

## MEHANIKA III

### GRAFIČKI RAD BR. 2

#### Primjena zakona kinetičkog momenta za određivanje ugaone brzine krutog tijela

Ploča H, mase  $m_1$ , rotira oko vertikalne ose z konstantnom ugaonom brzinom  $\omega_0$ ; pri tome se materijalna tačka L, mase  $m_2$ , nalazi u tački O žlijeba AB urezanog na ploči H, a tačka O je na rastojanju OA od tačke A mjereći duž žlijeba. U nekom trenutku (smatramo ga početnim trenutkom  $t = 0$ ) na sistem počne djelovati spreg sila momenta  $M_z = f_1(t)$ . U nekom trenutku  $t_1$  prestaje djelovati spreg sila; istovremeno tačka L započinje relativno kretanje iz tačke O duž žlijeba AB (u smjeru prema B) po zakonu  $OL = s = f_2(t - t_1)$  za  $t > t_1$ .

Potrebno je odrediti ugaonu brzinu ploče H kada je  $t = t_1$  i kada je  $t = T$  ne uzimajući u obzir otpor rotaciji ploče H. Obrasci za računanje momenta inercije ploče dati u tabeli 1.

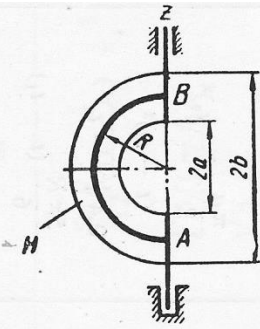
Tabela 1.

Aksijalni momenti inercije homogenih ploča				
	$J_x$	$J_y$	$J_z$	
	$\frac{mR^2}{2}$	$\frac{mR^2}{4}$	$\frac{mR^2}{4}$	
	$\frac{m(R^2 + r^2)}{2}$	$\frac{m(R^2 + r^2)}{4}$	$\frac{m(R^2 + r^2)}{4}$	
	$\frac{m(a^2 + b^2)}{3}$	$\frac{mb^2}{3}$	$\frac{ma^2}{3}$	
	$\frac{ma^2}{3}$	0	$\frac{ma^2}{3}$	
	$\frac{m(3a^2 + b^2)}{18}$	$\frac{mb^2}{18}$	$\frac{ma^2}{6}$	

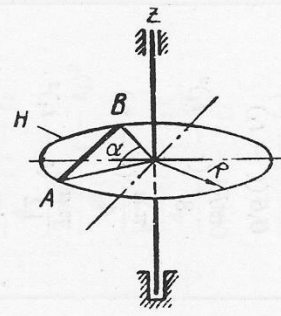
Varijanta (sl. D-5a, b, c)	$m_1$ kg	$m_2$ kg	$\omega_0^*$ 1/s	$a$ m	$b$ m	$R$ m	$\alpha$ stupnjeva	$AO$ m	$M_z = f_1(t)$ Nm	$t_1$ s	$T$ s	$OL = s = f_2(t - t_1)$ m
1	32	10	-1	1	1,5	1,2	-	$\frac{\pi R}{6}$	$-29,6t^2$	3	4	$\frac{5\pi R}{12}(t - t_1)$
2	200	60	-2	-	-	2	120	$\frac{\sqrt{3}}{2}$	101	5	6	$\sqrt{3}(t - t_1)^2$
3	120	40	0	2	-	-	-	0	$-120t$	4	6	$\frac{\sqrt{2}}{4}(t - t_1)^2$
4	16	5	-3	-	-	1	30	0,4	$21t$	2	6	$0,6\sqrt{t - t_1}$
5	66	10	1,5	2	1,5	-	-	0	$15\sqrt{t}$	4	6,5	$0,5(t - t_1)$
6	160	80	-1,25	1,5	-	2,5	-	$\frac{\pi a}{6}$	$-700t$	$\sqrt{3}$	$2\sqrt{3}$	$\frac{5\pi a}{18}(t - t_1)^2$
7	300	50	-2	1,6	1	0,8	-	0	968	1	2	$\frac{\pi R}{2}(t - t_1)^2$
8	80	20	0	1,2	-	2	-	$\frac{\pi a}{2}$	$240\sqrt{t}$	4	8	$\frac{\pi a}{4}\sqrt{t - t_1}$
9	20	5	5	1,2	-	0,4	45	$\frac{\pi R}{4}$	$-29,2t$	3	4	$\frac{3\pi R}{4}(t - t_1)^2$
10	100	40	2	2	$\sqrt{2}$	-	-	$\frac{\sqrt{2}}{2}$	$-90\sqrt{t}$	4	5	$\frac{\sqrt{2}}{4}(t - t_1)$
11	60	20	-1	2	-	-	15	0	$40t$	2	4	$0,4(t - t_1)^2$
12	40	10	-3	1	-	2	-	0	$50t^2$	3	5	$\frac{\pi a}{3}(t - t_1)$
13	24	4	4	1	-	-	-	0,5	$-27\sqrt{t}$	1	3	$0,3(t - t_1)$
14	40	10	2	-	-	1	-	0	$120t$	1	4	$0,5(t - t_1)$
15	120	50	-4	1	-	2	-	0	$330t^2$	2	3	$\frac{\pi a}{2}(t - t_1)^2$
16	60	10	-5	1	1,2	-	30	0,4	74	2	6	$0,3\sqrt{t - t_1}$
17	50	10	-2	-	-	1,6	30	0,6	$69t$	4	6	$0,6(t - t_1)$
18	120	50	3	2	3	0,8	-	$\frac{\pi R}{2}$	324	3	5	$\frac{\pi R}{8}(t - t_1)^2$
19	90	30	1	1,5	-	-	-	0	$-135t$	2	3	$\frac{\pi a}{4}(t - t_1)$
20	50	12	3	1	-	1,2	-	$\frac{\pi a}{6}$	$-14t^2$	3	5	$\frac{\pi a}{12}(t - t_1)^2$
21	40	10	-6	-	-	1	-	$\frac{\sqrt{2}}{2}$	$75\sqrt{t}$	1	3	$\frac{\sqrt{2}}{16}(t - t_1)^2$
22	150	50	-1	1,6	1,2	0,6	-	$\frac{\pi R}{2}$	163	4	5	$\frac{\pi R}{2}\sqrt{t - t_1}$
23	90	20	2	$\sqrt{2}$	1	-	-	$\frac{\sqrt{3}}{2}$	-210	2	3	$\frac{\sqrt{3}}{2}(t - t_1)$
24	50	12	-3	0,6	-	-	60	0,2	$+27t^2$	2	6	$0,4\sqrt{t - t_1}$
25	36	8	-5	-	-	0,5	-	0	$20t$	2	4	$\frac{\pi R}{6}(t - t_1)^2$
26	150	40	-4	1,5	-	2	-	$\frac{\pi a}{6}$	$1170\sqrt{t}$	1	2	$\frac{\pi a}{2}(t - t_1)^2$
27	120	30	0	1	-	-	60	0	$-25t$	2	3	$(t - t_1)^2$
28	15	4	-2	0,6	-	-	-	0,1	$5,6t$	3	4	$0,4\sqrt{t - t_1}$
29	20	5	5	0,6	-	0,6	-	0	$-6,3\sqrt{t}$	4	5	$\frac{5\pi R}{6}(t - t_1)$
30	150	50	0	1,6	1,2	-	-	1,6	$688t$	2	4	$0,2(t - t_1)^2$

Predznak (-) ispred  $M_z$  i  $\omega$  odgovara smjeru kretanja kazaljke na satu ako se posmatе sa strane pozitivnog smjera ose z.

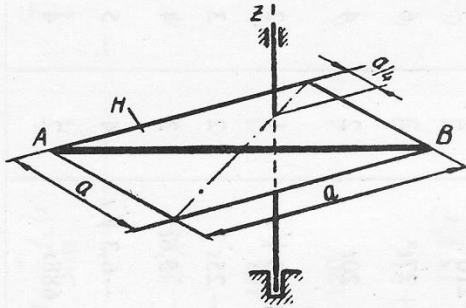
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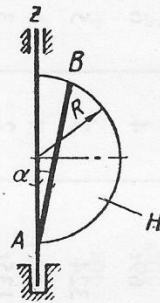
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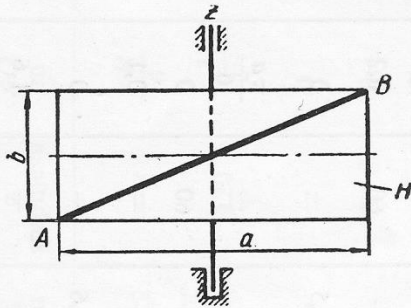
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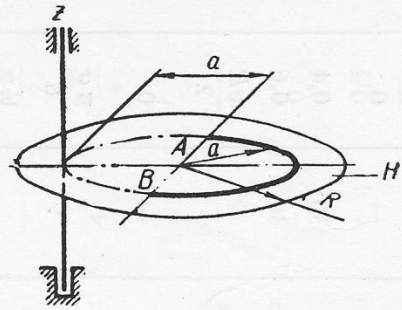
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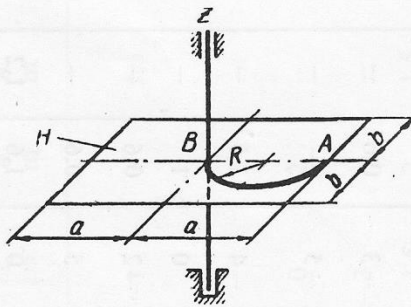
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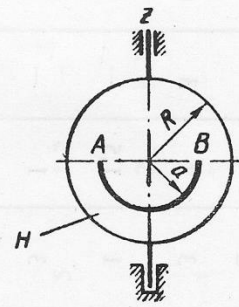
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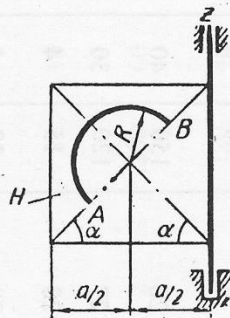
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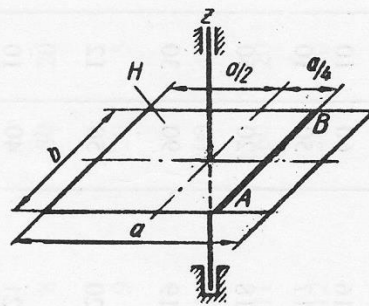
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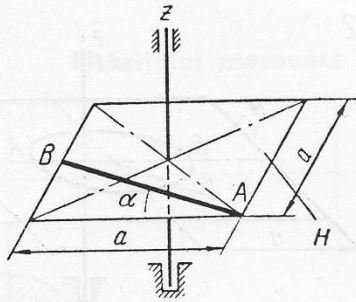
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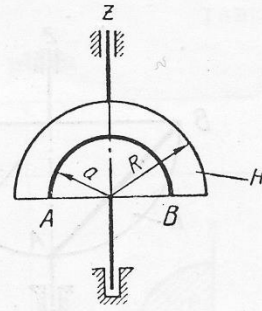
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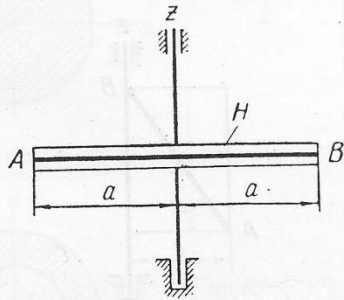
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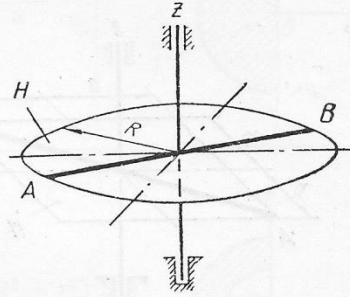
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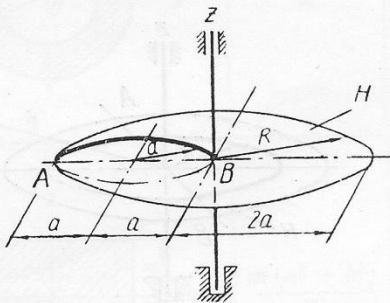
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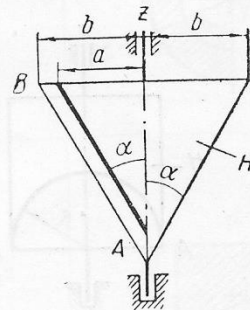
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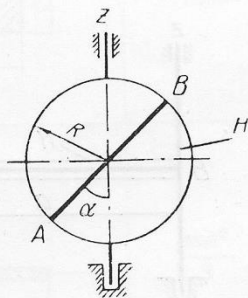
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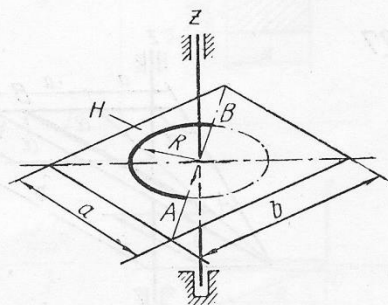
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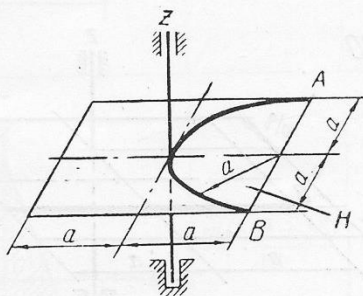
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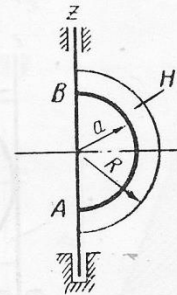
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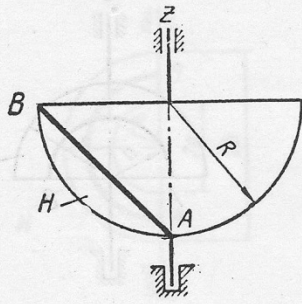
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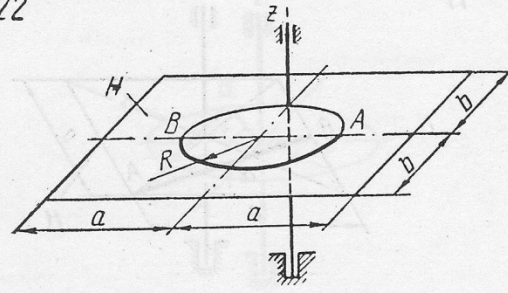
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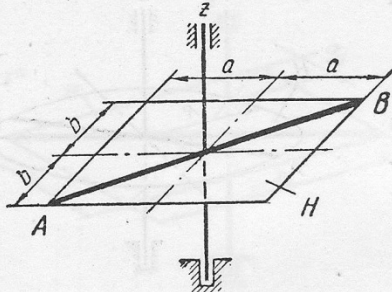
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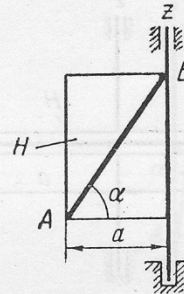
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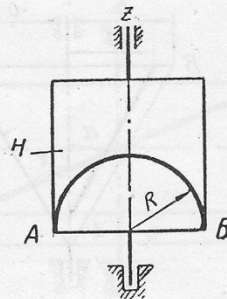
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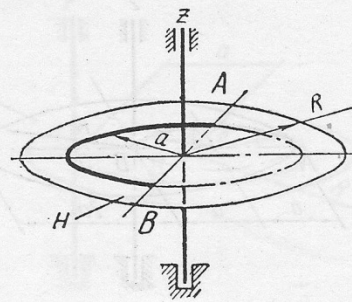
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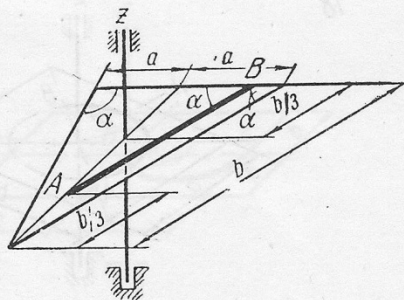
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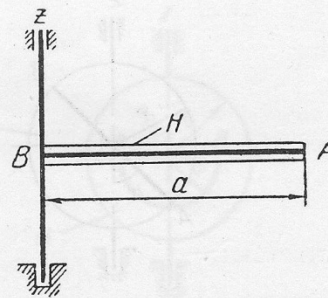
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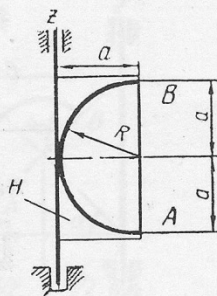
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