,98
278,6 261,45 270,03
261,7 278,35 270,03
278,1

$\Delta i' = +0,010$

$i' = 3,0$ n

262,4
298,6 262,75 280,68
263,1 298,80 280,60
297,6 263,55 280,58
264,0

$\Delta i' = +0,005$

II állás

$i' = 0$

216,1
288,7 216,78 252,74
217,45 287,95 252,70
287,20 218,18 252,69
218,90

$i' = +3,0$

310,3
297,2 310,18 303,69
310,05 297,58 303,82
297,95 309,88 303,92
309,70

$\Delta i' = 0$

$i` = -3.0$

325,15
299,95 325,03 312,49
324,90 300,03 312,62
300,70 324,60 312,65
324,30

$\Delta i` = 0$

$i` = 3,0$ N

344,0
304,95 343,83 324,39
343,65 305,43 324,54
305,90 343,23 324,58
342,80

$\Delta i` = 0$

III allás

$i` = 0$

201,1
303,1 202,1 252,60
203,1 302,1 252,60
301,1 204,1 252,60
205,1

$i` = +3,0$

160,8
166,1 160,8 163,45
160,8 166,03 163,42
165,95 160,70 163,33
160,60

$\Delta i` = -0,005$

$i` = -3,0$

171,0
158,9 171,0 164,95
170,7 159,0 164,85
159,1 170,45 164,78
170,2

$\Delta i` = -0,005$

$i` = 3,0$ N

174,5
121,1 174,45 147,78
174,4 121,65 148,03
122,2 173,80 148,00
173,2

$\Delta i` = 0$

Lap függélyesen és 180° vertikálisban
írott lap délen; cönigálás nyíl keleten

I állás

i = 0

234,2		
266.6	234,55	250,58
234.9	266,30	250,60
266.0	235,20	250,60
235,5		

i = +3.0

	274.1		
	355,4	275,5	315,45
	276.9	354,3	315,60
	353,2	277.6	315,40
Δi = +0.010	278,3		

i = −3.0

	331,3		
	229.0	330,20	279.60
	329.1	230,35	279,73
	231.7	328.05	279.88
	327.0		
Δi = +0,005			

i = 3,0 ~

	317,7		
	277,3	317,35	297,33
	317.0	277,75	297,38
	278,2	316,30	297,25
Δi = 0	315,6		

II állás

i = 0

287,95		
214.95	287,13	251,04
286,30	215,63	250,97
216,30	285,65	250,98
285,00		

i = +3.0

	355,6		
	391,3	355,83	373,57
	356.05	390,70	373,38
	390,1	356,58	373,34
Δi = −0,025	357.0		

$i' = -3,0$

406,2

381,9	406,70	394,30
407,2	382,30	394,75
382,7	407,25	394,98

$\Delta i' = +0,020$ 407,3

$i' = 3,0$ ~

407,3

357,0	436,65	396,83
436,0	357,60	396,80
358,2	435,05	396,63

$\Delta i' = 0$ 434,1

III állás

$i' = 0$

269,7

252,95	269,30	251,13
268,9	253,03	251,12
253,70	268,80	251,10

268,1

$i' = +3,0$

72,2

55,7	72,30	64,00
72,4	55,95	64,18
56,2	71,75	63,98

$\Delta i' = 0$ 71,1

$i' = -3,0$

57,0

74,3	56,9	65,60
57,8	74,6	66,20
74,9	58,30	66,60

$\Delta i' = -0,015$ 58,8

$i' = 3,0$ ~

59,2

47,3	59,75	53,53
60,3	47,00	53,65
46,7	59,80	53,25

$\Delta i' = -0,010$ 59,3

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II állás

$i = 4{,}5\ A \approx$

418,9				
482.0	419.30	450,65		
419,7	481,85	450,78		
481,7	219.90	450,80		
420,1	481,40	450,75	451,36	$v = +201{,}5$
481,1	420,85	450,98		$v_c = +198{,}1$ $\quad v_c' = +197{,}4$
421,6	481,05	451,03		$\alpha = +6^\circ 23' 55''$
481,0	422,85	451,93		
4,53 424,1	480,65	452,38		
480,0	425,00	452,65		
425,9				

$i = 3{,}0\ A \approx$

273,1				
425,2	273.90	349,55		
274,7	424,05	349,38		$v = +99{,}7$
420,9	275,40	349,65		
276,1	423,25	349,68	349,52	$v_c = +99{,}3$
422,6	276,75	349,64		$\alpha = +3^\circ 12' 20''$
277,4	421,30	349,35		
420,0	278,90	349,45		
280,4	419,10	349,45		
418,2				

$i' = 0$

140,0			
358,2	141,55	249,88	249,87
143,1	356,60	249,85	
355,0	~~142,00~~	24'	
~~140~~,9			

VII állás

$i = 4,5$ A n

546,6				
475,7	546,25	571,03		
546,1	477,40	571,75		
479,1	546,45	512,78	512,35	$v = +262,1$
546,8	480,00	513,40		$v_c = +254,9$
480,9	544,90	512,90		$\alpha = +8°13'52''$
545,0	481,50	512,25		
482,1				

$i = 3,0$ A n

324,1				
370,8	324,60	347,70		
325,1	369,95	347,53		
369,1	324,85	346,98		
324,6	367,05	345,83	347,37	$v = +97,1$
365,0	328,00	346,00		$v_c = +96,7$ $\quad v'_c = +96,5$
331,4	365,15	348,28		$\alpha = +3°7'21''$
365,0	331,30	348,30		
331,2	365,50	348,25		
$i = 3,01$	365,7			

$i = 0$

357,7			
144,5	356,05	250,28	
354,4	146,10	250,25	250,26
147,7	352,80	250,25	
351,2			

VIII állás

$i = 4{,}5$ A ~

136,7
102,0 137,00 119,80
137,9 101,85 119,88
101,4 137,80 119,60 } 120,19
137,7 103,40 120,55
105,4 136,80 121,10
135,9

vektor i=0 állás!!

$i = 3{,}0$ ~

117,0
439,0 119,5 279,40
122,0 436,85 279,48
434,4 124,80 279,60 } 279,52
127,6 431,85 279,73
429,0 129,70 279,50
131,8

$V = -259{,}01$
$V_c = -257{,}3$
$\alpha = 8°18' 30''$

$i = 0$

424,9
334,4 424,15 379,28
423,4 335,10 379,25 } 379,27
335,8 422,75 379,28
422,1

$V = -99{,}7$
$V_c = -98{,}9$
$\alpha = -3°11' 35''$

I állás

$i = 4{,}5$ A ~

226,9
204,1 227,85 215,98
228,8 204,40 216,60 } 216,37
204,7 228,35 216,53
217,9 204,80 216,35
204,9

$V = -163{,}0$
$V_c = -162{,}3$
$\alpha = -5°14' 20''$

$i = 4{,}49$

$i = 3{,}0$ ~

210,0
383,9 211,35 297,63
212,7 382,70 297,70
381,5 213,65 297,58 } 297,47
214,6 379,95 297,28
378,4 215,95 297,18
217,0

$V = -182{,}2$
$V_c = -87{,}3$
$\alpha = -2°37' 30''$

$i = 0$

441,0
319,0 440,0 379,65
409,0 320,2 379,60 } 379,62
321,1 408,1 379,60
407,2

$i = 4{,}5$ Amp. $\quad v = 3{,}0$ Amp.

	w	V_c	w'	V_c'
$\frac{I+V}{2}$	$\lambda = 5°29'8$	$-170{,}2$	$\lambda - 2°46'48$	$-86{,}1$
$\frac{II+VI}{2}$	$\lambda + 6°1'35'' - 45°$	$+186{,}1$	$\lambda + 3°0'18'' - 45$	$+93{,}1$
$\frac{III+VII}{2}$	$\lambda + 8°51'50'' - 90°$	$+274{,}4$	$\lambda + 3°23'8'' - 90$	$+104{,}8$
$\frac{IV+VIII}{2}$	$\lambda - 8°56'58'' - 135$	$-277{,}1$	$\lambda - 3°27'50'' - 135$	$-107{,}3$

$V = -x \cdot \omega 2\xi - y \sin 2\xi$ $\quad x = a \sin 2\lambda$ $\quad y = a \cos 2\lambda$

$i = 4{,}5$ a. m.

Summiert

$-982x + 191y = -170{,}200$ $\quad +166{,}942$
$+209x - 978y = -186{,}100$ $\quad +179{,}051$
$-953x - 304y = -274{,}400$ $\quad +274{,}042$
$-307x - 952y = -277{,}100$ $\quad +283{,}802$

Normalgleichungen:

$+20105x + 1900y = +4748144$
$+1900x + 19917y = +4967144$

ausgeglichen
$x = +214{,}53$ $\quad 2\lambda = 43°8'20''$ $\quad a^2 = 98432$
$y = +228{,}93$ $\quad \lambda = 21°34'10''$ $\quad a = 313{,}84$

$i = 3{,}0$ a. m.

Summiert

$-995x + 97y = -86{,}100$ $\quad -84{,}265$
$+105x - 995y = -93{,}100$ $\quad -89{,}487$
$-993x - 118y = -104{,}700$ $\quad -105{,}656$
$-121x - 993y = -107{,}300$ $\quad -110{,}646$

Normalgleichungen:

$+20017x + 363y = +1928444$
$+363x + 19994y = +2031863$

ausgeglichen
$x' = +94{,}53$ $\quad 2\lambda = 43°24'50''$ $\quad a^2 = 18918$
$y' = +99{,}91$ $\quad \lambda = 21°42'25''$ $\quad a' = 137{,}54$

$\frac{x}{x'} = 2{,}269$ $\quad \frac{y}{y'} = 2{,}291$ $\quad \frac{a}{a'} = 2{,}282$ $\quad \frac{\overline{4{,}5}^2}{3^2} = 2{,}250$

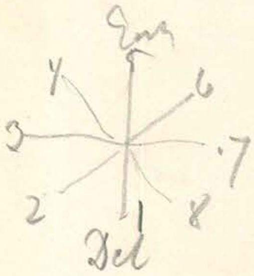
Ph. 21 (9,994) 9,994 gr. súlyú kritikus sárgarézhenger. 1

914 Centrikusan [illegible] lapján felül, bevágás [illegible].

8as állásokban, tekercs[illegible] [illegible] 2K.

~~17,5 [illegible]~~ Külső H: 3,0

1 ampère intenzitásnál a legyező irányában H = ~~3,[illegible]~~ C.G.S.



Skála távol. 887 skalarész

I állás

$i = 0$

corr

257,7			
247.4	257,7	249.55	
257,7	247,45	249,58	249,58
247.5	257,70	249,60	
257.7			

$i = 4,5 \sim$

99.8			
73,8	100,65	87,23	
101,5	72,95	87,23	
72,1	100,90	86,50	86,73
100,3	72,15	86,23	
72,2	100,65	86,43	
101,0	72,55	86,78	
72,9			86,61
72,3			
99.8	72,7	86,25	
73,1	99.9	86,50	86
100,0	72,7	86,35	
72,3			

$v = n - n_0$

$v = + 163,18$

$v_c = -161,3$

$\alpha = -5^\circ 12' 30''$

$i = 3.0 \sim$

152,1			
186.3	152,4	169,35	
152,7	186.2	169,45	169,35
186,1	152,55	169,33	
152,4	186,15	169,28	
186,2			

$v = -80,3$

$v_c = -80,1$

$\alpha = -2^\circ 35' ~~15~~''$

$i = 0$

263,9			
236,0	263,65	249,83	
263,4	236,15	249,78	249,79
236,3	263,20	249,75	
263,0			

$i = 0$ 249,69

Hallás

$i = 4{,}5$ A ~

423,1				
430,6	423,45	427,03		
423,8	430,45	427,13		
430,0	423,70	427,00	427,22	
423,6	431,20	427,40		
432,1	423,00	427,55		
$i = 4{,}57$ 422,4	432,05	427,23		
432,0				

$v = +177{,}4$

$V_c = +175{,}1$ $\quad V_c' = 174{,}8$

$\alpha = +5^\circ 39' 15''$

$i = 3{,}0$ A ~

325,0				
349,7	324,70	337,20		
324,4	348,45	336,68		
348,2	324,55	336,38		
324,7	348,55	336,63	336,93	
348,9	325,20	337,05		
325,7	349,60	337,65		
350,0				

$v = +87{,}1$

$V_c = +86{,}8$

$\alpha = +2^\circ 48' 15''$

$i = 0$

260,8			
239,1	260,60	249,85	
260,4	239,25	249,83	249,84
239,4	260,25	249,83	
260,1			

Hallás

$i = 4{,}5$ A ~

511,7				
600,6	512,7	556,65		
513,7	598,55	556,13		
596,5	515,80	556,15		
517,9	591,80	554,85		
587,1	517,25	552,18	554,26	
516,6	589,85	553,23		
592,6	516,35	554,48		
516,1	590,60	553,35		
$i = 4{,}49$ 588,6	517,05	552,83		
518,0	587,55	552,78		
586,5				

$v = +304{,}4$

$V_c = +293{,}3$ $\quad V_c' = 293{,}9$

$\alpha = +9^\circ 28' 15''$

$i = 3{,}0$ ∾

360,7			
365,9	361,15	363,53	$v = +112{,}5''$
361,6	365,55	363,58	$v_c = +112{,}9$
365,2	361,40	363,30	363,40
361,2	365,45	363,33	$\alpha = +3^\circ 38' 50''$
365,7	360,85	363,28	
360,5			

$i = 0$

140,8			
357,4	142,4	249,90	
144,0	355,7	249,85	249,86
354,2	145,55	249,83	
147,1	352,60	249,85	
357,0			

IV állás

$i = 4{,}5$ ∿ a

− 1,0			
− 115,1	− 2,7	− 58,90	$v = -308{,}6$
− 4,4	− 115,4	− 59,90	$v_c = -296{,}9$
− 115,7	− 4,4	− 60,05	− 59,23
− 4,4	− 113,7	− 59,05	$\alpha = -9^\circ 35' 25''$
− 111,7	− 6,25	− 58,98	
− 8,1	− 110,40	− 59,25	
− 109,1	− 7,8	− 58,45	
− 7,5			

$i = 3{,}0$ ∿ a

180,8			
86,9	179,70	133,30	
178,6	87,80	133,20	$v = -116{,}3$
88,7	177,70	133,20	$v_c = -115{,}7$
176,8	89,25	133,03	133,04
89,8	176,00	132,90	$\alpha = -3^\circ 44' 5''$
175,2	90,25	132,73	
90,7	175,20	132,95	
175,2			

$i = 0$

181,7			
316,0	182,70	249,35	249.34
183,7	315,0	249,35	
314,0	184,65	249,30	
185,6			

V állás

$i = 4,5$ A

49,1					
86,2	49,45	67,80			
49,8	86,15	67,98			
86,1	50,20	68,15			
50,6	85,95	68,28	68,36	$V = -180,9$	
85,8	50,80	68,30		$V_c = -178,4$	$-179,1$
$i = 4,48$ 57,0	86,55	68,78		$\alpha = -5^\circ 45' 45''$	
87,0	51,10	69,20			
57,2					

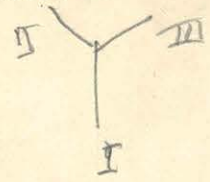
$i = 3,0$ A

90,6					
223,2	90,75	156,98			
90,9	222,25	156,58			
221,3	91,65	156,48		$V = -92,4$	
92,4	220,55	156,48	156,86	$V_c = -92,0$	
219,8	93,25	156,53		$\alpha = -2^\circ 58' 20''$	
94,1	220,05	157,08			
220,30	95,45	157,88			
96,8					

$i = 0$

192,2			
205,3	193,1	249,20	249,23
194,0	204,5	249,25	
203,7	194,8	249,25	
195,6			

Okt. 30



5 mm. hosszú sárgaréz rudacska
ismét - dél irányban

$i = 0$

164.8
225,0 165,8 195,55
166,8 224,8 195,80
224,0 167,4 195,85
168,0

I állás

$i = 4.5$ R ~ -4,0

141.7
225,0 143,0 184,00
144,3 223,65 183,98
222,0 145,65 183,98
$\Delta i = +0,015$ 147.0

II állás

$i = 4.5$ R ~ -7

110,0
188,8 111,5 150,15
113,0 187.4 150,20
186,0 114,3 150,15
$\Delta i = +0,005$ 115,6

III állás

$i = 4.5$ R +10

266,3
254,9 256,10 255,50
255,9 254,85 255,38
254,8 255,90 255,35
$\Delta i = 0$ 255,9

$i = 0$

214.0
178,1 213,40 195,75
212,8 178,68 195,74
179,25 212,25 195,75
211,70

Az előbbi rudacska lelapítva lapjának normálisa észak-dél irányban

$i = 0$

132,0		
253,8	134,10	193,95
136,2	251,80	194,00
249,8	138,20	194,00
140,2		

I állás

$i = 4.5 \sim$

235,9		
148,4	234,40	191,40
232,9	149,90	191,40
151,4	231,45	191,43
230,0		

II állás

$i = 4.5\ A \sim$

174,9		
257,0	180,15	215,58
181,4	249,85	215,63
248,7	182,65	215,68
183,9		

III állás

$i = 4{,}5\ A \sim$

155,4		
191,2	156,10	173,65
156,8	190,60	173,70
190,0	157,45	173,73
158,1		

$i = 0$

214,0		
175,1	213,35	194,23
212,7	175,75	194,23
176,4	212,00	194,20
211,3		

1914 okt. 28

Lap függélyesen az 1ső vertikálisban írott lap alatt, corrigált nyil felül

I állás

i = 0

191,15		
214.40	192,28	253,29
192.60	212,25	253,43
212.10	194.80	253,45
196.00		

i = +3.0

291,1		
236.0	290,55	263,28
290.0	236.65	263,33
237.2	289.4	263,35
288,8		

Δi = +0,010

i = −3.0

245,6		
303,3	246,20	274,75
246,8	302,65	274,73
302,0	247,45	274,73
248,1		

Δi = 0

i = 3.0 ~

318,8		
223.8	317,75	270,78
316,7	224.80	270,75
225,8	315,70	270,75
314.7		

Δi = +0,020

II állás

i = 0

214.75		
292.00	215,48	253,74
216,20	291.20	253,70
290.40	217.00	253,70
217,80		

i = +3.0

331,7		
302,9	331,4	317,15
331,1	303,35	317,23
303,8	331,30	317,55
331,6		

Δi = +0,030

$i' = -3.0$

	306,6		
	329.8	306,68	318,24
	306,75	329.75	318,25
	329.7	307,20	318,45
$\Delta i = +0,015$	307.65		

$i' = 3.0$ N

	278.8		
	288,25	280,8	334,53
	282,80	287,10	334,97
$\Delta i = +0,020$	286.00	284,05	335,00
	285,00		

III allas

$i' = 0$

	171.6		
	333.4	173,20	253,30
	174.8	331,85	253 33
	330,0	176,25	253,28
	177.7		

$i' = +3.0$

	102,7		
	246.0	105,35	175,68
	106.0	244.45	175,23
$\Delta i = 0$	242.9	107,50	175,20
	109.0		

$i' = -3.0$

	227,2		
	103,2	225,65	164,43
	224.1	104,60	164,35
	106.0	223,05	164,53
$\Delta i = 0$	222,0		

$i' = 3.0$ N

	162,9		
	143.1	162,65	152,88
	162,4	143,20	152,80
	143,3	162,05	152,68
$\Delta i = +0,020$	161,7		

Lap függélyesen az 1ső vertikálisban írott lap délen, corrigált nyil nyugatra

I állás

$i = 0$

227.85		
227.90	228,38	253,14
228,90	277.40	253,15
276.90	229.40	253,15
229.90		

$i = +3.0$

	289.95		
	355,20	290,98	323,09
	292.0	354,50	323,25
$\Delta i = -0,015$	353.8	292.65	323,23
	293,3		

$i = -3.0$

	318,10		
	357.65	319.0	338,33
	319.90	357.73	338,82
	357.80	320,15	338,98
$\Delta i = +0,050$	320,40		

$i = 3.0$ ~

	322,3		
	343,5	322,50	333.00
	322,7	343.55	333,13
	343.6	323,30	333,45
$\Delta i = +0.040$	323.9		

II állás

$i = 0$

322,0		
186.1	320,55	253,33
319.1	187,50	253,30
188,9	317,70	253,30
316,3		

$i = +3.0$

	383,3		
	324.9	382.65	353,78
	382,0	325,75	353,58
	326.4	380,85	353,63
$\Delta i = -0,040$	379.7		

$l' = -3.0$

333.1		
389.9	333.08	361,49
333.05	389.35	361,20
388,8	334,88	361,84
336.7		

$\Delta l' = -0,010$

$l' = 3.0$ ~

376.9		
366,2	377.25	371.73
377.6	366.85	372,03
366.7	377,25	371,98
376.9		

$\Delta l' = +0,025$

III állás

$l' = 0$

158,9		
345,2	160,85	253,03
162,8	343,25	253.03
341,3	164,70	253,00
166,6		

$l' = +3.0$

44.9		
80,2	44,40	62,30
43,9	82,65	63,28
85,1	41,50	63,30
39,1		

$\Delta l' = +0,030$

$l' = -3.0$

41,8		
67,3	12,70	40,00
13,6	66,50	40,05
65,7	14,85	40,28
16,1		

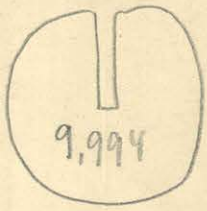
$\Delta l' = -0,030$

$l' = 3.0$ ~

22.0		
59.0	20,70	39,85
19,4	58.40	38,90
57,8	20,05	38,93
20,7		

$\Delta l' = +0,030$

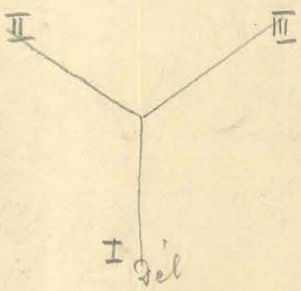
1914. okt. 26



9,994 gr. súlyú Kritikus sárgarézlemez korongtárcsa (1)
Centrikusan írott lappal felül,
harmonikus állásban

Tekercshordó oldalkar belső széle 22 c. távolságban
Skálatávol : 892 mm.

Trott lap felül,
Nyíllal jelzett irány északra



I állás

i = 0

352,1			
150,6	350,75	250,68	250,6
349,4	151,85	250,63	
153,1	348,05	250,58	
346,7			

i = + 3,0 A

187,1				
341,6	188,2	264,80	264,8	V = + 14,1
189,3	340,5	264,90		
339,4	190,3	264,85		
191,3				

i = - 3,0 A

328,9				
196,8	328,05	262,43	262,4	V = + 11,7
327,2	197,60	262,40		
198,4	326,40	262,40		
325,6				

i = 3,0 A

201,05				
322,95	201,88	262,42	262,4	V + 11,7
202,70	322,13	262,42		
321,30	203,45	262,38		
204,20				

II állás

i = 0

295,2			
206,9	294,60	250,75	250,8
294,0	207,50	250,75	
208,1	293,40	250,75	
292,8			

$i = +3.0$ ℓ

57,1					
208,8	58,05	133,43	} 133,2	$V = -117,5$	
59,0	207,40	133,20			
206,0	60,05	133,03			
61,1					

$i = -3,0$ ℓ

189,9					
55,7	187,98	121,84	} 121,4	$V = -129,3$	
186,0	56,95	121,18			
57,0	185,95	121,18			
184,7					

$i = 3,0$ ℓ ~

129,9					
138,7	129,9	134,30	} 134,1	$V = -116,6$	
129,9	138,45	134,18			
138,2	129,20	133,70			

III állás

$i = 0$

279,8					
222,1	279,35	250,73	} 250,7		
278,9	222,55	250,73			
223,0	278,50	250,75			
278,1					

$i = +3,0$ ℓ

	270,0					
	420,4	271,90	346,15	} 346,3	$V = +95,6$	$V_c + 95,3$
	272,8	418,75	346,28			
	417,1	275,55	346,33			
$\Delta i = +0,020$	277,3					

$i = -3,0$ ℓ

	421,6					
	320,3	420,50	370,40	} 370,6	$V = +119,9$	$V_c = +119,5$
	419,4	321,70	370,55			
	323,1	418,70	370,90			
$\Delta i = +0,010$	418,0					

$i = 3,0$ ℓ ~

	318,1					
	383,9	318,15	351,03	} 351,3	$V = +100,6$	$V_c = +100,3$
	318,2	384,25	351,23			
	384,6	318,75	351,63			
$\Delta i = +0,010$	319,3					

Nyíllal jelzett irány kalibrálása

I állás

$i' = 0$

344,3					
196,2	243,25	269,73	269,7		
242,2	197,30	269,75			
198,4	241,15	269,78			
240,1					

$i' = +3,0$ A

174,7					
327,3	176,15	251,73	251,7	$V = -18,0$	
177,6	325,80	251,70			
324,3	178,95	251,63			
180,3					$\Delta i' = 0$

$i' = -3,0$

338,7					
184,9	337,05	260,98	260,9	$V = -8,8$	
335,4	186,35	260,88			
187,8	333,85	260,83			$\Delta i' = 0$
332,3					

$i' = 3,0$ N

193,8						
324,4	194,8	259,60	259,5	$V = -10,2$	$V_c = -10,3$	
195,8	323,25	259,50				
322,1	196,75	259,43				$\Delta i' = -0,015$
197,7						

II állás

$i' = 0$

329,2					
211,0	328,35	269,68	269,7		
327,5	211,85	269,68			
212,7	326,65	269,68			
325,8					

$i' = +3,0$ A

413,7					
327,4	412,80	370,10	370,0	$V = +100,3$	
411,9	327,80	369,85			
328,2	411,60	369,90			$\Delta i' = 0$
411,3					

$i = -3,0$ ℓ

331,3

407,8	333,10	370,45	} 370,8	$V = +101,1$	
334,9	407,35	371,13			
406,9					

$i = 3,0$ ∾

310,2					
420,0	311,15	365,58			
312,1	418,90	365,45	} 365,3	$V = +95,6$	
417,8	312,55	365,18			
$\Delta i = -0,005$ 313,0	418,05	365,03			
416,2					

III allás

$i = 0$

164,95					
370,10	166,48	269,79	} 269,8	$V =$	
168,00	371,60	269,80			
370,10	169,45	269,78			
170,9					

$i = +3,0$

109,8					
257,2	110,75	183,98			
111,7	256,15	183,93	} 184,0	$V = -85,8$	$V_c = -85,7$
$\Delta i = +0,005$ 255,1	112,85	183,98			
114,0					

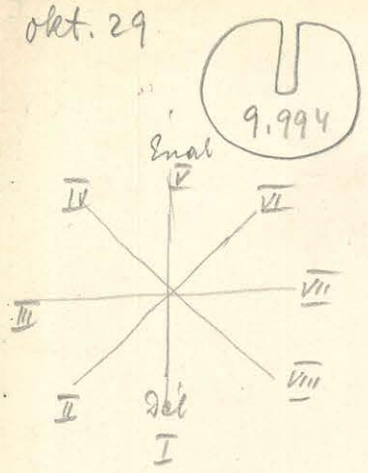
$i = -3,0$

108,3					
245,6	109,45	177,53			
$\Delta i = -0,005$ 110,6	244,00	177,30	} 177,2	$V = -92,6$	$V_c = -92,8$
242,4	111,25	176,83			
111,9					

$i = 3,0$ ∾

162,2					
202,9	162,30	182,60			
162,4	203,40	182,90	} 182,9	$V = -86,9$	$V_c = -86,7$
203,9	162,25	183,13			
$\Delta i = +0,015$ 162,3					

okt. 29



9,994 gr. súlyú kritikus sárgaréz lemez.

Excentrikusan (12 mm. excentricitással) keleten
érő lapja felül, karcsú nyíl észak felé
8 as állásban

~~ejtőjén ... okt ...~~

22 cm távolságban

I állás

$i = 0$

304,1		
209,3	302,35	255,83
301.6	210,65	256,13
212,0	300,30	256.15
299.0		

$i = 3.0$ v

316,2		
390,4	317,15	353,78
318,1	389,63	353,87
388,9	319.10	354,00
320,1		

$\Delta i = +0,070$

II állás

$i = 3,0$ v

380,9		
408,1	380,9	394,50
380,9	408,0	394,60
408,5	380,55	394,53
380,2		

$\Delta i = +0.005$

III állás

$i = 3,0$ v

239.6		
263,2	239.90	251,55
240,2	262,90	251,55
262,6	240,55	251.58
240,9		

$\Delta i = -0,015$

IV állás

$i = 3,0$ v

149,95		
97,10	149.43	123,27
148,90	98,40	123,65
99,70	148,00	123,85
147,10		

$\Delta i = +0,005$

V. állás

$l' = 3,0$ n

163,20		
184,70	163,60	174,15
164,10	184,05	174,08
183,40	165,00	174,20
165,90		

$\Delta l' = +0,015$

VI állás

$l' = 3,0$ n

277,0		
356,0	278,55	317,28
280,1	354,65	317,38
353,2	281,20	317,20
282,3		

$\Delta l' = -0,010$

VII állás

$l' = 3,0$ n

249,7		
195,0	248,85	221,93
248,0	195,75	221,88
196,5	247,20	221,85
246,4		

$\Delta l' = -0,005$

VIII állás

$l' = 3,0$ n

122,3		
254,3	124,2	189,25
126,1	252,3	189,20
250,3	127,6	188,95
129,1		

$\Delta l' = -0,015$

I állás

$l' = 3,0$ n

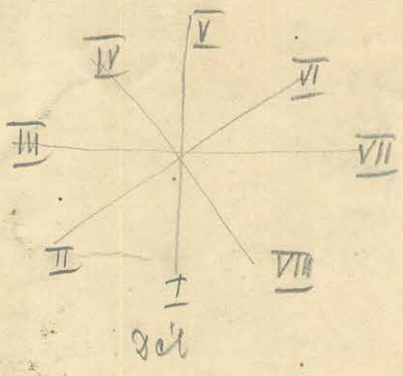
360,8		
344,9	360,85	352,88
360,9	344,75	352,83
344,6	360,35	352,48
359,8		

$\Delta l' = -0,025$

$l' = 0$

273,9		
237,9	270,4	255,65
272,9	238,4	255,65
238,9	272,4	255,65
271,9		

okt. 29.



9,994 gr. súlyú kritikus sáros arélemez

Excentrikusan (: 12 mm. excentricitással)
keleten, üres lap a felül, bevágás észak felé
8as állásban
ép úgy mint okt. 23-án

I állás

i = 0

296,7
217,1 295,55 256,33
294,4 218,20 256,30
219,0 293,00 256,30
292,2

i = 3.0 ν

297,6
238,4 296,75 267,58
295,9 239,25 267,58
240,1 295,10 267,60
294,0

Δi = +0,010

II állás

i = 3,0 ν

359,4
397,3 359,25 378,28
359,1 296,70 377,90
296,1 359,70 377,90
360,0

Δi = +0,010

III állás

i = 3,0 ν

304,6
363,0 305,3 334,15
306,0 362,65 334,33
362,0 306,15 334,23
306,0

Δi = 0

IV állás

i = 3,0 ν

~~212,2~~
117,7 214,1 164,40
210,6 118,75 164,38
119,8 208,70 164,25
207,4

Δi = +0,010

V állás

i = 3,0 ~

	74,7		
	107,0	74,25	90,83
	74,0	106,6	90,00
	104,7	75,60	90,15
Δi +0,015	77,2		

VI állás

i = 3,0 ~

	156,8		
	250,1	159,35	254,78
	161,9	247,55	254,73
	245,0	164,35	254,68
Δi = +0,005	166,8		

VII állás

i = 3,0 ~

	384,0		
	311,3	382,80	347,05
	281,6	312,20	346,90
	313,1	280,45	346,78
Δi = +0,020	279,0		

VIII állás

i = 3,0 ~

	183,2		
	213,7	184,15	198,93
	185,1	213,00	199,20
	212,9	185,50	199,20
	185,9		
Δi = +0,010			

I állás

i = 3,0 ~

	206,85		
	324,80	208,47	266,62
	210,00	323,10	266,55
	321,40	211,48	266,43
	212,95		
Δi = −0,005			

i = 0

	207,8		
	302,1	209,10	256,10
	210,4	301,80	256,10
	300,5	211,70	256,10
	213,0		

Az előbbi, ívalakú felső bevágás Keletfelé
12 m.m. excentricitással

$i = 0$

248,4		
255,0	248,55	251,78
248,7	254,90	251,80
254.8	248,80	251,80
248,9		

I állás

$i = 3.0$ ~

386,3		
397,7	385,65	391,68
385,0	398,15	391.58
398,6	384,95	391,78
384,9		

$\Delta i = -0{,}010$

II állás

$i = 3.0$ ~

239.2		
204.4	238,7	221,55
238,2	205,0	221,60
205,6	238,0	221,80
237.8		

$\Delta i = 0$

III állás

$i = 3.0$ ~

220,4		
184.7	220,0	202,35
219.6	184.85	202,23
185,0	218,85	202,93
218,1		

$\Delta i = -0{,}010$

IV állás

$i = 3.0$ ~

204,2		
281,3	205,30	243,30
206,4	280,20	243,30
279.1	207,55	243,33
208,7		

$\Delta i = +0{,}015$

V állás

$i' = 3.0$ ∾

254.8		
301.3	255,50	278,40
256.2	300,10	278,15-
299.9	256,90	278,40
$\Delta i' = 0$	257.4	

VI állás

$i' = 3.0$ ∾

57,8		
81,5-	58,25-	69,88
58,7	79.65-	69.18
77.8	58,40	68,10
$\Delta i' = 0$	58,1	

VII állás

$i' = 3.0$ ∾

129.5-		
184.7	131,20	157,95-
132.9	184,05-	158,48
183.4	133,55	158,48
$\Delta i' = +0,010$	134,2	

VIII állás

$i' = 3.0$ ∾

379.8		
390,5-	379.85	386,88
379.9	392.00	386,45-
392.5	379.65	386.08
$\Delta i' = -0,015$	379,4	

I állás

$i' = 3.0$ ∾

398,0		
390,1	397,25-	393,73
396.7	389.55	393,13
389.0	396,40	393,20
$\Delta i' = 0$	396,1	

$i' = 0$

257,1		
265,1	257.55-	251,33
258,0	264,70	251,35-
264,3	258,40	251,35-
	258,8	

Okt. 23

$i = 3{,}0$ Amp

	~		+		—		± közepe	
	ξ	ν_c'	ξ	ν_c'	ξ	ν_c'	ξ	ν_c'
$\frac{I+V}{2}$	$-2°27'$	$-76{,}3$	$-2°33'$	$-79{,}2$	$-2°35'$	$-80{,}1$		
$\frac{II+VI}{2}$	$-42°32'$	$+76{,}6$	$-42°19'$	$+83{,}1$	$-42°23'$	$+81{,}1$		
$\frac{III+VII}{2}$	$-87°23'$	$+81{,}2$	$-87°3'$	$+91{,}5$	$-87°9'$	$+88{,}6$		
$\frac{IV+VIII}{2}$	$-137°57'$	$-86{,}3$	$-138°3'$	$-94{,}9$	$-138°3'$	$-95{,}0$		

~ Vált. Kor. ára:

$$+996x - 84y = +76300$$
$$+87x - 996y = -76600$$
$$-996x - 90y = -81200$$
$$+102x + 995y = +86300$$

$\frac{a}{a'} = 2{,}275$

Normál egyenletek:

$$+20020x + 208y = +1590084$$
$$+208x + 19972y = +1630609$$

$x = +78{,}59$ $\quad$ $y = +80{,}83$

$2\lambda = 44°11'40''$ $\quad$ $a^2 = 12710$

$\lambda = 22°5'50''$ $\quad$ $a' = 112{,}74$

$i' = 4{,}5$ Gon.

	~ ξ	~ v_c'	+ ξ	+ v_c'	− ξ	− v_c'	± Közepes ξ	± Közepes v_c'
$\frac{I+V}{2}$	$-4^\circ 38'$	−154,7	$-5^\circ 13'$	−162,1	$-5^\circ 13'$	−162,1	$-5^\circ 13'$	−162,1
$\frac{II+VI}{2}$	$-40^\circ 4'$	+153,9	$-39^\circ 34'$	+169,3	$-39^\circ 41'$	+165,0	$-39^\circ 38'$	+167,2
$\frac{III+VII}{2}$	$-83^\circ 1'$	+212,9	$-82^\circ 24'$	+236,9	$-82^\circ 38'$	+229,9	$-82^\circ 34'$	+233,4
$\frac{IV+VIII}{2}$	$-141^\circ 57$	−217,0	$-142^\circ 53'$	−246,5	$-142^\circ 52'$	−245,8	$-142^\circ 53'$	−246,2

$x = a\sin 2\lambda \qquad y = a\cos 2\lambda \qquad -x\cos 2\xi - y\sin 2\xi = v_c'$

± közepre.

Szám tag

$+983x - 182y = +162100 \quad | +154289$
$+185x - 983y = -167200 \quad | -162715$
$-966x - 259y = -253400 \quad | -240115$
$+273x + 962y = +246200 \quad | +247496$

Normálegyenletek:

$+20082x + 1521y = 4210893$
$+1521x + 19919y = 4321504$

$x = +194{,}38$ ennek
$y = +202{,}11$

$2\lambda = 43^\circ 53' 0''$ $a^2 = 78632$
$\lambda = 21^\circ 56' 30''$ $a = 280{,}41$

Válaszsora:

$+985x - 174y = +154700$
$+171x - 985y = -153900$
$-970x - 242y = -212900$
$+239x + 971y = +217000$

Normálegyenletek:

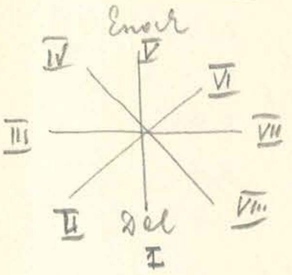
$+19975x + 1270y = +3844386$
$+1270x + 20019y = +3869025$

$x = +180{,}90$
$y = +181{,}79$

$2\lambda = 44^\circ 57' 30''$ $a^2 = 65772$
$\lambda = 22^\circ 28' 45''$ $a = 256{,}40$

okt. 23

9,994 gr. súlyú kritikus sárgarézlemez.
Centrikusan irott lappja felül, bevágás északon
8as állásokban



Először centrírozva:

~~18.5 cm távolságban~~ tekercstartó deszka belső széle 22 C.
1 ampere intenzitásnál a tengelyirányában H =
skálatávol: 892 mm

I állás:

i + esetében a tekercs északi pólusa belül

i = 0

252,95			
246,80	252,93	249,87	
252,90	246,85	249,88	249,88
246,90	252,85	249,88	
252,80			

i = +4,5 A

110,7					
64,3	110,95	87,63			
111,2	64,60	87,90	87,31	v = −162,59	v′ = −162,6
64,9	109,10	87,00			
107,0	66,40	86,70			v'_c = −160,9
67,9					α = −5° 11′

i = −4,5 A

129,1					
62,0	125,90	93,95			
122,7	63,55	93,13	93,54	v = −156,36	v′ = −156,4
65,1	121,95	93,53			
121,2					v'_c = −155,3
					α = −4° 59′

i = +3.0 A

116,9					
223,8	117,50	171,65			
118,1	222,70	170,40	170,77	v = −79,13	v′ = −79,1
221,6	118,90	170,25			
119,7					v'_c = −78,9
					α = −2° 32′

i = −3,0 A

237,2					
110,1	236,55	173,33			
235,9	112,10	174,00			
114,1	235,40	174,75	174,21	v = −75,69	v′ = −75,7
234,9	114,70	174,80			v'_c = −75,6
115,3					α = −2° 26′

i = 4,5 A ~

76,7					
121,9	77,10	99,50			
77,5	122,25	99,88	99,79	v = −150,11	v′ = −150,1
122,6	77,40	100,00			v'_c = −149,0
77,3					

i = 3,0 ~

α = −4° 47′

230,1					
122,0	229,5	175,75			
228,9	123,0	175,95	175,92	v = −73,98	v′ = −74,0
124,0	228,10	176,05			
227,3					v'_c = −73,9
					α = −2° 22′

II állás

$i = 0$

232,2
267.4 232,45 249,93
232,7 267,15 249,93 } 249,92
266,9 232,90 249,90
232,

$i = +4.5\ \Omega$

409,8
417,3 410,60 413,95
411,40 417,15 414,28 } 414,0 $v = +164,20$ $v' = +164,2$
417,00 411,15 414,08
410,90 416,50 413,70 $v_c' = +162,9$
416,00 $\alpha = +5^\circ 13'$

$i = -4.5\ \Omega$

424,3
392,0 424,45 408,23
424,6 391,85 408,23 } 408,30 $v = +158,50$ $v' = +158,5$
391,7 424,85 408,28
225,1 391,80 408,45 $v_c' = +157,3$
391,9 $\alpha = +5^\circ 3'$

$i = +3.0\ \Omega$

324,3
334,9 324,70 329,80
325,1 335,00 330,05 } 330,01 $v = +80,21$ $v' = +80,2$
325,1 325,15 330,13
325,2 334,90 330,05 $v_c' = +80,0$
324,7 $\alpha = +2^\circ 34'$

$i = -3.0\ \Omega$

337,8
313,3 338,05 325,68
338,2 314,05 326,18 } 326,26 $v = +76,46$ $v' = +76,5$
314,8 338,15 326,48
338,0 315,35 326,68 $v_c = +76,4$
315,9 $\alpha = +2^\circ 28'$

$i = 4.5\ \Omega\ \sim$

378,6
417,9 378,20 398,05
377,8 417,80 397,80 } 397,93 $v = +148,13$ $v' = +148,1$
417,7 378,15 397,93
378,5 $v_c = +147,1$
$\alpha = +4^\circ 43'$

$i = 3,0\ \Omega\ \sim$

236,0
409,6 237,05 323,33
238,1 408,35 323,23 } 323,23 $v = +73,43$ $v' = +73,4$
407,1 239,20 323,15
240,2 406,10 323,20 $v_c = +73,3$
405,1 $\alpha = +2^\circ 22'$

III állás

$i = 0$

326,6
174,0 325,40 249,70
324.2 175,15 249,68 } 249,69
176,3 323,10 249,70
322,0

$i = +4{,}5\ \Omega$

497,8
520,5 497,60 509,05
497,4 519,95 508,68 } 508,44 $V = +258{,}84$
519,4 496,85 508,13
496,0 519,45 507,88
519,5

$V' = +258{,}8$
$V_c = +253{,}5$
$\alpha = +8^\circ 7'$

$i = -4{,}5\ \Omega$

520,1
449,3 520,10 484,70
520,1 450,85 485,98 } 485,57 $V = +235{,}97$
452,4 519,70 486,05
519,3

$V' = +236{,}0$
$V_c' = +232{,}0$
$\alpha = +7^\circ 26'$

$i = +3{,}0\ \Omega$

304,0
393,1 304,95 349,03
305,9 393,00 349,45 } 349,43 $V = +99{,}83$
392,9 306,75 349,83
307,6

$V' = +99{,}8$
$V_c' = +99{,}5$
$\alpha = +3^\circ 12'$

$i = -3{,}0\ \Omega$

368,2
305,7 367,55 336,63
366,9 306,40 336,65 } 336,69 $V = +87{,}09$
307,1 366,45 336,78
366,0

$V' = +87{,}1$
$V_c = +86{,}9$
$\alpha = +2^\circ 48'$

$i = 4{,}5\ \Omega \sim$

492,2
464,3 491,70 478,00
491,2 465,95 478,58 } 478,45 $V = +228{,}85$
467,6 489,95 478,78
488,7

$V' = +228{,}9$
$V_c' = +225{,}2$
$\alpha = +7^\circ 14'$

$i = 3{,}0\ \Omega \sim$

213,1
464,0 215,40 339,70
217,7 461,65 339,68 } 339,60 $V = +90{,}00$
459,3 219,45 339,38
221,2 458,05 339,63
456,8

$V' = +90{,}0$
$V_c' = +89{,}8$
$\alpha = +2^\circ 53'$

$i = 0$

152,6
345,1 154,00 249,55
155,4 343,60 249,80 } 249,50
342,1 156,80 249,45
158,2

IV. állás

$i = 0$

283,1
216,8 282,6 249,70
282,1 217,3 249,70 } 249,71
217,8 281,65 249,73
281,2

$i = +4,5\ \Omega$

−18,2
+31,6 −16,00 +7,80
$\Delta i = -0,048$ −13,8 +31,80 +9,00 } +8,60 $V = -241,00$ $V' = -245,8$
+32,0 −12,20 +9,60 $V_c' = -241,3$
−10,6 $\alpha = -7°44'$

$i = -4,5\ \Omega$

+29,9
−63,5 +29,35 −17,08
$\Delta i = +0,008$ +28,8 −63,50 −17,35 } −17,17 $V = -266,77$ $V' = -265,8$
−63,5 +29,35 −17,08 $V_c' = -260,1$
+29,9 $\alpha = -8°19'$

$i = +3,0\ \Omega$

223,7
99,3 221,65 160,48
$\Delta i = -0,007$ 219,6 100,55 160,08 } 160,20 $V = -89,40$ $V' = -89,8$
101,8 218,30 160,05 $V_c' = -89,6$
217,0 $\alpha = -2°53'$

$i = -3,0\ \Omega$

107,0
190,8 107,85 149,33
$\Delta i = -0,048$ 108,7 190,80 149,75 } 149,78 $V = -99,82$ $V' = -103,0$
190,8 109,70 150,25 $V_c' = -102,7$
110,7 $\alpha = -3°18'$

$i = 4,5\ \Omega\ \sim$

−32,5
+77,9 −30,55 +23,68
$\Delta i = -0,007$ −28,6 +76,75 +24,08 } +23,62 $V = -225,98$ $V' = -226,7$
+75,6 −29,20 +23,20 $V_c' = -223,8$
−29,8 $\alpha = -7°9'$

$i = 3,0\ \Omega\ \sim$

276,9
46,7 274,9 160,80
$\Delta i = -0,007$ 272,9 48,8 160,85 } 160,86 $V = -88,74$ $V' = -88,8$
50,9 270,95 160,93 $V_c' = -88,6$
269,0 $\alpha = -3°1'$

Okt. 28

V allás

(2)

$i' = 0$

235,8
263,1 235,95 249,53 } 249,54
236,1 262,95 249,53 }
262,8 236,3 249,55 }
236,5

$i' = +4.5$

108,1
59,2 108,0 83,60
$\Delta i' = +0,078$ 107,9 59,5 83,70 } 83,70 $V = -165,90$ $V' = -164,6$
59,8 107,8 83,80 } $V_c' = -163,2$
107,7 $\alpha = -5°14'$

$i' = -4.5$

52,9
106,2 52,85 79,53 }
$\Delta i' = 0$ 52,8 105,45 79,13 } 79,18 $V = -170,42$ $V' = -170,4$
104,7 53,05 78,88 } $V_c' = -168,9$
53,3 $\alpha = -5°27'$

$i' = +3.0$

122,6
217,1 123,20 170,15
$\Delta i' = -0,002$ 123,8 216,20 170,00 } 170,00 $V = -79,60$ $V' = -79,7$
215,3 124,35 169,83 } $V_c' = -79,5$
124,9 $\alpha = -2°33'$

$i' = -3.0$

209,2
123,1 208,45 165,78
$\Delta i' = -0,012$ 207,7 123,50 165,60 } 165,55 $V = -84,05$ $V' = -84,8$
123,9 206,65 165,28 } $V_c' = -84,6$
205,6 $\alpha = -2°44'$

$i' = 4.5 \sim$

121,2
57,0 121,05 88,03
$\Delta i' = -0,005$ 120,9 55,65 88,28 } 88,23 $V = -161,27$ $V' = -162,6$
56,3 120,45 88,38 } $V_c' = -160,3$
120,0 $\alpha = -5°9'$

$i' = 3.0 \sim$

120,8
220,7 121,90 171,30
$\Delta i' = -0,012$ 123,0 219,85 171,43 } 171,34 $V = -78,26$ $V' = -78,8$
219,0 123,60 171,30 } $V_c' = -78,6$
124,2 $\alpha = -2°32'$

VI állás

$i' = 0$

219,4
279,4 219,85 249,63
220,3 279,00 249,65 } 249,64
278,6 220,70 249,65
221,1

$i' = +4,5$

479,6
274,3 478,85 426,58
478,1 275,10 426,60 } 426,70 $r = +177,00$ $r' = +177,5$
$\Delta i' = -0,007$ 275,9 477,95 426,93 $r_c' = +175,7$
477,8 $\alpha = +5^\circ 39'$

$i' = -4,5$

468,9
270,6 470,05 421,80
471,2 274,65 422,93 } 422,64 $r = +172,94$ $r' = 174,3$
$\Delta i' = -0,019$ 275,7 470,65 423,18 $r_c' = +172,7$
470,1 $\alpha = +5^\circ 34'$

$i' = +2,0$

381,7
292,3 281,75 337,03
281,8 293,00 337,40 } 337,34 $r = +87,64$ $r' = +86,4$
$\Delta i' = +0,019$ 293,7 381,45 337,58 $r_c' = +86,2$
381,1 $\alpha = +2^\circ 47'$

$i' = -2,0$

289,8
281,0 290,85 335,93
291,9 380,15 336,05 } 335,94 $r = +86,34$ $r' = +85,9$
$\Delta i' = +0,008$ 279,2 292,40 335,85 $r_c' = +85,7$
292,9 $\alpha = +2^\circ 45'$

$i' = 4,5$ ~

382,5
440,0 283,20 411,60
282,9 429,20 411,55 } 411,55 $r = +161,85$ $r' = +161,9$
$\Delta i' = 0$ 428,4 284,60 411,50 $r_c' = +160,6$
285,2 $\alpha = +5^\circ 9'$

$i' = 2,0$ ~

409,7
257,5 408,25 329,93
407,0 252,65 329,83 } 329,86 $r = +80,16$ $r' = +80,1$
$\Delta i' = +0,002$ 252,8 405,85 329,82 $r_c' = +79,9$
404,7 $\alpha = +2^\circ 34'$

VII állás

$i' = 0$

351,8						
149,3	350,30	249,80				
348,8	150,80	249,80	249,80			
152,3	344,30	249,80				
345,8						

$i' = +4.5$

491,2						
458,4	490,5	474,45				
489,8	457,5	473,65	473,91	$V = +224,07$	$v' = +224,6$	
$\Delta i' = -0,005$ 456,6	490,65	473,63			$v_c' = +220,2$	
491,5					$\alpha = +7°5'$	

$i' = -4.5$

484,3						
480,0	483,80	481,90				
$\Delta i' = -0,005$ 483,3	478,55	480,93	480,83	$V = +230,99$	$v' = +231,5$	
477,1	482,25	479,68			$v_c' = +227,7$	
481,2					$\alpha = +7°18'$	

$i' = +3.0$

437,2						
231,1	435,70	333,40				
$\Delta i' = 0$ 434,1	233,1	333,60	333,54	$V = +83,70$	$v' = +83,7$	
235,1	432,15	333,63			$v_c' = +83,5$	
430,2					$\alpha = +2°41'$	

$i' = -3.0$

434,0						
246,6	432,55	339,58				
$\Delta i' = -0,008$ 431,1	248,8	339,95	339,94	$V = +90,10$	$v' = +90,5$	
257,0	429,6	340,30			$v_c' = +90,3$	
428,1					$\alpha = +2°54'$	

$i' = 4,5$ ~

457,8						
472,3	457,8	465,05				
$\Delta i' = +0,018$ 457,8	471,9	464,85	464,94	$V = +215,10$	$v' = +213,4$	
471,5	458,35	464,93			$v_c' = +210,6$	
458,9					$\alpha = +6°44'$	

$i' = 3,0$ ~

375,9						
290,0	374,15	332,08				
$\Delta i' = -0,010$ 372,4	291,40	331,90	322,09	$V = +72,25$	$v' = +72,7$	
292,8	371,75	332,28			$v_c' = +72,6$	
371,1					$\alpha = +2°20'$	

VIII állás

$i = 0$

289,3
211,0 288,75 249,88 } 249,87
288,2 211,57 249,88 }
212,1 287,60 249,85 }
287,0

$i = +4,5$ ß

−12,0
−11,2 −12,05 −6,63 } −6,66 $V = -256,65$ $V' = -256,7$
−12,1 −11,10 −6,60 } $V_c' = -251,6$
−11,0 −12,50 −6,75 } $\alpha = -8°2'$
−12,9

$\Delta i = 0$

$i = -4,5$ ß

+14,3
+15,8 +12,90 +14,35 } +13,56 $V = -236,39$ $V' = -235,4$
+11,5 +15,10 +13,30 } $V_c' = -234,4$
+14,4 +11,65 +13,03 } $\alpha = -7°25'$
+11,8

$\Delta i = +0,010$

$i = +3,0$ ß

202,8
103,2 201,40 152,30 } 152,12 $V = -98,83$ $V' = -100,4$
200,0 103,95 151,98 } $V_c' = -100,1$
104,7 199,45 152,08 } $\alpha = -3°13'$
198,9

$\Delta i = -0,040$

$i = -3,0$ ß

208,7
87,8 237,05 162,40 } 162,13 $V = -87,82$ $V' = -87,5$
205,4 88,85 162,13 } $V_c' = -87,3$
89,9 203,75 161,83 } $\alpha = -2°48'$
202,1

$\Delta i = +0,005$

$i = 4,5$ ~

31,2
41,6 31,00 36,30 } 35,83 $V = -214,12$ $V' = -213,9$
30,8 40,90 35,81 } $V_c' = -210,9$
40,2 30,45 35,33 } $\alpha = -6°45'$
30,1

$\Delta i = +0,002$

$i = 3,0$ ~

39,8
288,9 41,85 165,38 } 165,55 $V = -84,40$ $V' = -84,2$
43,9 287,35 165,63 } $V_c' = -84,0$
285,8 45,5 165,65 } $\alpha = -2°42'$
47,1

$\Delta i = +0,004$

1915

Julius 22 ikén elküldött

A ~~nagy~~ *Könyvtári* *szabályzat*

Magyaros állandó megbizottságnak

jobbak.

$$\frac{\partial W}{\partial \alpha} - \mathcal{F} = \int du \left\{ \left[(a_{11} - a_{22}) - 2a_{12} \right] XY + a_{12}(Y^2 - X^2) \right\} \cos 2\alpha + \int \frac{a_{11} - a_{22}}{2} (Y^2 - X^2) \sin 2\alpha \, du + \int du \, Z(a_{13} Y - a_{23} X) \cos\alpha$$

$$- \int du \, Z(a_{23} Y + a_{13} X) \sin\alpha$$

Mágneses Impenzmotor

$$\mathcal{F} = \int Y \, dm_a - \int X \, dm_b + \int X \left(\frac{\partial Y}{\partial x} dm_a + \frac{\partial Y}{\partial y} dm_b + \frac{\partial Y}{\partial z} dm_c \right) - \int Y \left(\frac{\partial X}{\partial x} dm_a + \frac{\partial X}{\partial y} dm_b + \frac{\partial X}{\partial z} dm_c \right) \; *)$$

$$m_a = X\left(a_{11} \cos^2\alpha + a_{22} \sin^2\alpha - a_{12} \sin 2\alpha \right) + Y\left(\tfrac{1}{2}(a_{11} - a_{22}) \sin 2\alpha + a_{12} \cos 2\alpha \right) + Z\left(a_{13} \cos\alpha - a_{23} \sin\alpha \right) + \mu_a \cos(\delta + c\alpha)$$

$$m_b = X\left(\tfrac{1}{2}(a_{11} - a_{22}) \sin 2\alpha + a_{12} \cos 2\alpha \right) + Y\left(a_{11} \sin^2\alpha + a_{22} \cos^2\alpha + a_{12} \sin 2\alpha \right) + Z\left(a_{13} \sin\alpha + a_{23} \cos\alpha \right) + \mu_b \sin(\delta + c\alpha)$$

$$m_c = X\left(a_{13} \cos\alpha - a_{23} \sin\alpha \right) + Y\left(a_{13} \sin\alpha + a_{23} \cos\alpha \right) + a_{33} Z + \mu_v$$

$$a_{11} = \kappa_1 \lambda_1 \lambda_1 + \kappa_2 \lambda_2 \lambda_2 + \kappa_3 \lambda_3 \lambda_3 \qquad a_{12} = \kappa_1 \lambda_1 \mu_1 + \kappa_2 \lambda_2 \mu_2 + \kappa_3 \lambda_3 \mu_3$$

$$a_{22} = \kappa_1 \mu_1 \mu_1 + \kappa_2 \mu_2 \mu_2 + \kappa_3 \mu_3 \mu_3 \qquad a_{23} = \kappa_1 \mu_1 \nu_1 + \kappa_2 \mu_2 \nu_2 + \kappa_3 \mu_3 \nu_3$$

$$a_{33} = \kappa_1 \nu_1 \nu_1 + \kappa_2 \nu_2 \nu_2 + \kappa_3 \nu_3 \nu_3 \qquad a_{31} = \kappa_1 \nu_1 \lambda_1 + \kappa_2 \nu_2 \lambda_2 + \kappa_3 \nu_3 \lambda_3$$

ha $a_{11} = a_{22} = a_{33} = \kappa$ és $a_{12} = a_{23} = a_{31} = 0$

$$m_a = \kappa X + \mu_a \cos(\delta + c\alpha)$$

$$m_b = \kappa Y + \mu_a \sin(\delta + c\alpha)$$

$$m_c = \kappa Z + \mu_v$$

$$\mathcal{F} = Y \mu_a \cos(\delta + c\alpha) - X \mu_a \sin(\delta + c\alpha) + l \cos(\alpha + \varepsilon) \mu_a \left(\frac{\partial Y}{\partial x} \cos(\delta + c\alpha) + \frac{\partial Y}{\partial y} \sin(\delta + c\alpha) + \frac{\partial Y}{\partial z} \mu_v \right)$$

$$- l \sin(\alpha + \varepsilon) \mu_a \left(\frac{\partial X}{\partial x} \cos(\delta + c\alpha) + \frac{\partial X}{\partial y} \sin(\delta + c\alpha) + \frac{\partial X}{\partial z} \mu_v \right)$$

$$+ k \int l \cos(\alpha + \varepsilon) \left(X \frac{\partial Y}{\partial x} + Y \frac{\partial Y}{\partial y} + Z \frac{\partial Y}{\partial z} \right) du$$

$$- k \int l \sin(\alpha + \varepsilon) \left(X \frac{\partial X}{\partial x} + Y \frac{\partial X}{\partial y} + Z \frac{\partial X}{\partial z} \right) du$$

$$\left(X \frac{\partial Y}{\partial x} + Y \frac{\partial Y}{\partial y} + Z \frac{\partial Y}{\partial z} \right) = \frac{1}{2} \frac{\partial}{\partial y} \left(X^2 + Y^2 + Z^2 \right)$$

$$\left(X \frac{\partial X}{\partial x} + Y \frac{\partial X}{\partial y} + Z \frac{\partial X}{\partial z} \right) = \frac{1}{2} \frac{\partial}{\partial x} \left(X^2 + Y^2 + Z^2 \right)$$

---

ha $a, b = 0, c = 0$ helyen $m_a = m$ $m_b = 0$ $m_c = 0$ mágnes van akkor,

$$X^2 + Y^2 + Z^2 = m^2 \frac{\left(2(a-x)^2 - y^2 \right)^2 + 9(a-x)^2 y^2}{\left((a-x)^2 + y^2 \right)^5} = \frac{4(a-x)^4 + 5(a-x)^2 y^2 + y^4}{\left((a-x)^2 + y^2 \right)^5}$$

$$\text{és} \quad \frac{\partial}{\partial y} \left(X^2 + Y^2 + Z^2 \right) = -6y \frac{\left(5a^4 + 6a^2 y^2 + y^4 \right)}{\left((a-x)^2 + y^2 \right)^6} = -6y \frac{\left(5(a-x)^2 + y^2 \right)}{\left((a-x)^2 + y^2 \right)^5}$$

$$\frac{\partial}{\partial x} \left(X^2 + Y^2 + Z^2 \right) = +24 \frac{(a-x)^3}{\left((a-x)^2 + y^2 \right)^5}$$

*) X, Y, Z = Constans ekkor ha $\mu_a = \mu_b = 0$ $\quad \mathcal{F} = \frac{1}{2} \frac{\partial W}{\partial \alpha}$

Mágnesesen isotrop test forgásánál az influált mágnesességből

származó forgásmomentum da végtelen

$$F_i = \int K \frac{\partial}{\partial \alpha}\left(X^2+Y^2+Z^2\right) d\alpha$$

ha a mágneses erőt m horizontalis mágnes fejti ki mely nincs tengelyen

az XY síkban van úgy hogy $b=0$ akkor.

$$r^2=(a-x)^2+y^2+(c-z)^2 = a^2+l^2+(c-z)^2-2al\cos(\alpha+\varepsilon)$$

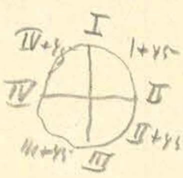
$$X^2+Y^2+Z^2 = \frac{4(a-x)^4+(y^2+(c-z)^2)^2+5(a-x)^2y^2+5(a-x)^2(c-z)^2}{\left((a-x)^2+y^2+(c-z)^2\right)^5}m^2$$

$$= \frac{4(a-x)^2+y^2+(c-z)^2}{\left((a-x)^2+y^2+(c-z)^2\right)^4}m^2$$

$$x = l\cos(\alpha+\varepsilon) \qquad y = l\sin(\alpha+\varepsilon)$$

α szerint differentiálás után

$$F_i = -m^2\int K\,\frac{24a^3l\sin(\alpha+\varepsilon) - \left[21a^2-3(l^2+(c-z)^2)\right]l^2\sin 2(\alpha+\varepsilon) + 6al^3\sin 2(\alpha+\varepsilon)\cos(\alpha+\varepsilon)}{\left(a^2+l^2+(c-z)^2-2al\cos(\alpha+\varepsilon)\right)^5}$$



homogén elemre – a 8 állásban F_i értéke, ha $z=0$.

I $\quad F_i = 0$

I_{+45} – – – – – – – – $-\dfrac{12\sqrt{2}a^3l - \left[21a^2-3(l^2+c^2)\right]l^2+3\sqrt{2}al^3}{(a^2+l^2+c^2-\sqrt{2}al)^5}$

II $\quad -\dfrac{24a^3l}{(a^2+l^2+c^2)^5}m^2K\,d\alpha$

II_{+45} – – – – – – – – $-\dfrac{12\sqrt{2}a^3l + \left[21a^2-3(l^2+c^2)\right]l^2+3\sqrt{2}al^3}{(a^2+l^2+c^2+\sqrt{2}al)^5}$

III $\quad 0$

III_{+45} – – – – – – – – $III_{+45} = -II_{+45}$

IV $\quad +\dfrac{24a^3l}{(a^2+l^2+c^2)^5}m^2K\,d\alpha$

IV_{+45} – – – – – – – – $IV_{+45} = -I_{+45}$

M_a

$$X_0 = \frac{2a^2-c^2}{\gamma^5} M_a$$

$$Z_0 = \frac{3ac}{\gamma^5} M_a$$

$$\frac{\partial X}{\partial x} = \frac{6a^3-9ac^2}{\gamma^7} M_a = 3a\frac{(2a^2-3c^2)}{\gamma^7} M_a$$

$$\frac{\partial y}{\partial y} = -\frac{3a}{\gamma^5} M_a$$

$$\frac{\partial Z}{\partial x} = +\frac{12a^2c-3c^3}{\gamma^7} M_a$$

$$\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y} = \frac{9a^3-6ac^2}{\gamma^7} M_a$$

$$\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y} = \frac{3a^3-12ac^2}{\gamma^7} M_a$$

$$X_0^2 = \frac{(2a^2-c^2)^2}{\gamma^{10}} M_a^2$$

$$X_0 Z_0 = 3\frac{ac(2a^2-c^2)}{\gamma^{10}} M_a^2$$

$$\left| X\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\right|_0 = 3\frac{a(3a^2-2c^2)(2a^2-c^2)}{\gamma^{12}} M_a^2$$

$$\left| X\frac{\partial X}{\partial x}\right|_0 = 3\frac{a(2a^2-3c^2)(2a^2-c^2)}{\gamma^{12}} M_a^2$$

$$\left| Z\frac{dZ}{dx}\right|_0 = 9\frac{ac^2(4a^2-c^2)}{\gamma^{12}} M_a^2$$

$$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y}\right) = 9\frac{ac(4a^2-c^2)(a^2-4c^2)}{\gamma^{14}} M_a^2$$

$$\left|\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x}\right| = 9\frac{ac(2a^2-c^2)(4a^2-c^2)}{\gamma^{14}} M_a^2$$

$$\left|\left(\frac{\partial X}{\partial x}\right)^2 - \left(\frac{\partial y}{\partial y}\right)^2\right| = 9a^2\frac{(2a^2-3c^2)^2-(a^2+c^2)^2}{\gamma^{14}} M_a^2 = 9a^2\frac{(3a^2-2c^2)(a^2-4c^2)}{\gamma^{14}} M_a^2$$

$$\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2 = 9a^2\frac{(3a^2-2c^2)^2}{\gamma^{14}} M_a^2$$

$$\left| Z\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right) + X\frac{\partial Z}{\partial x}\right|_0 = 3c\frac{17a^4-12a^2c^2+c^4}{\gamma^{12}} M_a^2$$

$$X\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y}\right) = +3a\frac{(2a^2-c^2)(a^2-4c^2)}{\gamma^{12}} M_a^2$$

$$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right) = +9ac\frac{(4a^2-c^2)(3a^2-2c^2)}{\gamma^{14}}$$

A remanent magnetizing bar's magnetic moment = F_r

$$F_r = l\sin\alpha\left\{h\left\{\left(c\frac{\partial y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 \cos\varepsilon\cos(\delta+c\alpha) - \left(\frac{\partial y}{\partial y} - c\frac{\partial X}{\partial x}\right)_0 \sin\varepsilon\sin(\delta+c\alpha)\right\} - v\left|\frac{\partial Z}{\partial x}\right|_0 \cos\varepsilon\right\} + l\cos\alpha\left\{h\left\{\left(c\frac{\partial y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 \sin\varepsilon\cos(\delta+c\alpha) + \left(\frac{\partial y}{\partial y} - c\frac{\partial X}{\partial x}\right)_0 \cos\varepsilon\sin(\delta+c\alpha)\right\} - v\left|\frac{\partial Z}{\partial x}\right|_0 \sin\varepsilon\right\} - ch X_0 \sin(\delta+c\alpha)$$

electric key ha $c=1$ $\quad F_r = -\sin\alpha\left[X_0\int r\,dw + \left|\frac{\partial Z}{\partial x}\right|_0 \int r\,l\,dw\cos\varepsilon\right] - \cos\alpha\left[X_0\int 6\,dw + \left|\frac{\partial Z}{\partial x}\right|_0 \int r\,l\,dw\sin\varepsilon\right] - \sin 2\alpha\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\left(\int r\,l\,dw\cos\varepsilon - \left(\frac{\partial y}{\partial y} - \frac{\partial y}{\partial y}\right)\int r\,l\,dw\sin\varepsilon\right] -$

M_c

$$X_0 = \frac{3ac}{\gamma^5} M_c$$

$$Z_0 = \frac{2c^2-a^2}{\gamma^5} M_a$$

$$\frac{\partial X}{\partial x} = \frac{12a^2c-3c^3}{\gamma^7} M_c$$

$$\frac{\partial y}{\partial y} = -\frac{3c}{\gamma^5} M_c$$

$$\frac{\partial Z}{\partial x} = +\frac{12ac^2-3a^3}{\gamma^7} M_c$$

$$\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y} = +\frac{15a^2c}{\gamma^7}$$

$$\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y} = +\frac{9a^2c-6c^3}{\gamma^7}$$

$$X_0 Z_0 = 3\frac{ac(2c^2-a^2)}{\gamma^{10}} M_c^2$$

$$\left| X\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\right|_0 = 45\frac{a^3c^2}{\gamma^{12}} M_c^2$$

$$\left| X\frac{\partial X}{\partial x}\right|_0 = 9\frac{ac^2(4a^2-3c^2)}{\gamma^{12}} M_c^2$$

$$\left| Z\frac{\partial Z}{\partial x}\right|_0 = 3\frac{a(2c^2-a^2)(4c^2-a^2)}{\gamma^{12}} M_c^2$$

$$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y}\right)_0 = 9\frac{ac(4c^2-a^2)(3a^2-2c^2)}{\gamma^{14}} M_c^2$$

$$\left|\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x}\right|_0 = 9\frac{ac(4a^2-c^2)(4c^2-a^2)}{\gamma^{14}} M_c^2$$

$$\left|\left(\frac{\partial X}{\partial x}\right)^2 - \left(\frac{\partial y}{\partial y}\right)^2\right|_0 = 9c^2\frac{(4a^2-c^2)^2-(a^2+c^2)^2}{\gamma^{14}} M_c^2 = 45a^2c^2\frac{(3a^2-2c^2)}{\gamma^{14}} M_c^2$$

$$\left|\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right|_0^2 = 225\frac{a^2c^2}{\gamma^{14}} M_c^2 = 225\frac{a^2c^2}{\gamma^{14}}\frac{a^2}{\gamma^{14}} M_c^2$$

$$Z\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right) + X\frac{\partial Z}{\partial x} = 6a^2c\frac{11c^2-4a^2}{\gamma^{12}}$$

Két harmonikus mező +a és −a helyen.

+a abszcissza m −a abszcissza +m

$X_0 = 2\frac{2a^2-c^2}{r^5}m$ ha $c=$ $X_0^2 = \frac{4m}{r^3}$ $X_0^2 = 16\frac{m^2}{r^6}$

$Z_0 = 0$ $Z_0 = 0$ $X_0 Z = 0$

$\left(\frac{\partial X}{\partial x}\right)_0 = 0$ $\left(\frac{\partial X}{\partial x}\right)_0 = 0$ $X\left(\frac{\partial X}{\partial \eta} - \frac{\partial y}{\partial \eta}\right) = 0$

$\left(\frac{\partial y}{\partial \eta}\right)_0 = 0$ $\frac{\partial y}{\partial \eta_0} = 0$ $X\frac{\partial X}{\partial x} = 0$

$\left(\frac{\partial z}{\partial x}\right)_0 = \frac{6(4a^2c - c^3)}{r^7}m$ $\frac{\partial z}{\partial x} = 0$ $Z\frac{\partial Z}{\partial x} = 0$

$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right) = 0$

$\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) = 0$ $\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x} = 0$

$\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right) = 0$ $\left(\left(\frac{\partial X}{\partial x}\right)^2 - \left(\frac{\partial y}{\partial \eta}\right)^2\right) = 0$

$\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right)^2 = 0$

$Z\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) + X\frac{\partial Z}{\partial x} = 0$

$X\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right) = 0$

$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) = 0$

+a abszcissza m −a abszcissza −m

$X_0 = 0$ ha $c=0$ $X_0 = 0$ $X_0^2 = 0$

$Z_0 = \frac{6ac}{r^5}m$ $Z_0 = 0$ $X_0 Z_0 = 0$

$\left(\frac{\partial X}{\partial x}\right)_0 = 6a\frac{(2c^2-3b^2)}{r^7}m$ $\left(\frac{\partial X}{\partial x}\right)_0 = 12\frac{m}{r^4}$ $X\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) = 0$

$\left(\frac{\partial y}{\partial \eta}\right)_0 = -6\frac{a}{r^5}m$ $\frac{\partial y}{\partial \eta_0} = -6\frac{m}{r^4}$ $X\frac{\partial X}{\partial x} = 0$

$\left(\frac{\partial z}{\partial x}\right)_0 = 0$ $\left(\frac{\partial z}{\partial x}\right)_0 = 0$ $Z\frac{\partial Z}{\partial x} = 0$

$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right) = 0$

$\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right)_0 = +18\frac{m}{r^4}$ $\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x} = 0$

$\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right)_0 = +6\frac{m}{r^4}$ $\left(\left(\frac{\partial X}{\partial x}\right)^2 + \left(\frac{\partial y}{\partial \eta}\right)^2\right)_0 = 108\frac{m^2}{r^8}$

$\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right)^2 = 324\frac{m^2}{r^8}$

$Z\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) + X\frac{\partial Z}{\partial x} = 0$

$X\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial \eta}\right) = 0$

$\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial \eta}\right) = 0$

$m = 270000$ $r = 60$

$$F = -\sin\alpha \cdot \frac{4m}{r^3}\mu_a - \cos\alpha \cdot \frac{4m}{r^3}\mu_b - \sin 2\alpha \cdot 16\frac{m^2}{r^6}\int (a_{11} - a_{22})\,dw - \cos 2\alpha \cdot 32\frac{m^2}{r^6}\int a_{12}\,dw$$

$$F = -\sin 2\alpha\left\{54\frac{m^2}{r^8}\left[\int (a_{11} - a_{22})\,l^2 dw + \int (a_{11} + a_{22})\,l^2 \cos 2\varepsilon\, dw\right] + 18\frac{m}{r^4}\mu_a \lambda\right\}$$

$$- \cos 2\alpha\left\{108\frac{m^2}{r^8}\int a_{12} l^2 dw + 18\frac{m}{r^4}\mu_b \lambda\right\}$$

$$- \sin 4\alpha\, 162\frac{m^2}{r^8}\int (a_{11} - a_{22})\,l^2 \cos 2\varepsilon\, dw - \cos 4\alpha \cdot 324\frac{m^2}{r^8}\int a_{12} l^2 \cos 2\varepsilon\, dw$$

$m = 270000$ és $a = 60$ $c = 0$ $r = a$

$\alpha = 225°$

+a	-a
$X = +16,9491$	$X = +50,1220$
$y = +4,1945$	$y = -18,6930$
$\frac{\partial x}{\partial \alpha} = +5,2043$	$\frac{\partial x}{\partial \alpha} = -49,2740$
$\frac{\partial y}{\partial \alpha} = +6,2977$	$\frac{\partial y}{\partial \alpha} = +3,2749$

Csupán influenciát forgásmomentum:

1) csak egy mágnes

$$\mathcal{F}_{225°} = \left[(q_{11}-q_{22})\left(\frac{y^2-x^2}{2} + x\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha}\right) + 2q_{12}\left(-xy + y\frac{\partial y}{\partial \alpha} - x\frac{\partial x}{\partial \alpha}\right) + (q_{11}+q_{12})\left(x\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha}\right)\right]_2$$

Az egész rúdra ható forgásmomentum (akár +a akár -a ban van mágn.)

$$\mathcal{F}_{225°} = \mathcal{F}_{45°} = \left[-(q_{11}-q_{22})\,2,909 + q_{12}\,6426,436 - (q_{11}+q_{22})\,2416,798\right] m^2 V. 10^{-12}$$

2) Két egyirányú mágnes.

$$\mathcal{F}_{225°} = \mathcal{F}_{45°} = \left[-(q_{11}-q_{22})\,1727,494 - q_{12}\,15160,124 - (q_{11}+q_{22})\,6190,064\right] m^2 V. 10^{-12}$$

3) két ellentett mágnes

$\bar{X} = -33,1829$	$X^2 = 1101,105$
$y = +22,8875$	$y^2 = 523,838$
$\frac{\partial x}{\partial \alpha} = +54,4783$	$Xy = -759,474$
$\frac{\partial y}{\partial \alpha} = +3,0228$	$X\frac{\partial x}{\partial \alpha} = -1807,748$ etc

$$\mathcal{F}_{225} = \mathcal{F}_{450} = \left[(q_{11}-q_{22})\,1715,866 + q_{12}\,10545,624 - (q_{11}+q_{22})\,3477,128\right] m^2 V. 10^{-12}$$

$\alpha = 315°$

1) Csak ej mágnes

$$F_{315} = F_{135} = \left[+(q_{11} - q_{22})\, 2,909 + q_{12}\, 6426,436 + (q_{11} + q_{22})\, 2416,798 \right] m^2 v\, 10^{-12}$$

2) Kék segítségével mágnes

$$F_{315} = F_{135} = \left[+(q_{11} - q_{22})\, 1727,494 - q_{12}\, 15760,124 + (q_{11} + q_{22})\, 6190,064 \right] m^2 v\, 10^{-12}$$

3) Kék ellentett mágnes

$$F_{315} = F_{135} = \left[-(q_{11} - q_{22})\, 1715,866 + q_{12}\, 10545,624 + (q_{11} + q_{22})\, 3477,128 \right] m^2 v\, 10^{-12}$$

$\alpha = 90^\circ$ $\quad x = 0 \quad y = 11$

	$+a$	$-a$
	$X = +25,0585$	$X = +25,0585$
	$y = -10,7428$	$y = +10,7428$
	$\frac{\partial X}{\partial \alpha} = -17,7091$	$\frac{\partial X}{\partial \alpha} = +17,7091$
	$\frac{\partial y}{\partial \alpha} = +10,7786$	$\frac{\partial y}{\partial \alpha} = +10,7786$
	$X^2 = +627,928$	$X^2 = +627,928$
	$y^2 = +115,408$	$y^2 = +115,408$
	$Xy = -269,198$	$Xy = +269,198$
	$X\frac{\partial X}{\partial \alpha} = -443,763$	$X\frac{\partial X}{\partial \alpha} = +443,763$
	$X\frac{\partial y}{\partial \alpha} = +270,096$	$X\frac{\partial y}{\partial \alpha} = +270,096$
	$y\frac{\partial X}{\partial \alpha} = +190,245$	$y\frac{\partial X}{\partial \alpha} = +190,243$
	$y\frac{\partial y}{\partial \alpha} = -115,792$	$y\frac{\partial y}{\partial \alpha} = +115,792$

1) Csak egy maradt.

$$\mathcal{F}_{90^\circ} = -(a_{11}-a_{22})\left(Xy + X\frac{\partial X}{\partial \alpha} - y\frac{\partial y}{\partial \alpha}\right) - 2a_{12}\left(\frac{y^2-X^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial X}{\partial \alpha}\right) + (a_{11}+a_{12})\left(X\frac{\partial X}{\partial \alpha} + y\frac{\partial y}{\partial \alpha}\right)$$

$Xy + X\frac{\partial X}{\partial \alpha} - y\frac{\partial y}{\partial \alpha} = -597,169$	$= +597,169$
$\frac{y^2-X^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial X}{\partial \alpha} = +204,081$	$= +204,081$
$X\frac{\partial X}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = -559,555$	$= +559,555$

$$\mathcal{F}_{90^\circ} = -a_{12}\, 816,324\ m^2 N \cdot 10^{-12}$$

2) kéd egyirányú mágnes

$X = +50,1170$

$y = 0$

$\frac{\partial x}{\partial \alpha} = 0$

$\frac{\partial y}{\partial \alpha} = +21,5572$

$X^2 = +2571,714$

$Xy = X\frac{\partial x}{\partial \alpha} = y^2 = y\frac{\partial x}{\partial \alpha} = y\frac{\partial y}{\partial \alpha} = 0$

$X\frac{\partial y}{\partial \alpha} = +1080,382$

$$Xy + X\frac{\partial x}{\partial \alpha} - y\frac{\partial y}{\partial \alpha} = 0$$

$$\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha} = -175,475$$

$$X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = 0$$

$$F_{90^\circ} = +\, 9_{12}\, 701,900\ m^2 v\ 10^{-12}$$

3) kéd ellentett mágnes

$X = 0$

$y = -21,4856$

$\frac{\partial x}{\partial \alpha} = -35,4182$

$\frac{\partial y}{\partial \alpha} = 0$

$X^2 = X\frac{\partial x}{\partial \alpha} = X\frac{\partial y}{\partial \alpha} = y\frac{\partial y}{\partial \alpha} = 0 = Xy$

$y^2 = +461,631$

$y\frac{\partial x}{\partial \alpha} = +760,981$

$$Xy + X\frac{\partial x}{\partial \alpha} - y\frac{\partial y}{\partial \alpha} = 0$$

$$\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha} = +991,797$$

$$X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = 0$$

$$F_{90^\circ} = -\, 9_{12}\, 3967,188\ m v^2\ 10^{-12}$$

$\alpha = 0$

$+a$	$x = 11 \quad y = 0$ $-a$
$X = +82{,}0042\ 10^{-6}\ m$	$X = -15{,}0772\ 10^{-6}$
$y = 0$	$y = 0$
$\frac{\partial x}{\partial \alpha} = 0$	$\frac{\partial x}{\partial \alpha} = 0$
$\frac{\partial y}{\partial \alpha} = -46{,}6576\ 10^{-6}$	$\frac{\partial y}{\partial \alpha} = -4{,}8779$
$X^2 = +6724{,}689\ 10^{-12}$	$- \quad = +227{,}322$
$y^2 = 0$	$= 0$
$xy = 0$	$= 0$
$X\frac{\partial x}{\partial \alpha} = 0$	$= 0$
$X\frac{\partial y}{\partial \alpha} = -3826{,}119$	$= +73{,}545$
$y\frac{\partial x}{\partial \alpha} = 0$	$= 0$
$y\frac{\partial y}{\partial \alpha} = 0$	$= 0$

1) Coate egy mágnes

$$F_{00} = (a_{11} - a_{22})\left(xy + X\frac{\partial x}{\partial \alpha} - y\frac{\partial y}{\partial \alpha}\right) + 2a_{12}\left(\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha}\right) + (a_{11} + a_{22})\left(X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha}\right)$$

$xy + X\frac{\partial x}{\partial \alpha} - y\frac{\partial y}{\partial \alpha} = 0$	0
$\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha} = -7188{,}464$	$= -40{,}116$
$X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = 0$	

$$F_{00} = -\,a_{12}\ 14457{,}160\ m^2 v\ 10^{-12}$$

2) Két egyirányú mágnes

$X = +66,9270$

$y = 0$

$\frac{\partial X}{\partial \alpha} = 0$

$\frac{\partial y}{\partial \alpha} = -57,5355$

$X^2 = +4479,220$

$y^2 = X\frac{\partial X}{\partial \alpha} = y\frac{\partial X}{\partial \alpha} = y\frac{\partial y}{\partial \alpha} = 0$

$X\frac{\partial y}{\partial \alpha} = -3449,116$

$$\frac{y^2 - X^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial X}{\partial \alpha} = -5688,728$$

$$F_{00} = -9,12\,22754,912\ m^2 v\, 10^{-12}$$

3) Két ellentétes mágnes

$X = +97,0814$

$y = 0$

$\frac{\partial X}{\partial \alpha} = 0$

$\frac{\partial y}{\partial \alpha} = -41,7797$

$X^2 = 9424,798$

$y^2 = X\frac{\partial X}{\partial \alpha} = y\frac{\partial X}{\partial \alpha} = y\frac{\partial y}{\partial \alpha} = 0$

$X\frac{\partial y}{\partial \alpha} = -4056,032$

$$\frac{y^2 - X^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial X}{\partial \alpha} = -5035,802$$

$$F_{00} = -35073,724\ m^2 v\, 10^{-12}$$

$\alpha = 180°$ $\quad x = -11 \quad y = 0$

$X = + 15,0772\ 10^{-6}$ $\quad$ $X = - 82,0042$

$y = 0$ $\quad$ $y = 0$

$\frac{\partial X}{\partial \alpha} = 0$ $\quad$ $\frac{\partial X}{\partial \alpha} = 0$

$\frac{\partial Y}{\partial \alpha} = + 4,8779$ $\quad$ $\frac{\partial Y}{\partial \alpha} = + 46,6576$

$X^2 = + 227,322$ $\quad$ $X^2 = 6724,689$

$X \frac{\partial Y}{\partial \alpha} = + 73,545$ $\quad$ $X \frac{\partial Y}{\partial \alpha} = - -3826,119$

1) Csak egy mágnes

$F_{180°} = F_{0°} = - q_{12}\ 14457,160\ m^2 v\ 10^{-12}$

2) Két egyirányú mágnes

$F_{180°} = F_{0°} = - q_{12}\ 22754,912\ m^2 v\ 10^{-12}$

3) Két ellentett mágnes

$F_{180°} = F_{0°} = - q_{12}\ 35073,724\ m^2 v\ 10^{-12}$

$y=0$ $x=l$ $\quad c-z=0 \quad y=l \quad x=0 \qquad b=0 \qquad m_a=m \qquad m_b=0 \qquad m_c=0$

$$x=\frac{2(a-x)^2-y^2}{\left[(a-x)^2+y^2\right]^{\frac{5}{2}}}\,m \qquad \frac{\partial x}{\partial\alpha}=-3(a-x)\,y\,\frac{2(a-x)^2-3y^2}{r^7}m-3xy\,\frac{4(a-x)^2-y^2}{r^7}m$$

$$y=-3\,\frac{(a-x)y}{r^5}\,m \qquad \frac{\partial y}{\partial\alpha}=+3y^2\,\frac{4(a-x)^2-y^2}{r^7}m-3(a-x)x\,\frac{(a-x)^2-4y^2}{r^7}m$$

$\alpha=45^{-0}$

$+a$	$-a$
$x=+50,1320.10^{-6}\,m$	$x=+16,9491.10^{-6}\,m$
$y=-18,6930\,10^{-6}\,m$	$y=+4,1945\,10^{-6}\,m$
$\frac{\partial x}{\partial\alpha}=-49,2740.10^{-6}\,m$	$\frac{\partial x}{\partial\alpha}=+5,2043.10^{-6}\,m$
$\frac{\partial y}{\partial\alpha}=+3,2749\,10^{-6}\,m$	$\frac{\partial y}{\partial\alpha}=+6,2977.10^{-6}\,m$
$x^2=+2573,217\,10^{-12}\,m^2$	$x^2=+287,272\,10^{-12}\,m^2$
$y^2=+349,428$	$y^2=+17,594$
$xy=-937,117$	$xy=+71,093$
$x\frac{\partial x}{\partial\alpha}=-2470,204$	$x\frac{\partial x}{\partial\alpha}=+88,208$
$x\frac{\partial y}{\partial\alpha}=+164,177$	$x\frac{\partial y}{\partial\alpha}=+106,740$
$y\frac{\partial x}{\partial\alpha}=+921,079$	$y\frac{\partial x}{\partial\alpha}=+21,829$
$y\frac{\partial y}{\partial\alpha}=-61,218$	$y\frac{\partial y}{\partial\alpha}=+26,416$

Csupán niflenáls forgásmomentum

1). Csak egy mágnes.

$$F_{45^0}=\left[(a_{11}-a_{22})\left(\frac{y^2-x^2}{2}+x\frac{\partial y}{\partial\alpha}+y\frac{\partial x}{\partial\alpha}\right)+2a_{12}\left(-xy+y\frac{\partial y}{\partial\alpha}-x\frac{\partial x}{\partial\alpha}\right)+(a_{11}+a_{22})\left(x\frac{\partial x}{\partial\alpha}+y\frac{\partial y}{\partial\alpha}\right)\right]v$$

$+a$	$-a$
$\frac{y^2-x^2}{2}+x\frac{\partial y}{\partial\alpha}+y\frac{\partial x}{\partial\alpha}=+3,361.10^{-12}$	$\frac{y^2-x^2}{2}+x\frac{\partial y}{\partial\alpha}+y\frac{\partial x}{\partial\alpha}=-6,270$
$-xy+y\frac{\partial y}{\partial\alpha}-x\frac{\partial x}{\partial\alpha}=+3346,103\,10^{-12}$	$-xy+y\frac{\partial y}{\partial\alpha}-x\frac{\partial x}{\partial\alpha}=-132,885$
$x\frac{\partial x}{\partial\alpha}+y\frac{\partial y}{\partial\alpha}=-2531,422$	$x\frac{\partial x}{\partial\alpha}+y\frac{\partial y}{\partial\alpha}=+114,624$

$$\left(F_{45^0}\right)_{+a}=\left[(a_{11}-a_{22})\,3,361+a_{12}\,6692,206-(a_{11}+a_{22})\,2531,422\right]m^2v\,10^{-12}$$

$$\left(F_{45^0}\right)_{-a}=\left[-(a_{11}+a_{22})\,6,270-a_{12}\,265,770+(a_{11}+a_{22})\,114,624\right]m^2v\,10^{-12}$$

Az egész rudra ható forgásmomentum (akár $+a$, akár $-a$ nál van a mágnes)

$$F_{45^0}=\left[-(a_{11}-a_{22})\,2,909+a_{12}\,6426,436-(a_{11}+a_{22})\,2416,798\right]m^2.v.10^{-12}$$

$$F_{45}=\left[-(a_{11}-a_{22})\,7,369+a_{12}\,6471,468-(a_{11}+a_{22})\,2430,590\right]$$

225

2) két egyirányú mágnes

$X = +67,0811$ $\quad X^2 = +4499,872$

$Y = -14,4985$ $\quad Y^2 = +210,207$

$\frac{\partial x}{\partial \alpha} = -44,0697$ $\quad XY = -972,575$

$\frac{\partial y}{\partial \alpha} = +9,5726$ $\quad X\frac{\partial x}{\partial \alpha} = -2956,244$

$X\frac{\partial y}{\partial \alpha} = +642,141$

$Y\frac{\partial x}{\partial \alpha} = +638,945$

$Y\frac{\partial y}{\partial \alpha} = -138,788$

Csak a rácsok egyik végére ható forgatónyomaték $(F_{45})_{1\,vég}$

$$\frac{Y^2 - X^2}{2} + X\frac{\partial y}{\partial \alpha} + Y\frac{\partial x}{\partial \alpha} = -863,747$$

$$-XY + Y\frac{\partial y}{\partial \alpha} - X\frac{\partial x}{\partial \alpha} = -3790,031$$

$$X\frac{\partial x}{\partial \alpha} + Y\frac{\partial y}{\partial \alpha} = -3095,032$$

Az egész rúdra ható forgatónyomaték:

~~$F_{45} = \left[-(a_{11}-a_{22})1727,494 - a_{12}\,15160,124 - (a_{11}+a_{22})6190,064\right] m^2 v\, 10^{-12}$~~

$$F_{45} = \left[-(a_{11}-a_{22})1743,748 - a_{12}\,15246,884 - (a_{11}+a_{22})6217,082\right] m^2 v\, 10^{-12}$$

F_{45} 225

3) két ellentett mágnes

$X = +33,1829$ $\quad X^2 = +1101,105$

$Y = -22,8875$ $\quad Y^2 = +523,838$

$\frac{\partial x}{\partial \alpha} = -54,4783$ $\quad XY = -759,474$

$\frac{\partial y}{\partial \alpha} = -3,0228$ $\quad X\frac{\partial x}{\partial \alpha} = -1807,748$

$X\frac{\partial y}{\partial \alpha} = -100,305$

$Y\frac{\partial x}{\partial \alpha} = +1246,872$

$Y\frac{\partial y}{\partial \alpha} = +69,184$

$$\frac{Y^2 - X^2}{2} + X\frac{\partial y}{\partial \alpha} + Y\frac{\partial x}{\partial \alpha} = +857,933$$

$$-XY + Y\frac{\partial y}{\partial \alpha} - X\frac{\partial x}{\partial \alpha} = +2636,406$$

$$X\frac{\partial x}{\partial \alpha} + Y\frac{\partial y}{\partial \alpha} = -1738,564$$

Az egész rúdra ható forgatónyomaték

~~$F_{45} = \left[(a_{11}-a_{22})1715,866 + a_{12}\,10545,624 - (a_{11}+a_{22})3477,128\right] m^2 v\, 10^{-12}$~~

$$F_{45} = \left[(a_{11}-a_{22})1714,268 + a_{12}\,10083,920 - (a_{11}+a_{22})3505,282\right] m^2 v\, 10^{-12}$$

F_{45} 225

$\alpha = 135°$

$+a$	$-a$
$X = +50,1320$	$X = +16,9491$
$y = +18,6930$	$y = -4,1945$
$\frac{\partial X}{\partial \alpha} = +49,2740$	$\frac{\partial x}{\partial \alpha} = -5,2043$
$\frac{\partial y}{\partial \alpha} = +3,2749$	$\frac{\partial y}{\partial \alpha} = +6,2977$
$X^2 = +2573,217$	$x^2 = +287,272$
$y^2 = +349,428$	$y^2 = +17,594$
$Xy = +937,117$	$xy = -71,093$
$X\frac{\partial x}{\partial \alpha} = +2470,204$	$X\frac{\partial x}{\partial \alpha} = -88,208$
$X\frac{\partial y}{\partial \alpha} = +164,177$	$X\frac{\partial y}{\partial \alpha} = +106,740$
$y\frac{\partial x}{\partial \alpha} = +921,079$	$y\frac{\partial x}{\partial \alpha} = +21,829$
$y\frac{\partial y}{\partial \alpha} = +61,218$	$y\frac{\partial y}{\partial \alpha} = -26,416$

Cupán influaid forgásmomentum

1) Csak egy magas

$$F_{135} = \left[-(a_{11} - a_{22}) \left(\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha} \right) - 2a_{12} \left(-xy + y\frac{\partial y}{\partial \alpha} - X\frac{\partial x}{\partial \alpha} \right) + (a_{11} + a_{22}) \left(X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} \right) \right] v$$

	$+a$	$-a$
$\frac{y^2 - x^2}{2} + X\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha}$	$= +3,361$	$-6,270$
$-xy + y\frac{\partial y}{\partial \alpha} - X\frac{\partial x}{\partial \alpha}$	$= -3346,103$	$+132,885$
$X\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha}$	$= +2531,422$	$-114,624$

~~$F_{135} = \left[+(a_{11} - a_{22}) 2,909 + a_{12}\, 6426,456 + (a_{11} + a_{22}) 2416,798 \right] m^2 v\, 10^{-12}$~~

$F_{135} = \left[+(a_{11} - a_{22}) 7,369 + a_{12}\, 6471,468 + (a_{11} + a_{22}) 2430,590 \right] m^2 v 10^{-12}$

315

2) Két szomszédos mágnes

$X = +67,081$
$Y = +14,4985$
$\frac{\partial X}{\partial \alpha} = +44,0697$
$\frac{\partial Y}{\partial \alpha} = +9,8726$

$X^2 = +4499,872$
$Y^2 = +210,207$
$XY = +972,575$
$X\frac{\partial X}{\partial \alpha} = +$ etc
$X\frac{\partial Y}{\partial \alpha} = +$
$Y\frac{\partial X}{\partial \alpha} = +$
$Y\frac{\partial Y}{\partial \alpha} = +$

$$\frac{Y^2 - X^2}{2} + X\frac{\partial X}{\partial \alpha} + Y\frac{\partial X}{\partial \alpha} = -863,747$$

$$-XY + Y\frac{\partial Y}{\partial \alpha} - X\frac{\partial X}{\partial \alpha} = +3790,031$$

$$X\frac{\partial X}{\partial \alpha} + Y\frac{\partial Y}{\partial \alpha} = +3095,032$$

~~$F_{135} = \left[+(a_{11}-a_{22})\,1727,494 - a_{12}\,15160,124 + (a_{11}+a_{22})\,6190,064\right] m^2 v\, 10^{-12}$~~

$$F_{\frac{135}{315}} = \left[+(a_{11}-a_{22})\,1743,748 - a_{12}\,15246,884 + (a_{11}+a_{22})\,6217,082\right] m^2 v\, 10^{-12}$$

3) Két ellentett mágnes

$X = +33,1829$
$Y = +22,8875$
$\frac{\partial X}{\partial \alpha} = +54,4783$
$\frac{\partial Y}{\partial \alpha} = -3,0228$

$$F_{135} = \left[-(a_{11}-a_{22})\,1715,866 + a_{12}\,10545,624 + (a_{11}+a_{22})\,3477,128\right] m^2 v\, 10^{-12}$$

$$F_{\frac{135}{315}} = \left[-(a_{11}-a_{22})\,1714,268 + a_{12}\,10083,920 + (a_{11}+a_{22})\,3505,282\right] m^2 v\, 10^{-12}$$

$a_{11} = \kappa_1 \lambda_1 \lambda_1 + \kappa_2 \lambda_2 \lambda_2 + \kappa_3 \lambda_3 \lambda_3$

$a_{22} = \kappa_1 \mu_1 \mu_1 + \kappa_2 \mu_2 \mu_2 + \kappa_3 \mu_3 \mu_3$

$a_{33} = \kappa_1 \nu_1 \nu_1 + \kappa_2 \nu_2 \nu_2 + \kappa_3 \nu_3 \nu_3$

$a_{12} = \kappa_1 \lambda_1 \mu_1 + \kappa_2 \lambda_2 \mu_2 + \kappa_3 \lambda_3 \mu_3$

$a_{23} = \kappa_1 \mu_1 \nu_1 + \kappa_2 \mu_2 \nu_2 + \kappa_3 \mu_3 \nu_3$

$a_{31} = \kappa_1 \nu_1 \lambda_1 + \kappa_2 \nu_2 \lambda_2 + \kappa_3 \nu_3 \lambda_3$.

$d\omega$ a kiforgatott elem

h, v a remanens nyomatékegységi

$$\frac{\partial (dW)}{\partial \alpha} = (a_{11} - a_{22})\left(2XY + X\frac{\partial X}{\partial \alpha} - Y\frac{\partial Y}{\partial \alpha}\right) d\omega \cdot \cos 2\alpha + (a_{11} - a_{22})\left(Y^2 - X^2 + X\frac{\partial Y}{\partial \alpha} + Y\frac{\partial X}{\partial \alpha}\right) d\omega \sin 2\alpha + 2a_{12}\left(Y^2 - X^2 + X\frac{\partial Y}{\partial \alpha} + Y\frac{\partial X}{\partial \alpha}\right) d\omega \cos 2\alpha$$

$$+ 2a_{12}\left(-2XY + Y\frac{\partial Y}{\partial \alpha} - X\frac{\partial X}{\partial \alpha}\right) d\omega \sin 2\alpha$$

$$+ 2a_{13}\left(YZ + Z\frac{\partial X}{\partial \alpha} + X\frac{\partial Z}{\partial \alpha}\right) d\omega \cos\alpha + 2a_{13}\left(-XZ + Z\frac{\partial Y}{\partial \alpha} + Y\frac{\partial Z}{\partial \alpha}\right) d\omega \sin\alpha - 2a_{23}\left(YZ + Z\frac{\partial X}{\partial \alpha} + X\frac{\partial Z}{\partial \alpha}\right) d\omega \sin\alpha + 2a_{23}\left(-XZ + Z\frac{\partial Y}{\partial \alpha} + Y\frac{\partial Z}{\partial \alpha}\right) d\omega \cos\alpha$$

$$+ (a_{11} + a_{22})\left(X\frac{\partial X}{\partial \alpha} + Y\frac{\partial Y}{\partial \alpha}\right) d\omega + 2a_{33} Z\frac{\partial Z}{\partial \alpha} d\omega$$

$$+ h\left(\frac{\partial X}{\partial \alpha} + Y\right) d\omega \cos(\alpha + \delta) + h\left(\frac{\partial Y}{\partial \alpha} - X\right) d\omega \sin(\alpha + \delta) + v\frac{dZ}{\partial \alpha} d\omega$$

X_0, Y_0, Z_0 a forgás középpontjára vonatkoznak (dω elem) tehát ha a forgástengely a Z tengely az $x=0$ $y=0$ és tetszőleges Z koordinátájú dω elemre.

$$X = X_0 + \left(\frac{\partial X}{\partial x}\right)_0 l \cos(\alpha + \varepsilon) + \left(\frac{\partial X}{\partial y}\right)_0 l \sin(\alpha + \varepsilon)$$

$$Y = Y_0 + \left(\frac{\partial Y}{\partial x}\right)_0 l \cos(\alpha + \varepsilon) + \left(\frac{\partial Y}{\partial y}\right)_0 l \sin(\alpha + \varepsilon)$$

$$Z = Z_0 + \left(\frac{\partial Z}{\partial x}\right)_0 l \cos(\alpha + \varepsilon) + \left(\frac{\partial Z}{\partial y}\right)_0 l \sin(\alpha + \varepsilon$$

$$\frac{\partial X}{\partial \alpha} = -\left(\frac{\partial X}{\partial x}\right)_0 l \sin(\alpha + \varepsilon) + \left(\frac{\partial X}{\partial y}\right)_0 l \cos(\alpha + \varepsilon)$$

$$\frac{\partial Y}{\partial \alpha} = -\left(\frac{\partial Y}{\partial x}\right)_0 l \sin(\alpha + \varepsilon) + \left(\frac{\partial Y}{\partial y}\right)_0 l \cos(\alpha + \varepsilon)$$

$$\frac{\partial Z}{\partial \alpha} = -\left(\frac{\partial Z}{\partial x}\right)_0 l \sin \alpha + \varepsilon + \left(\frac{\partial Z}{\partial y}\right)_0 l \cos(\alpha + \varepsilon)$$

$$m'_x = \left(\kappa_1\lambda_1^2 + \kappa_2\lambda_2^2 + \kappa_3\lambda_3^2\right)\left(X\cos\alpha + Y\sin\alpha\right) + \left(\kappa_1\lambda_1\mu_1 + \kappa_2\lambda_2\mu_2 + \kappa_3\lambda_3\mu_3\right)\left(-X\sin\alpha + Y\cos\alpha\right) + \left(\kappa_1\lambda_1\nu_1 + \kappa_2\lambda_2\nu_2 + \kappa_3\lambda_3\nu_3\right)Z = m$$

$$m'_y = \left(\kappa_1\lambda_1\mu_1 + \kappa_2\lambda_2\mu_2 + \kappa_3\lambda_3\mu_3\right)\left(X\cos\alpha + Y\sin\alpha\right) + \left(\kappa_1\mu_1^2 + \kappa_2\mu_2^2 + \kappa_3\mu_3^2\right)\left(-X\sin\alpha + Y\cos\alpha\right) + \left(\kappa_1\mu_1\nu_1 + \kappa_2\mu_2\nu_2 + \kappa_3\mu_3\nu_3\right)Z$$

$$m'_z = \left(\kappa_1\lambda_1\nu_1 + \kappa_2\lambda_2\nu_2 + \kappa_3\lambda_3\nu_3\right)\left(X\cos\alpha + Y\sin\alpha\right) + \left(\kappa_1\mu_1\nu_1 + \kappa_2\mu_2\nu_2 + \kappa_3\mu_3\nu_3\right)\left(-X\sin\alpha + Y\cos\alpha\right) + \left(\kappa_1\nu_1^2 + \kappa_2\nu_2^2 + \kappa_3\nu_3^2\right)Z$$

$$\kappa_1\lambda_1\lambda_1 + \kappa_2\lambda_2\lambda_2 + \kappa_3\lambda_3\lambda_3 = a_{11}$$
$$\kappa_1\lambda_1\mu_1 + \kappa_2\lambda_2\mu_2 + \kappa_3\lambda_3\mu_3 = a_{12}$$
$$\kappa_1\lambda_1\nu_1 + \kappa_2\lambda_2\nu_2 + \kappa_3\lambda_3\nu_3 = a_{13}$$

$$\kappa_1\mu_1\nu_1 + \kappa_2\mu_2\nu_2 + \kappa_3\mu_3\nu_3 = a_{23}$$
$$\kappa_1\mu_1\mu_1 + \kappa_2\mu_2\mu_2 + \kappa_3\mu_3\mu_3 = a_{22}$$
$$\kappa_1\nu_1\nu_1 + \kappa_2\nu_2\nu_2 + \kappa_3\nu_3\nu_3 = a_{33}$$

Koszinuszos momentum m és μ

$$m_x = m'_x\cos(\alpha+\varepsilon) - m'_y\sin(\alpha+\varepsilon)$$
$$m_y = m'_x\sin(\alpha+\varepsilon) + m'_y\cos(\alpha+\varepsilon)$$
$$m_z = m'_z$$

Mágneses momentum: $\mu_x = \mu_\lambda\cos(\alpha+\delta)$, $\mu_y = \mu_\lambda\sin(\alpha+\delta)$, $\mu_z = \mu_\nu$ — az eredő momentum összetevői: $m_x+\mu_x$, $m_y+\mu_y$, $m_z+\mu_z$

$$n = \mu_x + m_x = a_{11}X\cos^2(\alpha+\varepsilon) + a_{22}X\sin^2(\alpha+\varepsilon) - a_{12}X\sin 2(\alpha+\varepsilon) + \tfrac{1}{2}(a_{11}-a_{22})Y\sin 2(\alpha+\varepsilon) + a_{12}Y\cos 2(\alpha+\varepsilon) + a_{13}Z\cos(\alpha+\varepsilon) - a_{23}Z\sin(\alpha+\varepsilon) + \mu_\lambda\cos(\alpha+\delta)$$

$$e = \mu_y + m_y = a_{11}Y\sin^2(\alpha+\varepsilon) + a_{22}Y\cos^2(\alpha+\varepsilon) + a_{12}Y\sin 2(\alpha+\varepsilon) + \tfrac{1}{2}(a_{11}-a_{22})X\sin 2(\alpha+\varepsilon) + a_{12}X\cos 2(\alpha+\varepsilon) + a_{13}Z\sin(\alpha+\varepsilon) + a_{23}Z\cos(\alpha+\varepsilon) + \mu_\lambda\sin(\alpha+\delta$$

$$v = \mu_z + m_z = a_{13}X\cos(\alpha+\varepsilon) - a_{23}X\sin(\alpha+\varepsilon) + a_{13}Y\sin(\alpha+\varepsilon) + a_{23}Y\cos(\alpha+\varepsilon) + a_{33}Z + \mu_\nu$$

$$X = X_{00z} + \left(\frac{\partial X}{\partial x}\right)_{00z}x + \left(\frac{\partial X}{\partial y}\right)_{00z}y$$
$$Y = Y_0 + \left(\frac{\partial Y}{\partial x}\right)_{00z}x + \left(\frac{\partial Y}{\partial y}\right)_{00z}y$$
$$Z = Z_0 + \left(\frac{\partial Z}{\partial x}\right)_{00z}x + \left(\frac{\partial Z}{\partial y}\right)_{00z}y$$

kerfogati elem $d\omega$ magneses momentum összetevői $(m_x+\mu_x) = \varkappa\, d\omega$

$m_y+\mu_y = \mathfrak{c}\, d\omega$

$m_z+\mu_z = \nu\, d\omega$

Magneses Potentiál függvény $dW = \varkappa\, d\omega \frac{\partial V}{\partial x} + \mathfrak{c}\, d\omega \frac{\partial V}{\partial y} + \nu\, d\omega \frac{\partial V}{\partial z} = \varkappa\, d\omega\, X + \mathfrak{c}\, d\omega\, Y + \nu\, d\omega\, Z$

$dW =$

$$\frac{\partial V}{\partial x} = \left(\frac{\partial V}{\partial x}\right)_{00z} + \left(\frac{\partial^2 V}{\partial x^2}\right)_{00z} x + \left(\frac{\partial^2 V}{\partial x \partial y}\right)_{00z} y$$

$$\frac{\partial V}{\partial y} = \left(\frac{\partial V}{\partial y}\right)_{00z} + \left(\frac{\partial^2 V}{\partial y^2}\right)_{00z} y + \left(\frac{\partial^2 V}{\partial x \partial y}\right)_{00z} x$$

$$\frac{\partial V}{\partial z} = \left(\frac{\partial V}{\partial z}\right)_{00z} + \left(\frac{\partial^2 V}{\partial x \partial z}\right)_{00z} x + \left(\frac{\partial^2 V}{\partial y \partial z}\right)_{00z} y + \cdots$$

$$X = \frac{\partial V}{\partial x} = X_{00z} + \left(\frac{\partial X}{\partial x}\right)_{00z} l\cos\alpha + \left(\frac{\partial X}{\partial y}\right)_{00z} l\sin\alpha$$

$$Y = \frac{\partial V}{\partial y} = Y_{00z} + \left(\frac{\partial Y}{\partial y}\right)_{00z} l\sin\alpha + \left(\frac{\partial Y}{\partial x}\right)_{00z} l\cos\alpha$$

$$Z = \frac{\partial V}{\partial z} = Z_{00z} + \left(\frac{\partial Z}{\partial x}\right)_{00z} l\cos\alpha + \left(\frac{\partial Z}{\partial y}\right)_{00z} l\sin\alpha .$$

$$\frac{dW}{d\omega} = a_{11} X^2 \cos^2(\alpha+\varepsilon) + a_{22} X^2 \sin^2(\alpha+\varepsilon) - a_{12} X^2 \sin 2(\alpha+\varepsilon) + \tfrac{1}{2}(a_{11}-a_{22}) XY \sin 2(\alpha+\varepsilon) + a_{12} XY \cos 2(\alpha+\varepsilon) + a_{13} XZ \cos(\alpha+\varepsilon) - a_{23} XZ \sin(\alpha+\varepsilon) + \mu_h X \cos(\alpha+\delta)$$
$$+ a_{11} Y^2 \sin^2(\alpha+\varepsilon) + a_{22} Y^2 \cos^2(\alpha+\varepsilon) + a_{12} Y^2 \sin 2(\alpha+\varepsilon) + \tfrac{1}{2}(a_{11}-a_{22}) XY \sin 2(\alpha+\varepsilon) + a_{12} XY \cos 2(\alpha+\varepsilon) + a_{13} YZ \sin(\alpha+\varepsilon) + a_{23} YZ \cos(\alpha+\varepsilon) + \mu_h Y \sin(\alpha+\delta)$$
$$+ a_{13} XZ \cos(\alpha+\varepsilon) - a_{23} XZ \sin(\alpha+\varepsilon) + a_{13} YZ \sin(\alpha+\varepsilon) + a_{23} YZ \cos(\alpha+\varepsilon) + a_{33} Z^2 + \mu_v Z$$

a Torziómomentum. 1 mre.

$$F_{th} = +k\,d\mu\left(X\frac{\partial Y}{\partial x} + Y\frac{\partial Y}{\partial y}\right)x - k\,d\mu\left(X\frac{\partial X}{\partial x} + Y\frac{\partial Y}{\partial x}\right)y$$

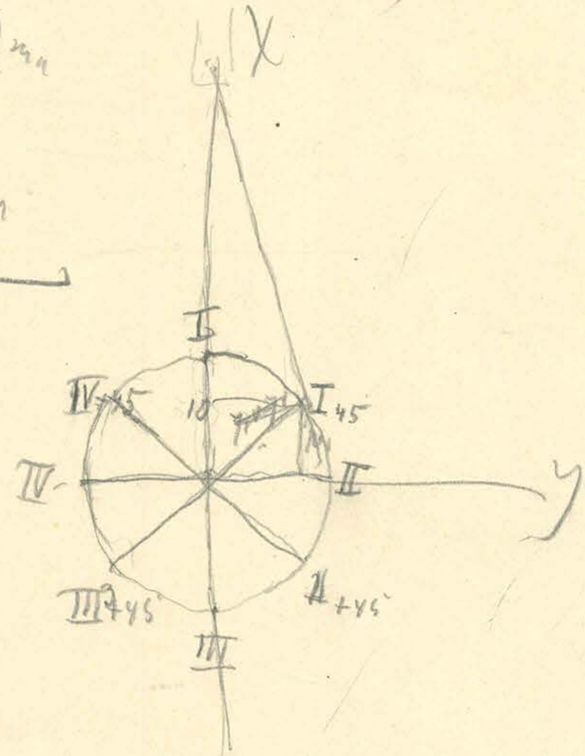
a hol $x = l\cos\alpha$. $y = l\sin\alpha$.

M coordinátái: $a = a - x$ $b = -y$ $c = 0$.

$r^2 = (a-x)^2 + y^2$ m_a $m_b = 0$ $m_c = 0$

$$\begin{cases} X = \frac{3(a-x)^2}{r^5} m_a - \frac{m_a}{r^3} \\ Y = -3\frac{(a-x)y}{r^5} m_a \end{cases}$$

$$\begin{cases} \frac{\partial X}{\partial x} = \left(-\frac{9(a-x)}{r^5} + 15\frac{(a-x)^3}{r^7}\right)m_a \\ \frac{\partial Y}{\partial y} = \left(-3\frac{(a-x)}{r^5} + 15\frac{(a-x)y^2}{r^7}\right)m_a \\ \frac{\partial Y}{\partial x} = \left(+3\frac{y}{r^5} - 15\frac{(a-x)^2 y}{r^7}\right)m_a \end{cases}$$



$$X = \frac{2(a-x)^2 - y^2}{r^5} m_a$$

$$Y = -3\frac{(a-x)y}{r^5} m_a$$

$$\frac{\partial X}{\partial x} = +3(a-x)\frac{2(a-x)^2 - 3y^2}{r^7} m_a$$

$$\frac{\partial Y}{\partial y} = -3(a-x)\frac{(a-x)^2 - 4y^2}{r^7} m_a.$$

$$\frac{\partial X}{\partial y} = \frac{\partial Y}{\partial x} = -3y\frac{4(a-x)^2 - y^2}{r^7} m_a$$

$$F_{tv} = +k\,d\mu\, Z\frac{\partial Y}{\partial z}x - k\,d\mu\, Z\frac{\partial X}{\partial z}y$$ a helyén $a - x$ b helyén $-y$ $c = c$

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

$$Z = 3\frac{(a-x)c}{r^5}$$

$$\frac{\partial X}{\partial z} = +3c\frac{4(a-x)^2 - y^2 - c^2}{r^7}$$

$$\frac{\partial Y}{\partial z} = -15c\frac{(a-x)y}{r^7}$$

$c = 0 \qquad b = 0. \qquad m_2 = m \qquad m_1 = 0 \qquad m_3 = 0$

$$X = \frac{2(a-x)^2 - y^2}{((a-x)^2+y^2)^{\frac{5}{2}}} m \qquad \frac{\partial X}{\partial \alpha} = -3(a-x)y\frac{2(a-x)^2-3y^2}{((a-x)^2+y^2)^{\frac{7}{2}}} - 3xy\frac{4(a-x)^2-y^2}{((a-x)^2+y^2)^{7/2}}$$

$$Y = -3\frac{(a-x)y}{r^5} m \qquad \frac{\partial Y}{\partial \alpha} = +3y^2\frac{4(a-x)^2-y^2}{((a-x)^2+y^2)^{7/2}} - 3(a-x)x\frac{(a-x)^2-4y^2}{((a-x)^2+y^2)^{\frac{7}{2}}}$$

$\varphi = 45^\circ$ $\qquad +a$

$$X = \frac{2(40-\frac{11}{\sqrt{2}})^2 - 60{,}5}{(1721-\sqrt{2}\,880)^{\frac{5}{2}}} m = +\frac{2016{,}46}{476{,}49^{\frac{5}{2}}}$$

$+50{,}1320\ 10^{-6}$

$$Y = -3\frac{(40-\frac{11}{\sqrt{2}})\frac{11}{\sqrt{2}}}{(\quad)^{\frac{5}{2}}} m = -\frac{751{,}889}{476{,}49^{\frac{5}{2}}}$$

$-18{,}6930\ 10^{-6}$

$$\frac{\partial X}{\partial \alpha} = -3\frac{11}{\sqrt{2}}(40-\frac{11}{\sqrt{2}})\frac{2(40-\frac{11}{\sqrt{2}})^2-181{,}5}{(\quad)^{\frac{7}{2}}} - 3\cdot 60{,}5\frac{4(40-\frac{11}{\sqrt{2}})^2-60{,}5}{(\quad)^{\frac{7}{2}}}$$

$$\frac{\partial X}{\partial \alpha} = -\frac{2168116}{476{,}49^{\frac{7}{2}}} \qquad -49{,}2740\ 10^{-6}$$

$$\frac{\partial Y}{\partial \alpha} = +187{,}5\frac{4(40-\frac{11}{\sqrt{2}})^2-60{,}5}{(\quad)^{\frac{7}{2}}} + 3(40-\frac{11}{\sqrt{2}})\frac{11}{\sqrt{2}}\frac{(40-\frac{11}{\sqrt{2}})^2-242}{(\quad)^{\frac{7}{2}}}$$

$$\frac{\partial Y}{\partial \alpha} = +\frac{144099}{476{,}49^{\frac{7}{2}}} \qquad +3{,}2749\ 10^{-6}$$

$\varphi = 225^\circ$ $\qquad -a.$

$$X = \frac{2(40+\frac{11}{\sqrt{2}})^2 - 60{,}5}{(1721+\sqrt{2}\,880)^{\frac{5}{2}}} m = +\frac{4505{,}02}{2965{,}51^{\frac{5}{2}}}$$

$+16{,}9491\ 10^{-6}$

$$Y = +3\frac{(40+\frac{11}{\sqrt{2}})\frac{11}{\sqrt{2}}}{(\quad)^{\frac{5}{2}}} m = +\frac{1114{,}88}{2965{,}51^{\frac{5}{2}}}$$

$+4{,}1945\ 10^{-6}$

$$\frac{\partial X}{\partial \alpha} = +3\frac{11}{\sqrt{2}}(40+\frac{11}{\sqrt{2}})\frac{2(40+\frac{11}{\sqrt{2}})^2-181{,}5}{(\quad)^{\frac{7}{2}}} - 3\cdot 60{,}5\frac{4(40+\frac{11}{\sqrt{2}})^2-60{,}5}{(\quad)^{\frac{7}{2}}}$$

$$\frac{\partial X}{\partial \alpha} = +\frac{3241370}{2965{,}51^{\frac{7}{2}}} \qquad +5{,}2043\ 10^{-6}$$

$$\frac{\partial Y}{\partial \alpha} = +187{,}5\frac{4(40+\frac{11}{\sqrt{2}})^2-60{,}5}{(\quad)^{\frac{7}{2}}} + 3(40+\frac{11}{\sqrt{2}})\frac{11}{\sqrt{2}}\frac{(40+\frac{11}{\sqrt{2}})^2-242}{(\quad)^{\frac{7}{2}}}$$

$$\frac{\partial Y}{\partial \alpha} = +\frac{3921500}{2965{,}51^{\frac{7}{2}}} \qquad +6{,}2977\ 10^{-6}$$

$\varphi = 225^\circ$

$X = +16{,}9491\ 10^{-6}\ m$

$Y \quad +4{,}1945\ 10^{-6}\ m$

$\frac{\partial X}{\partial \alpha} = +5{,}2043 \cdot 10^{-6}\ m$

$\frac{\partial Y}{\partial \alpha} = +6{,}2977\ 10^{-6}\ m$

$X = +50{,}1320\ 10^{-6}\ m$

$Y = -18{,}6930\ 10^{-6}\ m$

$\frac{\partial X}{\partial \alpha} = -49{,}2740\ 10^{-6}\ m$

$\frac{\partial Y}{\partial \alpha} = 3{,}2749\ 10^{-6}\ m$

x^2 ~~287,272~~
y^2 ~~17,594~~

$x^2 = +2573{,}217$ +	~~$x^2 = +287{,}272$~~ +
$y^2 = +349{,}428$ +	$y^2 = +17{,}594$ +
$xy = -937{,}117$ +	$xy = +71{,}093$ −
$x\frac{\partial x}{\partial \alpha} = -2470{,}204$ +	$x\frac{\partial x}{\partial \alpha} = +88{,}208$ −
$x\frac{\partial y}{\partial \alpha} = +164{,}177$ +	$x\frac{\partial y}{\partial \alpha} = +106{,}740$ +
$y\frac{\partial x}{\partial \alpha} = +921{,}079$ +	$y\frac{\partial x}{\partial \alpha} = +21{,}829$ +
$y\frac{\partial y}{\partial \alpha} = -61{,}018$ +	$y\frac{\partial y}{\partial \alpha} = +26{,}416$ −

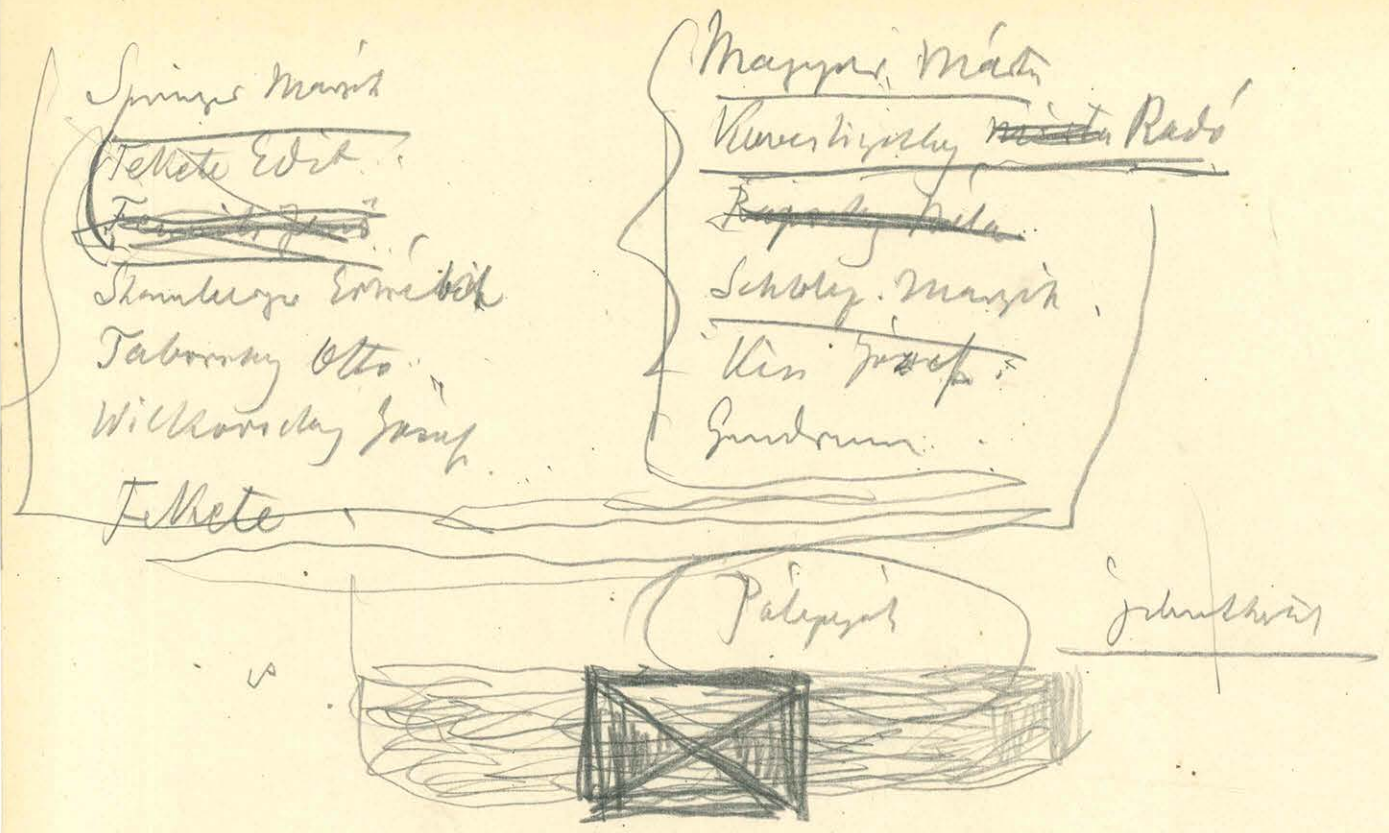
$\alpha = 45°$

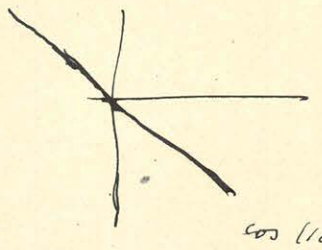
$\left(\frac{y^2-x^2}{2} + x\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha}\right) = +3{,}261\,10^{-12}$	$+3{,}261\,10^{-12}$
$-xy + y\frac{\partial y}{\partial \alpha} - x\frac{\partial x}{\partial \alpha} = +3346{,}103\,10^{-12}$	$-3346{,}103\,10^{-12}$
$x\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = +2531{,}422$	$+2531{,}422$

$\alpha = 225°$

$\frac{y^2-x^2}{2} + x\frac{\partial y}{\partial \alpha} + y\frac{\partial x}{\partial \alpha} = $ ~~$-141{,}109$~~ rossz	~~$-141{,}109$~~ rossz
$-xy + y\frac{\partial y}{\partial \alpha} - x\frac{\partial x}{\partial \alpha} = -132{,}885$	$+132{,}885$
$x\frac{\partial x}{\partial \alpha} + y\frac{\partial y}{\partial \alpha} = +114{,}624$	$-114{,}624$

egyiránypi	ellenőrző
$X = +67,0811$	$X = +33,1829$
$y = -14,4985$	$y = -22,8875$
$\frac{\partial X}{\partial \alpha} = -44,0697$	$\frac{\partial X}{\partial \alpha} = -54,4783$
$\frac{\partial y}{\partial \alpha} = +9,5726$	$\frac{\partial y}{\partial \alpha} = -3,0228$
$X^2 = +4499,872$	$X^2 =$
$y^2 = +210,207$	$y^2 =$
$Xy = -972,575$	$Xy =$
$X\frac{\partial X}{\partial \alpha} = +2956,244$	$X\frac{\partial X}{\partial \alpha} =$
$X\frac{\partial y}{\partial \alpha} = +642,141$	$X\frac{\partial y}{\partial \alpha} =$
$y\frac{\partial X}{\partial \alpha} = +638,945$	$y\frac{\partial X}{\partial \alpha} =$
$y\frac{\partial y}{\partial \alpha} = -138,788$	$y\frac{\partial y}{\partial \alpha} =$





$\cos 180°$

$\cos 225°$

$\cos (45° + \alpha) + 180°$

$-$

$-49,2740$
$-18,6930$
$\overline{-67,9670}$

$+3,2749$
$-50,1320$
$\overline{-46,8571}$

$x =$

$\cos(180° + \alpha + \delta) = -\cos(\alpha + \delta)$
$\sin(180° + \alpha + \delta) = -\sin(\alpha + \delta)$

$135°$

$x_{135} = + x_{45}$

$y_{135} = -y_{45}$

$\left(\frac{\partial x}{\partial \alpha}\right)_{135} = \left(\frac{\partial x}{\partial \alpha}\right)_{45}$

$\left(\frac{\partial y}{\partial \alpha}\right)_{135} = +\left(\frac{\partial y}{\partial \alpha}\right)_{45}$

$315°$

$45°$

x'_{45}

y'_{45}

$135°$

x'_{45}

$-y'_{45}$

x''_{45}

y''_{45}

x''_{45}

$-y'_{45}$

$x_{45} = x'_{45} + x''_{45}$

y_{45}

x_{45}

$-y_{45}$

$+ \frac{(a+x)\,y}{x^5}$

$+ 3$

$+ 3(a+x)$

$+ 3\frac{(a+x)\,y}{x^5}$

$\frac{2(a+x)^2 - 3y^2}{x^5}$

$- 3xy$

Ugyanis infinitezimális forgás mentén

$$(a_{11}-a_{22})\left(\frac{y^2-x^2}{2}+x\frac{\partial y}{\partial \alpha}+y\frac{\partial x}{\partial \alpha}\right)v+2a_{12}\left(-xy+y\frac{\partial y}{\partial \alpha}-x\frac{\partial x}{\partial \alpha}\right)v$$

$$+(a_{11}+a_{22})\left(x\frac{\partial x}{\partial \alpha}+y\frac{\partial y}{\partial \alpha}\right)v$$

Mágnes [illegible] + a alá – a az egyik [illegible]
V az egyik végén [illegible] lefogyott

$$F_{45,225}=\left[-(a_{11}-a_{22})137{,}748+a_{12}6426{,}436-(a_{11}+a_{22})2416{,}798\right]m^2 v\, 10^{-12}$$

$$F_{135,315}=\left[-(a_{11}-a_{22})137{,}748-a_{12}6426{,}436+(a_{11}+a_{22})2416{,}798\right]m^2 v\, 10^{-12}$$

Két egyirányú mágnes

$$F_{45,225}=\left[-(a_{11}-a_{22})1727{,}494-a_{12}4244{,}914+(a_{11}+a_{22})5624{,}912\right]m^2 v\, 10^{-12}$$

$$F_{135,315}=$$

log 2965,51 = 3,472100
1,736050

3,304590
6,695135
0,609455 − 4 4,06889 10^{-4}

3,653697

2,876153
6,695135
0,181018 − 4 1,51712 10^{-4}

3,047228

6,336083
10,643465
0,692618 − 5 49,2740 10^{-6}

6,570729
11,794370
0,716359 − 6 5,20426 10^{-6}

5,158661
10,643465
0,515196 − 6 3,27489 10^{-6}

6,593452
11,794370
0,799182 − 6 6,29770 10^{-6}

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log 1098,98 = 3,040990
1,520495

log 2343,26 = 3,369820
1,684910

3,304590
7,604475
0,760115 − 5 50,1320 10^{-6}

3,653697
8,424550
0,229147 − 5 16,9491 10^{-6}

2,876153
7,604475
0,271678 − 5 18,6930 10^{-6}

3,047228
8,424550
0,622678 − 6 4,19448 10^{-6}

$$F_z = \left\{ -\left[X\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0 \int a_{12}\, l\, dw \sin\varepsilon \; -\frac{1}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]\int a_{23}\, l^2\, dw \sin 2\varepsilon \right\} \sin\alpha$$

$$+ \left\{ +\frac{1}{2}\left[X\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l\, dw \sin\varepsilon - \frac{1}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]\int a_{13}\, l^2\, dw \sin 2\varepsilon \; -\left[X\frac{\partial X}{\partial x}\right]_0 \int (a_{11}+a_{22})\, l\, dw \sin\varepsilon \; -2\left[Z\frac{\partial z}{\partial x}\right]_0 \int a_{33}\, l\, dw \sin\varepsilon \; -\left[\frac{\partial z}{\partial x}\right]_0 \int x\, l\, dw \sin\varepsilon \right\} \cos\alpha$$

$$+ \left\{ +2\left[z\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)+X\frac{\partial z}{\partial x}\right]_0 \int a_{23}\, l\, dw \sin\varepsilon \; +\left[\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right]_0 \int b\, l\, dw \sin\varepsilon \right\} \sin 2\alpha$$

$$+ \left\{ -2\left[z\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)+X\frac{\partial z}{\partial x}\right]_0 \int a_{13}\, l\, dw \sin\varepsilon \; -\frac{1}{2}\left[\left(\frac{\partial X}{\partial x}\right)^2-\left(\frac{\partial y}{\partial y}\right)^2\right]_0 \int (a_{11}+a_{22})\, l^2\, dw \sin 2\varepsilon \; -\left[\left(\frac{\partial z}{\partial x}\right)\right]_0 \int a_{33}\, l^2\, dw \sin 2\varepsilon \; -\left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0 \int x\, l\, dw \sin\varepsilon \right\} \cos 2\alpha$$

$$+ \left\{ +3\left[X\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0 \int a_{12}\, l\, dw \sin\varepsilon \; +\frac{3}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0 \int a_{23}\, l^2\, dw \sin 2\varepsilon \right\} \sin 3\alpha$$

$$+ \left\{ -\frac{3}{2}\left[\left(X\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l\, dw \sin\varepsilon - \frac{3}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0 \int a_{13}\, l^2\, dw \sin 2\varepsilon \right\} \cos 3\alpha$$

$$+ \left\{ +\left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)^2\right]_0 \int a_{12}\, l^2\, dw \sin 2\varepsilon \right\} \sin 4\alpha$$

$$+ \left\{ -\frac{1}{2}\left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)^2\right]_0 \int (a_{11}-a_{22})\, l^2\, dw \sin 2\varepsilon \right\} \cos 4\alpha$$

Ha a YZ síkban $y=0$ akkor: $y_0=0$ és $\left(\frac{\partial y}{\partial x}\right)_0=0$ és $\left(\frac{\partial y}{\partial z}\right)_0=0$

$$F = F_1 + F_2$$

$$F_1 = \left\{-2X_0Z_0\int a_{13}\,dw - \left[\frac{\partial X}{\partial x}\cdot\frac{\partial Z}{\partial x}\right]\int a_{13}l^2dw - \frac{1}{2}\left[X\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0\int(a_{11}-a_{22})l\,dw\cos\varepsilon - \left[X\frac{\partial X}{\partial x}\right]_0\int(a_{11}+a_{22})l\,dw\cos\varepsilon - 2\left[Z\frac{\partial Z}{\partial x}\right]_0\int a_{33}l\,dw\cos\varepsilon - \frac{1}{2}\left[\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0\int a_{13}l^2dw\cos2\varepsilon - X_0\int v_x\,dw - \left[\frac{\partial Z}{\partial x}\right]_0\int v_l\,dw\cos\varepsilon\right\}\sin\alpha$$

$$+\left\{-2X_0Z_0\int a_{23}\,dw - \left[\frac{\partial X}{\partial x}\cdot\frac{\partial Z}{\partial x}\right]\int a_{23}l^2dw - \left[X\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0\int a_{12}l\,dw\cos\varepsilon + \frac{1}{2}\left[\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x}+\frac{\partial y}{\partial y}\right)\right]_0\int a_{23}l^2dw\cos2\varepsilon - X_0\int v_x\,dw\right\}\cos\alpha$$

$$+\left\{-X_0^2\int(a_{11}-a_{22})\,dw - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x}\right)^2-\left(\frac{\partial y}{\partial y}\right)^2\right]_0\int(a_{11}-a_{22})l^2dw - 2\left[Z\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)+X\frac{\partial Z}{\partial x}\right]_0\int a_{13}l\,dw\cos\varepsilon - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x}\right)^2-\left(\frac{\partial y}{\partial y}\right)^2\right]_0\int(a_{11}+a_{22})l^2dw\cos2\varepsilon - \left[\left(\frac{\partial Z}{\partial x}\right)^2\right]_0\int a_{33}l^2dw\cos2\varepsilon - \left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0\int v_l\,dw\cos\varepsilon\right\}\sin2\alpha$$

$$+\left\{-2X_0^2\int a_{12}\,dw - \left[\left(\frac{\partial X}{\partial x}\right)^2-\left(\frac{\partial y}{\partial y}\right)^2\right]\int a_{12}l^2dw - 2\left[Z\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)+X\frac{\partial Z}{\partial x}\right]_0\int a_{23}l\,dw\cos\varepsilon - \left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0\int b_l\,dw\cos\varepsilon\right\}\cos2\alpha$$

$$+\left\{-\frac{3}{2}\left[X\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0\int(a_{11}-a_{22})l\,dw\cos\varepsilon - \frac{3}{2}\left[\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0\int a_{13}l^2dw\cos2\varepsilon\right\}\sin3\alpha$$

$$+\left\{-3\left[X\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]\int a_{12}l\,dw\cos\varepsilon - \frac{3}{2}\left[\frac{\partial Z}{\partial x}\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0\int a_{23}l^2dw\cos2\varepsilon\right\}\cos3\alpha$$

$$+\left\{-\frac{1}{2}\left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)\right]_0^2\int(a_{11}-a_{22})l^2dw\cos2\varepsilon\right\}\sin4\alpha$$

$$+\left\{-\left[\left(\frac{\partial X}{\partial x}-\frac{\partial y}{\partial y}\right)^2\right]_0\int a_{12}l^2dw\cos2\varepsilon\right\}\cos4\alpha$$

F_2 ől lásd a mellékelt ✡ lapon.

Egyes mágnes

egy m momentumú mágnes $\underline{a}^{\text{vége}}$ és $c=0^{b=0}$ helyen.

a mágnes

$$F=\left\{-\frac{3}{17}m^2\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon-\frac{12}{17}m^2\int(a_{11}+a_{22})\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_a\right\}\sin\alpha$$

$$+\left\{-\frac{6}{17}m^2\int a_{12}\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_b\right\}\cos\alpha$$

$$+\left\{-\frac{4}{r^6}m^2\int(a_{11}-a_{22})\,dw-\frac{27}{2}\frac{1}{r^8}m^2\int(a_{11}-a_{22})\,l^2dw-\frac{27}{2}\frac{1}{r^8}m^2\int(a_{11}+a_{22})\,l^2\cos2\varepsilon\,dw-\frac{9m}{r^4}\mu_a l\right\}\sin2\alpha$$

$$+\left\{-\frac{8}{r^6}m^2\int a_{12}\,dw-27\frac{1}{r^8}m^2\int a_{12}\,l^2dw-\frac{9m}{r^4}\mu_b l\right\}\cos2\alpha$$

$$+\left[-27\frac{m^2}{17}\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon\right]\sin3\alpha+\left[-54\frac{m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon\right]\cos3\alpha$$

$$+\left[-\frac{81}{2}\frac{m^2}{r^8}\int(a_{11}-a_{22})\,l^2dw\cos\varepsilon\right]\sin4\alpha+\left[-81\frac{m^2}{r^8}\int a_{12}\,l^2dw\cos\varepsilon\right]\cos4\alpha$$

vagyis.

$$\tilde{F}=\left\{-\frac{3m^2}{17}\int(5a_{11}+3a_{22})\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_a\right\}\sin\alpha+\left\{-\frac{6m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_b\right\}\cos\alpha$$

$$+\left\{-\frac{4m^2}{r^6}\int(a_{11}-a_{22})\,dw-\frac{27}{2}\frac{m^2}{r^8}\left[\int(a_{11}-a_{22})\,l^2dw+\int(a_{11}+a_{22})\,l^2\cos2\varepsilon\,dw\right]-\frac{9m}{r^4}\mu_a l\right\}\sin2\alpha$$

$$+\left\{-\frac{8m^2}{r^6}\int a_{12}\,dw-27\frac{m^2}{r^8}\int a_{12}\,l^2dw-9\frac{m}{r^4}\mu_b l\right\}\cos2\alpha$$

$$-\left[27\frac{m^2}{17}\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon\right]\sin3\alpha-\left[54\frac{m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon\right]\cos3\alpha$$

$$-\left[\frac{81}{2}\frac{m^2}{r^8}\int(a_{11}-a_{22})\,l^2dw\cos\varepsilon\right]\sin4\alpha-\left[81\frac{m^2}{r^8}\int a_{12}\,l^2dw\cos\varepsilon\right]\cos4\alpha$$

a mágnes

$$F=\left\{+\frac{3}{17}m^2\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon+\frac{12}{17}m^2\int(a_{11}+a_{22})\,l\,dw\cos\varepsilon-\frac{m2}{r^3}\mu_a\right\}\sin\alpha$$

$$+\left\{+\frac{6}{17}m^2\int a_{12}\,l\,dw\cos\varepsilon-\frac{m2}{r^3}\mu_b\right\}\cos\alpha.$$

$$+\left\{-\frac{4}{r^6}m^2\int(a_{11}-a_{22})\,dw-\frac{27}{2}\frac{m^2}{r^8}\int(a_{11}-a_{22})\,l^2dw-\frac{27}{2}\frac{m^2}{r^8}\int(a_{11}+a_{22})\,l^2\cos2\varepsilon\,dw+\frac{m9}{r^4}\mu_a l\right\}\sin2\alpha.$$

$$+\left\{-\frac{8}{r^6}m^2\int a_{12}\,dw-27\frac{m^2}{r^8}\int a_{12}\,l^2dw+\frac{m9}{r^4}\mu_b l\right\}\cos2\alpha$$

$$+\left[+27\frac{m^2}{17}\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon\right]\sin3\alpha+\left[+54\frac{m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon\right]\cos3\alpha.$$

$$+\left[-\frac{81}{2}\frac{m^2}{r^8}\int(a_{11}-a_{22})\,l^2dw\cos\varepsilon\right]\sin4\alpha+\left[-81\frac{m^2}{r^8}\int a_{12}\,l^2dw\cos\varepsilon\right]\cos4\alpha.$$

$$\tilde{F}=\left\{+\frac{3m^2}{17}\int(5a_{11}+3a_{22})\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_a\right\}\sin\alpha+\left\{+\frac{6m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon-\frac{2m}{r^3}\mu_b\right\}\cos\alpha$$

$$+\left\{-\frac{4m^2}{r^6}\int(a_{11}-a_{22})\,dw-\frac{27}{2}\frac{m^2}{r^8}\left[\int(a_{11}-a_{22})\,l^2dw+\int(a_{11}+a_{22})\,l^2\cos2\varepsilon\,dw\right]+\frac{9m}{r^4}\mu_a l\right\}\sin2\alpha$$

$$+\left\{-\frac{8m^2}{r^6}\int a_{12}\,dw-27\frac{m^2}{r^8}\int a_{12}\,l^2dw+\frac{9m}{r^4}\mu_b l\right\}\cos2\alpha$$

$$+\left[27\frac{m^2}{17}\int(a_{11}-a_{22})\,l\,dw\cos\varepsilon\right]\sin3\alpha+\left[54\frac{m^2}{17}\int a_{12}\,l\,dw\cos\varepsilon\right]\cos3\alpha$$

$$-\left[\frac{81}{2}\frac{m^2}{r^8}\int(a_{11}-a_{22})\,l^2dw\cos\varepsilon\right]\sin4\alpha-\left[81\frac{m^2}{r^8}\int a_{12}\,l^2dw\cos\varepsilon\right]\cos4\alpha$$

$$\sin 2\alpha - \left\{16\frac{m^2}{r^6}\int a_{12}dw + 54\frac{m^2}{r^8}\int a_{12}l^2dw\right\}\cos 2\alpha - \left\{81\frac{m^2}{r^8}\int (a_{11}-a_{22})l^2dw\cos\varepsilon\right\}\sin 4\alpha - \left\{162\frac{m^2}{r^8}\int a_{12}l^2dw\cos\varepsilon\right\}\cos 4\alpha$$

$$\left\{16\frac{m^2}{r^6}\int a_{12}dw + 54\frac{m^2}{r^8}\int a_{12}l^2dw \pm 18\frac{m}{r^4}\mu_b\lambda\right\}\cos 2\alpha - \left\{81\frac{m^2}{r^8}\int (a_{11}-a_{22})l^2dw\cos\varepsilon\right\}\sin 4\alpha - \left\{162\frac{m^2}{r^8}\int a_{12}l^2dw\cos\varepsilon\right\}\cos 4\alpha$$

$$\tilde{F} = \left[-54\frac{m^2}{r^8}\int (a_{11}+a_{22})l^2dw - 54\frac{m^2}{r^8}\int (a_{11}+a_{22})l^2dw\cos\varepsilon - 18\frac{m}{r^4}\mu_a\lambda\right]\sin 2\alpha$$

$$+\left[-108\frac{m^2}{r^8}\int a_{12}l^2dw - 18\frac{m}{r^4}\mu_b\lambda\right]\cos 2\alpha \cdot -18\frac{m^2}{r^8}\int (a_{11}-a_{22})l^2dw\cos 2\varepsilon \cdot 2\sin 4\alpha$$

$$-36\frac{m^2}{r^8}\int a_{12}l^2dw\cos 2\varepsilon\cos 4\alpha.$$

$K_2 = K_3$

$$a_{11} = K_1 + (K_2-K_1)\lambda_2^2 + (K_2-K_1)\lambda_3^2 = K_1 + (K_2-K_1) - (K_2-K_1)\lambda_1^2 = K_2 - (K_2-K_1)\cos^2\Delta\cos^2\varphi$$

$$a_{22} = K_1 + (K_2-K_1)\mu_2^2 + (K_2-K_1)\mu_3^2 = K_1 + K_2 - K_1) - (K_2-K_1)\mu_1^2 = K_2 - (K_2-K_1)\sin^2\Delta\cos^2\varphi.$$

$$a_{12} = (K_2-K_1)\lambda_2\mu_2 + (K_2-K_1)\lambda_3\mu_3 = -(K_2-K_1)\tfrac{1}{2}\sin 2\Delta\cos^2\varphi .$$

$$\begin{cases} a_{11} - a_{22} = -(K_2-K_1)\cos 2\Delta\cos^2\varphi \\ a_{12} = -(K_2-K_1)\tfrac{1}{2}\sin 2\Delta\cos^2\varphi \end{cases}$$

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$dw\, l \sin\alpha$	$dw\, l \cos\alpha$	$dw\, l^2 \sin 2\alpha$	$dw\, l^2 \cos 2\alpha$	dw
$-\frac{1}{2}\Big\{X\Big(2\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)(a_{11}-a_{22})\cos 2\varepsilon$		$\Big\{\frac{X_0^2}{l^2}+\frac{1}{2}\Big[\Big(\frac{\partial Y}{\partial y}\Big)^2-\Big(\frac{\partial X}{\partial x}\Big)^2\Big]_0\Big\}(a_{11}-a_{22})$	$\Big\{-\frac{X_0^2}{l^2}+\frac{1}{2}\Big[\Big(\frac{\partial Y}{\partial y}\Big)^2-\Big(\frac{\partial X}{\partial x}\Big)^2\Big]\Big\}2a_{12}$	$+\frac{1}{2}\Big\{$
$+\frac{1}{2}\Big\{X\Big(\frac{\partial Y}{\partial y}-2\frac{\partial X}{\partial x}\Big)(a_{11}-a_{22})\cos 2\varepsilon$	$+\frac{1}{2}\Big\{X\Big(\frac{\partial Y}{\partial y}-2\frac{\partial X}{\partial x}\Big)2a_{12}\cos 2\varepsilon$			$+\frac{1}{2}\Big\{X$
$+\frac{1}{4}\Big\{\Big[\frac{\partial Z}{\partial x}\Big(\frac{\partial Y}{\partial y}-2\frac{\partial X}{\partial x}\Big)\Big]_0 2a_{13}\cos 2\varepsilon$	$-\frac{1}{2}\Big\{X\Big(2\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)2a_{12}\cos 2\varepsilon$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)-X\frac{\partial Z}{\partial x}\Big]2a_{13}\cos 2\varepsilon\frac{1}{l}$		
$-\Big(2XZ+\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x}l\Big)_0 a_{13}\frac{1}{l}$	$-\frac{1}{4}\Big\{\Big[\frac{\partial Z}{\partial x}\Big(\frac{\partial Y}{\partial y}-2\frac{\partial X}{\partial x}\Big)\Big]2a_{23}l\cos 2\varepsilon$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)-X\frac{\partial Z}{\partial x}\Big]2a_{13}\cos 2\varepsilon\frac{1}{l}$		
$+\frac{1}{4}\Big\{\frac{\partial Z}{\partial x}\Big(\frac{\partial X}{\partial x}-2\frac{\partial Y}{\partial y}\Big)2a_{13}l\cos 2\varepsilon$	$-\Big(2XZ+\frac{\partial X}{\partial x}\frac{\partial Z}{\partial x}l\Big)a_{23}\frac{1}{l}$		$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)-X\frac{\partial Z}{\partial x}\Big]2a_{23}\cos 2\varepsilon\frac{1}{l}$	
	$-\frac{1}{4}\Big\{\frac{\partial Z}{\partial x}\Big(\frac{\partial X}{\partial x}-2\frac{\partial Y}{\partial y}\Big)2a_{23}l\cos 2\varepsilon$		$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\Big)-X\frac{\partial Z}{\partial x}\Big]2a_{23}\cos 2\varepsilon\frac{1}{l}$	$-\frac{1}{4}\Big\{\frac{\partial Z}{\partial x}$
$-\Big(X\frac{\partial X}{\partial x}\Big)(a_{11}+a_{22})\cos 2\varepsilon$		$+\frac{1}{2}\Big[\Big(\frac{\partial Y}{\partial y}\Big)^2-\Big(\frac{\partial X}{\partial x}\Big)^2\Big]_0(a_{11}+a_{22})\cos 2\varepsilon$		
$-\Big(Z\frac{\partial Z}{\partial x}\Big)_0 2a_{33}\cos 2\varepsilon$		$-\frac{1}{2}\Big[\Big(\frac{\partial Z}{\partial x}\Big)\Big]_0^2 2a_{33}\cos 2\varepsilon$		

	$+\frac{1}{2}\Big\{X\Big(\frac{\partial Y_0}{\partial y}-2\frac{\partial Y_0}{\partial x_0}\Big)(a_{11}-a_{22})\sin 2\varepsilon$			
	$-\frac{1}{2}\Big\{X\Big(\frac{\partial Y_0}{\partial y}-2\frac{\partial Y_0}{\partial x_0}\Big)(a_{11}-a_{22})\sin 2\varepsilon$			
$+\frac{1}{2}\Big\{X\Big(\frac{\partial Y_0}{\partial y}-2\frac{\partial Y_0}{\partial x_0}\Big)2a_{12}\sin 2\varepsilon$				
$-\frac{1}{2}\Big\{X\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial x_0}\Big)2a_{12}\sin 2\varepsilon$	$+\frac{1}{4}\Big\{\Big[\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial z_0}\Big)\Big]2a_{13}\sin 2\varepsilon$	$-\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{13}\sin 2\varepsilon\frac{1}{l}$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{13}\sin 2\varepsilon\frac{1}{l}$	
$+\frac{1}{4}\Big\{\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial z_0}\Big)2a_{23}l\sin 2\varepsilon$	$+\frac{1}{4}\Big\{\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial z_0}-2\frac{\partial Y_0}{\partial x_0}\Big)2a_{23}l\sin 2\varepsilon$	$-\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{23}\sin 2\varepsilon\frac{1}{l}$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{23}\sin 2\varepsilon\frac{1}{l}$	
$-\frac{1}{2}\Big\{X\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial z_0}\Big)2a_{12}\sin 2\varepsilon$	$+\frac{1}{4}\Big\{\Big[\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial z_0}\Big)\Big]2a_{13}\sin 2\varepsilon$	$-\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{13}\sin 2\varepsilon\frac{1}{l}$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{13}\sin 2\varepsilon\frac{1}{l}$	
$+\frac{1}{4}\Big\{\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial z_0}-2\frac{\partial Y_0}{\partial x_0}\Big)2a_{23}l\sin 2\varepsilon$	$+\frac{1}{4}\Big\{\frac{\partial Z}{\partial x_0}\Big(\frac{\partial Y_0}{\partial x_0}-2\frac{\partial Y_0}{\partial z_0}\Big)2a_{23}l\sin 2\varepsilon$	$-\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{23}\sin 2\varepsilon\frac{1}{l}$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{23}\sin 2\varepsilon\frac{1}{l}$	
	$-\Big(\frac{\partial Z}{\partial x_0}\Big)_0 2a_{33}\sin 2\varepsilon$		$-\frac{1}{2}\Big(\frac{\partial Z}{\partial x_0}\Big)_0^2 2a_{33}\sin 2\varepsilon$	
	$-\Big(X\frac{\partial X}{\partial x_0}\Big)(a_{11}+a_{22})\sin 2\varepsilon$		$+\frac{1}{2}\Big[\Big(\frac{\partial Y_0}{\partial x_0}\Big)^2+\Big(\frac{\partial X}{\partial x_0}\Big)^2\Big]_0(a_{11}+a_{22})\sin 2\varepsilon$	

$+\frac{1}{2}\Big\{Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]2a_{13}\sin 2\varepsilon$	$+\frac{1}{2}\Big[Z\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)-X\frac{\partial Z}{\partial x_0}\Big]_0 2a_{23}\cos 2\varepsilon$		$-\frac{1}{2}\Big\{\Big(\frac{\partial Y_0}{\partial x_0}-\frac{\partial Y_0}{\partial z_0}\Big)(a_{11}-a_{22})\sin 2\varepsilon$	
$-\frac{1}{2}\Big\{$	$+\frac{1}{2}\Big[$		$2a_{23}\cos 2\varepsilon$	

$dw\, l \sin 2\alpha$	$dw\, l \cos 2\alpha$	$dw\, l^2 \sin^2 2\alpha$	$dw\, l^2 \cos^2 2\alpha$
$+\frac{1}{2}\left[X\left(2\frac{\partial y}{\partial \xi}-\frac{\partial X}{\partial \xi}\right)(a_{11}-a_{22})\cos 2\varepsilon\right.$		$-\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2_0(a_{11}-a_{22})\cos 2\varepsilon$	
$+\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)(a_{11}-a_{22})\cos 2\varepsilon\right.$	$+\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)2a_{12}\cos 2\varepsilon\right.$	$-\frac{1}{4}\left[\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2_0(a_{11}-a_{22})\cos 2\varepsilon\right.$	$-\frac{1}{4}\left[\frac{\partial X}{\partial \xi}+\frac{\partial Y}{\partial \eta}\right]^2 2a_{12}\cos 2\varepsilon$
$+\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)\right]2a_{13}\cos 2\varepsilon$	$+\frac{1}{2}\left[X\left(2\frac{\partial y}{\partial \eta}-\frac{\partial X}{\partial \xi}\right)2a_{12}\cos 2\varepsilon\right.$		$-\frac{1}{4}\left[\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right]^2 2a_{12}\cos 2\varepsilon$
$-\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial X}{\partial \xi}-2\frac{\partial y}{\partial \eta}\right)2a_{13}\right]\cos 2\varepsilon$	$+\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)\right]2a_{23}\cos 2\varepsilon$		
	$-\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial X}{\partial \xi}-2\frac{\partial y}{\partial \eta}\right)2a_{13}\right]\cos 2\varepsilon$		
	$+\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)(a_{11}-a_{22})\sin 2\varepsilon\right.$		$-\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2_0(a_{11}-a_{22})\sin 2\varepsilon$
	$+\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)(a_{11}-a_{22})\sin 2\varepsilon\right.$	$+\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2 2a_{12}\sin 2\varepsilon$	$-\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2(a_{11}-a_{22})\sin 2\varepsilon$
$-\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)2a_{12}\sin 2\varepsilon\right.$		$+\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial Y}{\partial \eta}\right)^2 2a_{12}\sin 2\varepsilon$	
$-\frac{1}{2}\left[X\left(\frac{\partial y}{\partial \eta}-\frac{\partial X}{\partial \xi}\right)2a_{12}\sin 2\varepsilon\right.$	$+\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial y}{\partial \xi}-2\frac{\partial X}{\partial \xi}\right)\right]2a_{13}\sin 2\varepsilon$		
$+\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial y}{\partial \eta}-2\frac{\partial X}{\partial \xi}\right)2a_{23}\right]\sin 2\varepsilon$	$-\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial X}{\partial \xi}-2\frac{\partial y}{\partial \eta}\right)\right]2a_{23}\sin 2\varepsilon$		
$+\frac{1}{4}\left[\frac{\partial Z}{\partial \xi}\left(\frac{\partial X}{\partial \xi}-2\frac{\partial y}{\partial \eta}\right)2a_{23}\right]\sin 2\varepsilon$			
$+\frac{1}{4}\left(\frac{\partial X}{\partial \xi}-\frac{\partial y}{\partial \eta}\right)(a_{11}-a_{22})\sin 2\varepsilon$	$-\frac{1}{4}\left(\frac{\partial y}{\partial \eta}-\frac{\partial X}{\partial \xi}\right)^2_0(a_{11}-a_{22})\sin 2\varepsilon$	$+\frac{1}{4}\left(\left(\frac{\partial X}{\partial \xi}-\frac{\partial y}{\partial \eta}\right)^2\right)l^2 2a_{12}\cos 2\varepsilon$	

$dw\, er \cos\alpha + dw\, b \sin\alpha$ $\qquad$ $dw\, er \sin\alpha + dw\, b \cos\alpha$

$$\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, er \sin\alpha\cos\alpha\, l\cos\varepsilon - \left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, b \sin^2\alpha\, l\cos\varepsilon$$

$$+\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, er \sin\alpha\cos\alpha\, l\cos\varepsilon + \left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, b \cos^2\alpha\, l\cos\varepsilon$$

$$- X_0\, dw\, er \sin\alpha - X_0\, dw\, b \cos\alpha -$$

$$+\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, er \cos^2\alpha\, l\sin\varepsilon - \left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, b \sin\alpha\cos\alpha\, l\sin\varepsilon$$

$$-\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, er \sin^2\alpha\, l\sin\varepsilon - \left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right)_0 dw\, b \sin\alpha\cos\alpha\, l\sin\varepsilon$$

az állandó momentum függvényei a körülkező Z lap:

$$\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) \sin 2\alpha\, er\, l\cos\varepsilon\, dw$$

$$+\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) \cos 2\alpha\, b\, l\cos\varepsilon\, dw$$

$$- X_0\, dw\, er \sin\alpha - X_0\, dw\, b \cos\alpha\, dw$$

$$-\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) \sin 2\alpha\, b\, l\sin\varepsilon\, dw$$

$$+\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) \cos 2\alpha\, er\, l\sin\varepsilon\, dw$$

$$-\left(\frac{\partial Z}{\partial x}\right)_0 \sin\alpha\, l\, dw\, l\cos\varepsilon$$

$$-\left(\frac{\partial Z}{\partial x}\right)_0 \cos\alpha\, l\, dw\, l\sin\varepsilon$$

$$-2\frac{\partial Y}{\partial y} + \frac{\partial X}{\partial x}$$

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

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

$$\sin\alpha \sin 2\alpha = \frac{1}{2}\cos\alpha - \frac{1}{2}\cos 3\alpha$$

$$\sin\alpha \cos 2\alpha = -\frac{1}{2}\sin\alpha + \frac{1}{2}\sin 3\alpha$$

$$\cos\alpha \sin 2\alpha = \frac{1}{2}\sin\alpha + \frac{1}{2}\sin 3\alpha$$

$$\cos\alpha \cos 2\alpha = +\frac{1}{2}\cos\alpha + \frac{1}{2}\cos 3\alpha$$

$$\sin 2\alpha \cos 2\alpha = \frac{1}{2}\sin 4\alpha$$

$$\cos 2\alpha \cos 2\alpha = \frac{1}{2}\cos 4\alpha + \frac{1}{2}$$

$$\sin 2\alpha \sin 2\alpha = -\frac{1}{2}\cos 4\alpha + \frac{1}{2}$$

~~Gravitációs erőtér~~ $\varepsilon = 0$ $\quad y_0 = 0 \quad \left(\frac{\partial y}{\partial x}\right)_0 \quad \left(\frac{\partial y}{\partial z}\right)_0 = \left(\frac{\partial z}{\partial y}\right)_0 = 0$

$$X = X_0 + \left(\frac{\partial X}{\partial x}\right)_0 l \cos(\alpha+\varepsilon) \qquad \frac{\partial X}{\partial \alpha} = -\left(\frac{\partial X}{\partial x}\right)_0 l \sin(\alpha+\varepsilon)$$

$$y = \left(\frac{\partial y}{\partial x}\right)_0 l \sin\alpha + \varepsilon \qquad \frac{\partial y}{\partial \alpha} = +\left(\frac{\partial y}{\partial y}\right)_0 l \cos(\alpha+\varepsilon)$$

$$Z = Z_0 + \left(\frac{\partial z}{\partial x}\right)_0 l \cos\alpha + \varepsilon \qquad \frac{\partial z}{\partial \alpha} = +\left(\frac{\partial z}{\partial x}\right)_0 l \sin(\alpha+\varepsilon)$$

$$\left(yZ + Z\frac{\partial X}{\partial \alpha} + X\frac{\partial Z}{\partial \alpha}\right)' = \left[Z\left(\frac{\partial y}{\partial y} - \frac{\partial X}{\partial x}\right) - X\frac{\partial z}{\partial x}\right]_0 \sin\alpha \cos\varepsilon + \frac{1}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial y}{\partial y} - 2\frac{\partial X}{\partial x}\right)\right]_0 \sin 2\alpha\, l^2 \cos 2\varepsilon$$

$$+ \left[\qquad\qquad\right]_0 \cos\alpha\, l \sin\varepsilon + \frac{1}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial y}{\partial y} - 2\frac{\partial x}{\partial x}\right)\right]_0 \cos 2\alpha\, l^2 \sin 2\varepsilon$$

$$\left(-XZ + Z\frac{\partial y}{\partial \alpha} + y\frac{\partial z}{\partial \alpha}\right) = -\frac{1}{2}\left(2XZ + \frac{\partial X}{\partial x}\frac{\partial z}{\partial x}l^2\right) + \left[Z\left(\frac{\partial y}{\partial y} - \frac{\partial X}{\partial x}\right) - X\frac{\partial z}{\partial x}\right]_0 \cos\alpha\, l \cos\varepsilon - \frac{1}{2}\left[\frac{\partial z}{\partial x}\left(\frac{\partial X}{\partial x} - 2\frac{\partial y}{\partial y}\right)\right]_0 \cos 2\alpha\, l^2 \cos 2\varepsilon$$

$$- \left[\qquad\qquad\right]_0 \sin\alpha\, l \sin\varepsilon + \frac{1}{2}\left[\qquad\qquad\right]_0 \sin 2\alpha\, l^2 \sin 2\varepsilon$$

$$2XY + X\frac{\partial X}{\partial \alpha} - y\frac{\partial y}{\partial \alpha} = \left[X\left(2\frac{\partial y}{\partial y} - \frac{\partial X}{\partial x}\right)\right]_0 \sin\alpha \cos\varepsilon - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2\right]_0 \sin 2\alpha\, l^2 \cos 2\varepsilon$$

$$\left[\qquad\qquad\right]_0 \cos\alpha\, l \sin\varepsilon - \frac{1}{2}\left[\qquad\qquad\right]_0 \cos 2\alpha\, l^2 \sin 2\varepsilon$$

$$y^2 - X^2 + X\frac{\partial y}{\partial \alpha} + y\frac{\partial X}{\partial \alpha} = -X_0^2 + \frac{1}{2}\left[\left(\frac{\partial y}{\partial y}\right)^2 - \left(\frac{\partial X}{\partial x}\right)^2\right]_0 l^2 + \left[X\left(\frac{\partial y}{\partial x} - 2\frac{\partial X}{\partial x}\right)\right]_0 \cos\alpha\, l \cos\varepsilon - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2\right]_0 \cos 2\alpha\, l^2 \cos 2\varepsilon$$

$$- \left[X\left(\frac{\partial y}{\partial y} - 2\frac{\partial X}{\partial x}\right)\right]_0 \sin\alpha\, l \sin\varepsilon + \frac{1}{2}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2\right]_0 \sin 2\alpha\, l^2 \sin 2\varepsilon$$

$$X\frac{\partial X}{\partial \alpha}+Y\frac{\partial Y}{\partial \alpha} = -\left(X_0\frac{\partial X}{\partial x}\right)_0 \sin\alpha\, l\cos\varepsilon + \frac{1}{2}\left\{\left(\frac{\partial Y}{\partial y}\right)^2-\left(\frac{\partial X}{\partial x}\right)^2\right\}_0 \sin 2\alpha\, l^2\cos^2\varepsilon$$

$$-(\quad)\cos\alpha\, l\sin\varepsilon + \frac{1}{2}[\quad]\cos 2\alpha\, l^2\sin 2\varepsilon$$

$$Z\frac{\partial Z}{\partial \alpha} = -\left(Z\frac{\partial Z}{\partial x}\right)_0 \sin\alpha\, l\cos\varepsilon - \frac{1}{2}\left\{\left(\frac{\partial Z}{\partial x}\right)^2\right\}_0 \sin 2\alpha\, l^2\cos 2\varepsilon$$

$$-(\quad)_0\cos\alpha\, l\sin\varepsilon - \frac{1}{2}|\quad|_0\cos 2\alpha\, l^2\sin 2\varepsilon$$

$$\frac{\partial X}{\partial \alpha}+Y = \left(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\right)_0 \sin\alpha\, l\cos\varepsilon$$

$$+(\quad)\cos\alpha\, l\sin\varepsilon$$

$$\frac{\partial Y}{\partial \alpha}-X = -X_0+\left(\frac{\partial Y}{\partial y}-\frac{\partial X}{\partial x}\right)_0 \cos\alpha\, l\cos\varepsilon$$

$$-(\quad)_0\sin\alpha\, l\sin\varepsilon$$

$$\frac{\partial Z}{\partial \alpha} = -\left(\frac{\partial Z}{\partial x}\right)_0 \sin\alpha\, l\cos\varepsilon$$

$$-(\quad)\cos\alpha\, l\sin\varepsilon.$$

$$\frac{dF}{d\omega} = (a_{11}-a_{22})\left(X\frac{\partial X}{\partial\alpha} - Y\frac{\partial Y}{\partial\alpha}\right)\sin 2\alpha.$$

$$+2a_{11}X\frac{\partial X}{\partial\alpha}\cos^2\alpha + 2a_{11}Y\frac{\partial Y}{\partial\alpha}\sin^2\alpha + 2a_{22}X\frac{\partial X}{\partial\alpha}\sin^2\alpha + 2a_{12}Y\frac{\partial Y}{\partial\alpha}\cos^2\alpha + (a_{11}-a_{22})(Y^2-X^2)\sin 2\alpha + 2a_{12}\left(Y\frac{\partial Y}{\partial\alpha} - X\frac{\partial X}{\partial\alpha}\right)\sin 2\alpha + 2a_{12}(Y^2-X^2)\cos 2\alpha$$

$$+(a_{11}-a_{22})\left(X\frac{\partial Y}{\partial\alpha} + Y\frac{\partial X}{\partial\alpha}\right)\sin 2\alpha + 2(a_{11}-a_{22})XY\cos 2\alpha + 2a_{12}\left(X\frac{\partial Y}{\partial\alpha} + Y\frac{\partial X}{\partial\alpha}\right)\cos 2\alpha - 4a_{12}XY\sin 2\alpha.$$

$$+2a_{13}\left(Z\frac{\partial X}{\partial\alpha} + X\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - 2a_{13}XZ\sin\alpha - 2a_{23}\left(Z\frac{\partial X}{\partial\alpha} + X\frac{\partial Z}{\partial\alpha}\right)\sin\alpha - 2a_{23}XZ\cos\alpha + 2a_{13}\left(Z\frac{\partial Y}{\partial\alpha} + Y\frac{\partial Z}{\partial\alpha}\right)\sin\alpha + 2a_{13}YZ\cos\alpha$$

$$+2a_{23}\left(Z\frac{\partial Y}{\partial\alpha} + Y\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - 2a_{23}YZ\sin\alpha.$$

$$+2a_{33}Z\frac{\partial Z}{\partial\alpha}. + (a_{11}+a_{12})\left(X\frac{\partial X}{\partial\alpha} + Y\frac{\partial Y}{\partial\alpha}\right)$$

$$+\mu_1\frac{\partial X}{\partial\alpha}\cos(\alpha+\delta) - \mu_1 X\sin(\alpha+\delta) + \mu_2\frac{\partial Y}{\partial\alpha}\sin(\alpha+\delta) + \mu_2 Y\cos(\alpha+\delta) + \mu_3\frac{\partial Z}{\partial\alpha}.$$

$$\frac{dF}{dw} = 2a_{11}X\frac{\partial X}{\partial\alpha}\cos^2\alpha + a_{11}X^2\sin 2\alpha + 2a_{22}X\frac{\partial X}{\partial\alpha}\sin^2\alpha + a_{22}X^2\sin 2\alpha - 2a_{12}X\frac{\partial X}{\partial\alpha}\sin 2\alpha - 2a_{12}X^2\cos 2\alpha + \frac{1}{2}(a_{11}-a_{22})\left(X\frac{\partial Y}{\partial\alpha}+Y\frac{\partial X}{\partial\alpha}\right)\sin 2\alpha + (a_{11}-a_{22})XY\cos 2\alpha$$

$$+ a_{12}\left(X\frac{\partial Y}{\partial\alpha}+Y\frac{\partial X}{\partial\alpha}\right)\cos 2\alpha - 2a_{12}XY\sin 2\alpha + a_{13}\left(Z\frac{\partial X}{\partial\alpha}+X\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - a_{13}XZ\sin\alpha - a_{23}\left(Z\frac{\partial X}{\partial\alpha}+X\frac{\partial Z}{\partial\alpha}\right)\sin\alpha - a_{23}XZ\cos\alpha + \mu_1\frac{\partial X}{\partial\alpha}\cos(\alpha+\delta) - \mu_1 X\sin(\alpha+\delta)$$

$$+ 2a_{11}Y\frac{\partial Y}{\partial\alpha}\sin^2\alpha + a_{11}Y^2\sin 2\alpha + 2a_{22}Y\frac{\partial Y}{\partial\alpha}\cos^2\alpha - a_{22}Y^2\sin 2\alpha + 2a_{12}Y\frac{\partial Y}{\partial\alpha}\cos 2\alpha + 2a_{12}Y^2\cos 2\alpha + \frac{1}{2}(a_{11}-a_{22})\left(X\frac{\partial Y}{\partial\alpha}+Y\frac{\partial X}{\partial\alpha}\right)\sin 2\alpha + (a_{11}-a_{22})XY\cos 2\alpha$$

$$+ a_{12}\left(X\frac{\partial Y}{\partial\alpha}+Y\frac{\partial X}{\partial\alpha}\right)\cos 2\alpha - 2a_{12}XY\sin 2\alpha + a_{13}\left(Z\frac{\partial Y}{\partial\alpha}+Y\frac{\partial Z}{\partial\alpha}\right)\sin\alpha + a_{13}YZ\cos\alpha + a_{23}\left(Z\frac{\partial Y}{\partial\alpha}+Y\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - a_{23}YZ\sin\alpha + \mu_1\frac{\partial Y}{\partial\alpha}\sin(\alpha+\delta) + \mu_1 Y\cos(\alpha+\delta)$$

$$+ a_{13}Z\frac{\partial X}{\partial\alpha}\cos\alpha - a_{13}XZ\sin\alpha - a_{23}Z\frac{\partial X}{\partial\alpha}\sin\alpha - a_{23}XZ\cos\alpha + a_{13}Z\frac{\partial Y}{\partial\alpha}\sin\alpha + a_{13}YZ\cos\alpha + a_{23}Z\frac{\partial Y}{\partial\alpha}\cos\alpha - a_{23}YZ\sin\alpha$$

$$+ a_{13}\left(Z\frac{\partial X}{\partial\alpha}+X\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - a_{13}XZ\sin\alpha - a_{23}\left(Z\frac{\partial X}{\partial\alpha}+X\frac{\partial Z}{\partial\alpha}\right)\sin\alpha - a_{23}XZ\cos\alpha + a_{13}\left(Z\frac{\partial Y}{\partial\alpha}+Y\frac{\partial Z}{\partial\alpha}\right)\sin\alpha + a_{13}YZ\cos\alpha + a_{23}\left(Z\frac{\partial Y}{\partial\alpha}+Y\frac{\partial Z}{\partial\alpha}\right)\cos\alpha - a_{23}YZ\sin\alpha$$

$$+ 2a_{33}Z\frac{\partial Z}{\partial\alpha} + \mu_4\frac{\partial Z}{\partial\alpha}$$

$$X = X_0 + \left(\frac{\partial X}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + \left(\frac{\partial X}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

$$Y = Y_0 + \left(\frac{\partial Y}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + \left(\frac{\partial Y}{\partial y}\right)_0 l\sin(\alpha+\varepsilon)$$

$$Z = Z_0 + \left(\frac{\partial Z}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + \left(\frac{\partial Z}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

$$X^2 = X_0^2 + 2X_0\left(\frac{\partial X}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + 2X_0\left(\frac{\partial X}{\partial y_0}\right) l\sin(\alpha+\varepsilon)$$

$$Y^2 = Y_0^2 + 2Y_0\left(\frac{\partial Y}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + 2Y_0\left(\frac{\partial Y}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

$$\frac{\partial X}{\partial\alpha} = -\left(\frac{\partial X}{\partial x}\right)_0 l\sin(\alpha+\varepsilon) + \left(\frac{\partial X}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

$$\frac{\partial Y}{\partial\alpha} = -\left(\frac{\partial Y}{\partial x}\right)_0 l\cos(\alpha+\varepsilon) + \left(\frac{\partial Y}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

$$\frac{\partial Z}{\partial\alpha} = -\left(\frac{\partial Z}{\partial x}\right)_0 l\sin(\alpha+\varepsilon) + \left(\frac{\partial Z}{\partial y}\right)_0 l\cos(\alpha+\varepsilon)$$

~~$X\frac{\partial X}{\partial\alpha} = -X(X) l\sin(\alpha+\varepsilon) + X$~~

~~$X\frac{\partial X}{\partial\alpha} = -X\frac{\partial X}{\partial x} l\sin(\alpha+\varepsilon) + X\frac{\partial X}{\partial y} l\cos(\alpha+\varepsilon)$~~

$$X\frac{\partial X}{\partial\alpha} + Y\frac{\partial Y}{\partial\alpha} = -\left(X\frac{\partial X}{\partial x} + Y\frac{\partial Y}{\partial x}\right) l\sin(\alpha+\varepsilon) + \left(X\frac{\partial X}{\partial y}+Y\frac{\partial Y}{\partial y}\right) l\cos(\alpha+\varepsilon) + \frac{1}{2}\left(\left(\frac{\partial Y}{\partial y}\right)^2 - \left(\frac{\partial X}{\partial x}\right)^2\right) l^2 \sin 2(\alpha+\varepsilon) + \frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}\right) l^2\cos 2(\alpha+\varepsilon)$$

$$X\frac{\partial X}{\partial\alpha} - Y\frac{\partial Y}{\partial\alpha} = \left(Y\frac{\partial Y}{\partial x} - X\frac{\partial X}{\partial x}\right) l\sin(\alpha+\varepsilon) + \left(X\frac{\partial X}{\partial y} - Y\frac{\partial Y}{\partial y}\right) l\cos(\alpha+\varepsilon) - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x}\right)^2 + \left(\frac{\partial Y}{\partial y}\right)^2 - 2\left(\frac{\partial X}{\partial y}\right)^2\right] l^2\sin 2(\alpha+\varepsilon) - \frac{\partial X}{\partial y}\left(\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right) l^2\cos 2(\alpha+\varepsilon)$$

$$2XY = 2X_0Y + 2\left(X\frac{\partial Y}{\partial y} + Y\frac{\partial X}{\partial y}\right) l\sin(\alpha+\varepsilon) + 2\left(X\frac{\partial Y}{\partial x} + Y\frac{\partial X}{\partial x}\right) l\cos(\alpha+\varepsilon) + \left(\frac{\partial X}{\partial x}\frac{\partial Y}{\partial y} + \left(\frac{\partial X}{\partial y}\right)^2\right) l^2\sin 2(\alpha+\varepsilon) + \frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} - \frac{\partial Y}{\partial y}\right) l^2 \cos 2(\alpha+\varepsilon)$$

$$\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}\right) l^2$$

$$X\frac{\partial X}{\partial\alpha} - Y\frac{\partial Y}{\partial\alpha} + 2XY = \frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}\right) l^2 + 2XY + \left[3Y\frac{\partial X}{\partial y} + 2X\frac{\partial Y}{\partial y} - X\frac{\partial X}{\partial x}\right] l\sin(\alpha+\varepsilon) + \left[3X\frac{\partial X}{\partial y} + 2Y\frac{\partial X}{\partial x} - Y\frac{\partial Y}{\partial y}\right] l\cos(\alpha+\varepsilon)$$
$$- \frac{1}{2}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial Y}{\partial y}\right)^2 - 4\left(\frac{\partial X}{\partial y}\right)^2\right] l^2\sin 2(\alpha+\varepsilon) + 2\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} - \frac{\partial Y}{\partial y}\right) l^2\cos 2(\alpha+\varepsilon)$$

$$X\frac{\partial Y}{\partial\alpha} + Y\frac{\partial X}{\partial\alpha} + Y^2 - X^2 = Y^2 - X^2 + \frac{1}{2}\left(\left(\frac{\partial Y}{\partial y}\right)^2 - \left(\frac{\partial X}{\partial x}\right)^2\right) l^2 - \left[3X\frac{\partial X}{\partial y} - 2Y\frac{\partial Y}{\partial y} + Y\frac{\partial X}{\partial x}\right] l\sin(\alpha+\varepsilon) + \left[3Y\frac{\partial X}{\partial y} - 2X\frac{\partial X}{\partial x} + X\frac{\partial Y}{\partial y}\right] l\cos(\alpha+\varepsilon)$$
$$+ 2\frac{\partial X}{\partial y}\left[\frac{\partial Y}{\partial y} - \frac{\partial X}{\partial x}\right] l^2\sin 2(\alpha+\varepsilon) - \frac{1}{2}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial Y}{\partial y}\right)^2 - 4\left(\frac{\partial X}{\partial y}\right)^2\right] l^2\cos 2(\alpha+\varepsilon)$$

$k_1 \quad k_2 \quad k_3$

$A \quad B \quad C$

$k_1 A \quad k_2 B \quad k_3 C$

$l_1 \mu_1 \nu_1 \quad l_2 \mu_2 \nu_2 \quad l_3 \mu_3 \nu_3$

$m_x \quad m_y \quad m_z \qquad X, Y, Z$

$k_1 l_1 A + k_2 l_2 B + k_3 l_3 C = m_x$

$A = X l_1 + Y \mu_1 + Z \nu_1 \qquad B = X l_2 + Y \mu_2 + Z \nu_2$

$C = X l_3 + Y \mu_3 + Z \nu_3$

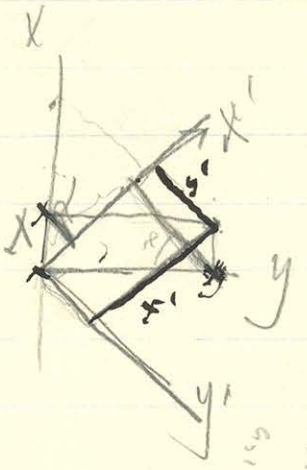
$k_1 l_1^2 X + k_1 l_1 \mu_1 Y + k_1 l_1 \nu_1 Z$
$+ k_2 l_2^2 X + k_2 l_2 \mu_2 Y + k_2 l_2 \nu_2 Z$
$+ k_3 l_3^2 X + k_3 l_3 \mu_3 Y + k_3 l_3 \nu_3 Z$ $= m_x$

$\left(k_1 l_1^2 + k_2 l_2^2 + k_3 l_3^2\right) X' + \left(k_1 l_1 \mu_1 + k_2 l_2 \mu_2 + k_3 l_3 \mu_3\right) Y' + \left(k_1 l_1 \nu_1 + k_2 l_2 \nu_2 + k_3 l_3 \nu_3\right) Z' = m_x'$

$\left(k_1 \mu_1^2 + k_2 \mu_2^2 + k_3 \mu_3^2\right)$

$X' = X \cos\alpha + Y \sin\alpha$

$Y' = -X \sin\alpha + Y \cos\alpha$



$m_1' = k_1 l_1 A + k_2 \mu_2 B + k_3 \mu_3 C$

$m_2' = k_1 \nu_1 A + k_2 \nu_2 B + k_3 \nu_3 C$

$$\sin\alpha\cos2\alpha = -\frac{1}{2}\sin\alpha + \frac{1}{2}\sin3\alpha$$

$$-\cos\alpha\cos2\alpha = +\frac{1}{2}\cos\alpha + \frac{1}{2}\cos3\alpha.$$

$$\sin\alpha\cos2\alpha = \frac{1}{2}\sin3\alpha$$

$$\cos2\alpha\cos2\alpha = \frac{1}{2}\cos4\alpha + \frac{1}{2}$$

$$\cos^2\alpha = \frac{1}{2} + \frac{1}{2}\cos2\alpha$$

$$\sin^2\alpha = \frac{1}{2} - \frac{1}{2}\cos2\alpha$$

$$(a_{11}-a_{22})\left\{\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}\right)l^2+2XY\right\}\sin\alpha\cos2\alpha$$

$$\left\{\begin{array}{l} +(a_{11}-a_{22})\left[3Y\frac{\partial X}{\partial y}+2X\frac{\partial Y}{\partial y}-X\frac{\partial X}{\partial x}\right]\sin\alpha\cos2\alpha\; l\cos\varepsilon\,dw - (a_{11}-a_{22})[\quad]\sin\alpha\cos2\alpha\; l\sin\varepsilon\,dw \\ (+a_{11}-a_{22})[\quad]\cos\alpha\cos2\alpha\; l\sin\varepsilon\,dw + (a_{11}-a_{22})\left[2X\frac{\partial X}{\partial y}+2Y\frac{\partial X}{\partial x}-Y\frac{\partial Y}{\partial y}\right]\cos\alpha\cos2\alpha\; l\cos\varepsilon\,dw \end{array}\right.$$

$$-\frac{1}{2}(a_{11}-a_{22})\left[\left(\frac{\partial X}{\partial x}-\frac{\partial Y}{\partial y}\right)^2-4\left(\frac{\partial X}{\partial y}\right)^2\right]\sin2\alpha\cos2\alpha\; l^2\cos2\varepsilon\,dw - 2(a_{11}-a_{22})\frac{\partial X}{\partial y}(\quad)\sin2\alpha\cos2\alpha\; l^2\sin\varepsilon\,dw$$

$$-\frac{1}{2}(a_{11}-a_{22})[\quad]\cos2\alpha\cos2\alpha\; l^2\sin2\varepsilon\,dw + 2(a_{11}-a_{22})\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x}-\frac{\partial Y}{\partial y}\right)\cos2\alpha\cos2\alpha\; l^2\cos2\varepsilon\,dw$$

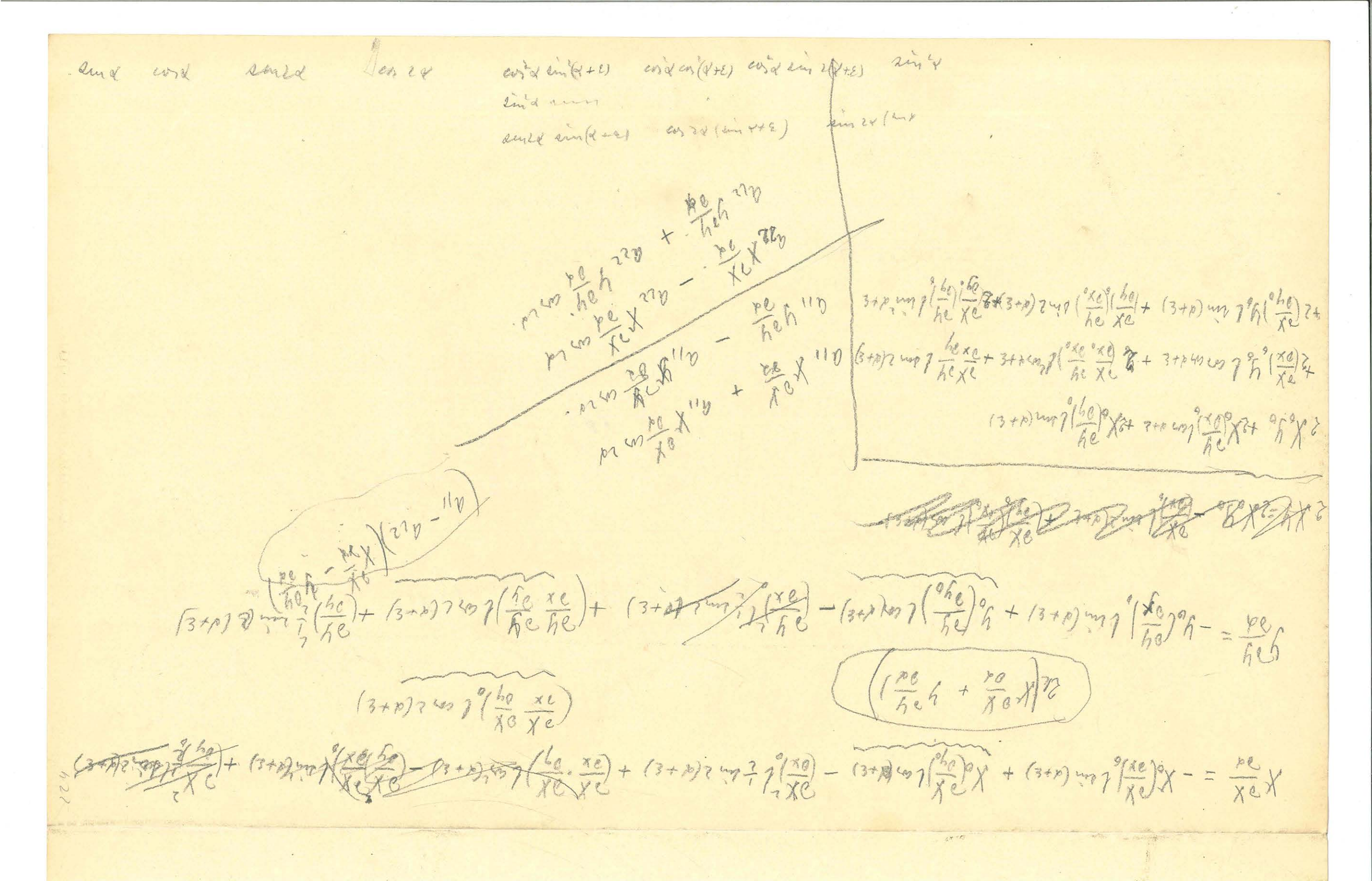
$$\frac{1}{2}+\frac{1}{2}\cos 2\alpha \qquad\qquad \frac{1}{2}-\frac{1}{2}\cos 2\alpha.$$

$$xy + x\frac{\partial y}{\partial x}\Big\{\cos(\alpha+\varepsilon) + x\frac{\partial y}{\partial y}\,l\sin(\alpha+\varepsilon)$$
$$y\frac{\partial x}{\partial x}\,l\cos(\alpha+\varepsilon)$$
$$+ y\frac{\partial x}{\partial y}\,l\sin(\alpha+\varepsilon)\Big\} + \frac{\partial x}{\partial x}\frac{\partial x}{\partial y}\,l^2\cos^2(\alpha+\varepsilon) + \frac{1}{2}\frac{\partial x}{\partial x}\frac{\partial y}{\partial y}\,l^2\sin 2(\alpha+\varepsilon)$$
$$+\frac{1}{2}\left(\frac{\partial x}{\partial y}\right)^2 l^2\sin^2(\alpha+\varepsilon) + \frac{\partial y}{\partial y}\frac{\partial x}{\partial y}\,l^2\sin^2(\alpha+\varepsilon)$$

$$+\frac{1}{2}\left(\left(\frac{\partial y}{\partial x}\right)^2+\left(\frac{\partial y}{\partial y}\right)^2+\left(\frac{\partial x}{\partial x}\right)^2-\left(\frac{\partial x}{\partial y}\right)^2\right)l\cos 2(\alpha+\varepsilon)$$

$$y^2-x' = y^2-x^2 + 2\left(y\frac{\partial y}{\partial x} - x\frac{\partial x}{\partial x}\right)l\cos(\alpha+\varepsilon) + 2\left(y\frac{\partial y}{\partial y} - x\frac{\partial x}{\partial y}\right)l\sin(\alpha+\varepsilon) + \frac{\partial y}{\partial x}\left(\frac{\partial y}{\partial x}-\frac{\partial x}{\partial y}\right)l^2\sin 2(\alpha+\varepsilon)$$

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



$$
\begin{aligned}
F = &\left\{ -\frac{1}{2}\left[3y\frac{\partial X}{\partial y} + 2X\frac{\partial y}{\partial y} - X\frac{\partial X}{\partial x}\right]_0 \int (a_{11}-a_{22})\, l\cos\varepsilon\, dw + \frac{1}{2}\left[3X\frac{\partial X}{\partial y} + 2y\frac{\partial X}{\partial x} - y\frac{\partial y}{\partial y}\right]_0 \int (a_{11}-a_{22})\, l\sin\varepsilon\, dw \right\} \sin\alpha \\
&+ \left\{ +\frac{1}{2}\left[3y\frac{\partial X}{\partial y} + 2X\frac{\partial y}{\partial y} - X\frac{\partial X}{\partial x}\right]_0 \int (a_{11}-a_{22})\, l\sin\varepsilon\, dw + \frac{1}{2}\left[3X\frac{\partial X}{\partial y} + 2y\frac{\partial X}{\partial x} - y\frac{\partial y}{\partial y}\right]_0 \int (a_{11}-a_{22})\, l\cos\varepsilon\, dw \right\} \cos\alpha \\
&+ \left\{ +\left[\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} + \frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l^2\, dw + 2X_0 y_0 \int (a_{11}-a_{22})\, dw - \frac{1}{4}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2 - 4\left(\frac{\partial X}{\partial y}\right)^2\right]_0 \int (a_{11}-a_{22})\, l^2\sin 2\varepsilon\, dw + \left[\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l^2\cos 2\varepsilon\, dw \right\} \cos 2\alpha \\
&+ \left\{ +\frac{1}{2}\left[3y\frac{\partial X}{\partial y} + 2X\frac{\partial y}{\partial y} - X\frac{\partial X}{\partial x}\right]_0 \int (a_{11}-a_{22})\, l\cos\varepsilon\, dw - \frac{1}{2}\left[3X\frac{\partial X}{\partial y} + 2y\frac{\partial X}{\partial x} - y\frac{\partial y}{\partial y}\right]_0 \int (a_{11}-a_{22})\, l\sin\varepsilon\, dw \right\} \sin 3\alpha \\
&+ \left\{ +\frac{1}{2}\left[3y\frac{\partial X}{\partial y} + 2X\frac{\partial y}{\partial y} - X\frac{\partial X}{\partial x}\right]_0 \int (a_{11}-a_{22})\, l\sin\varepsilon\, dw + \frac{1}{2}\left[3X\frac{\partial X}{\partial y} + 2y\frac{\partial X}{\partial x} - y\frac{\partial y}{\partial y}\right]_0 \int (a_{11}-a_{22})\, l\cos\varepsilon\, dw \right\} \cos 3\alpha \\
&+ \left\{ -\frac{1}{4}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2 - 4\left(\frac{\partial X}{\partial y}\right)^2\right]_0 \int (a_{11}-a_{22})\, l^2\cos 2\varepsilon\, dw - \left[\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l^2\sin 2\varepsilon\, dw \right\} \sin 4\alpha \\
&+ \left\{ -\frac{1}{4}\left[\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)^2 - 4\left(\frac{\partial X}{\partial y}\right)^2\right]_0 \int (a_{11}-a_{22})\, l^2\sin 2\varepsilon\, dw + \left[\frac{\partial X}{\partial y}\left(\frac{\partial X}{\partial x} - \frac{\partial y}{\partial y}\right)\right]_0 \int (a_{11}-a_{22})\, l^2\cos 2\varepsilon\, dw \right\} \cos 4\alpha
\end{aligned}
$$