Получить уравнение движения кулисного механизма. Найти значение углового ускорения $\ddot{\varphi}_1$ при $t = 0$.

Вариант 1
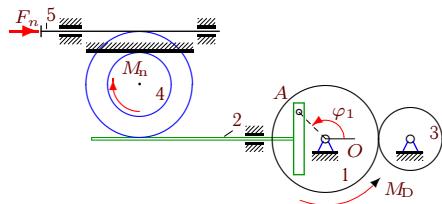
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 10$Нм, $k = 14$Нмс,
$\nu = 8$кНс/м, $\mu = 15$Нмс,
$I_1 = 7$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
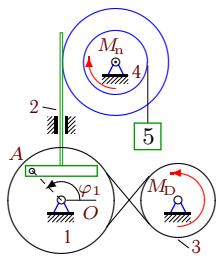
Вариант 2

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 13$Нм, $k = 11$Нмс,
$\mu = 11$Нмс, $I_1 = 18$кгм^2,
$m_2 = 18$кг, $m_3 = 36$кг,
$m_4 = 28$кг, $m_5 = 8$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.
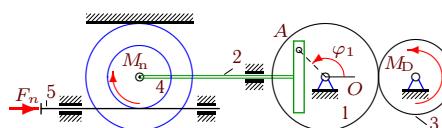
Вариант 3

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 10$Нм, $k = 14$Нмс,
$\nu = 25$Нс/м, $\mu = 11$Нмс,
$I_1 = 7$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
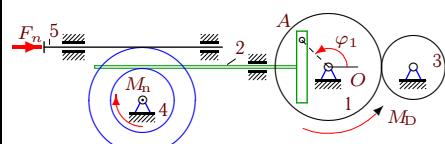
Вариант 4

$M_{D_z} = M_0 - k\omega_{1_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 11$Нм, $k = 15$Нмс,
$\nu = 35$Нс/м, $\mu = 14$Нмс,
$I_1 = 11$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.
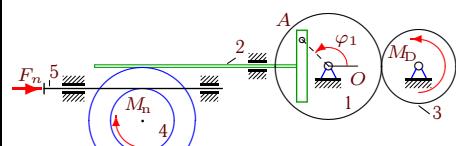
Вариант 5

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 8$Нм, $k = 15$Нмс,
$\nu = 50$Нс/м, $\mu = 14$Нмс,
$I_1 = 5$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.
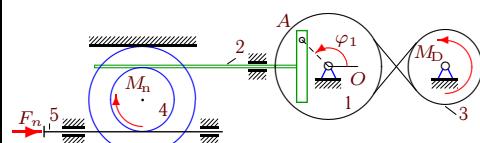
Вариант 6

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 9$Нм, $k = 12$Нмс,
$\nu = 40$Нс/м, $\mu = 14$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.
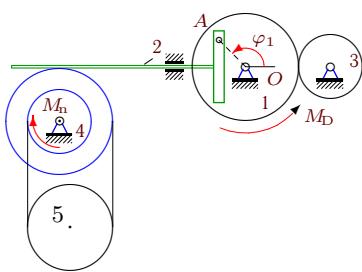
Вариант 7

$M_{D_z} = M_0 - k\omega_{1_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$M_0 = 10\text{Нм}, k = 15\text{Нмс},$
$\mu = 15\text{Нмс}, I_1 = 7\text{кгм}^2,$
$m_2 = 14\text{кг}, m_3 = 32\text{кг},$
$m_4 = 24\text{кг}, m_5 = 50\text{кг},$
$R_1 = 38\text{см}, r_1 = 27\text{см},$
$R_3 = 28\text{см}, R_4 = 20\text{см},$
$r_4 = 12\text{см}, i_4 = 13\text{см},$
$r_5 = 16\text{см},$
$\varphi_{1,0} = 1.1, \omega_{1_z,0} = 0.5\frac{1}{c}.$
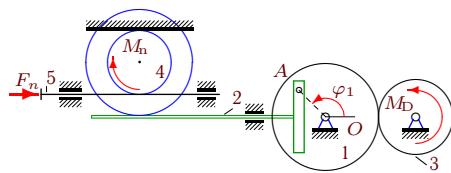
Вариант 8

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 7\text{Нм}, k = 11\text{Нмс},$
$\nu = 55\text{Нс/м}, \mu = 15\text{Нмс},$
$I_1 = 4\text{кгм}^2, m_2 = 14\text{кг},$
$m_3 = 32\text{кг}, m_4 = 24\text{кг},$
$R_1 = 34\text{см}, r_1 = 23\text{см},$
$R_3 = 24\text{см}, R_4 = 20\text{см},$
$r_4 = 12\text{см}, i_4 = 13\text{см},$
$\varphi_{1,0} = 1.1, \omega_{1_z,0} = 0.1\frac{1}{c}.$
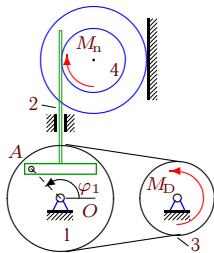
Вариант 9

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$M_0 = 11\text{Нм}, k = 11\text{Нмс},$
$\mu = 11\text{Нмс},$
$I_1 = 11\text{кгм}^2, m_2 = 17\text{кг},$
$m_3 = 35\text{кг}, m_4 = 27\text{кг},$
$R_1 = 34\text{см}, r_1 = 23\text{см},$
$R_3 = 24\text{см}, R_4 = 20\text{см},$
$r_4 = 12\text{см}, i_4 = 16\text{см},$
$\varphi_{1,0} = 1.4, \omega_{1_z,0} = 0.1\frac{1}{c}.$

3
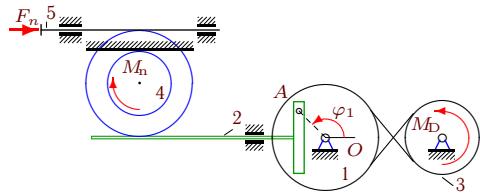
Вариант 10

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 14$Нмс,
$\nu = 8$кНс/м, $\mu = 15$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
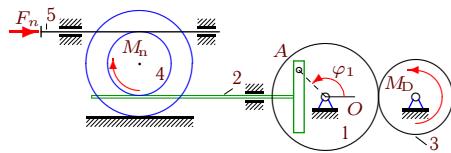
Вариант 11

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 7$Нм, $k = 13$Нмс,
$\nu = 40$Нс/м, $\mu = 14$Нмс,
$I_1 = 4$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.
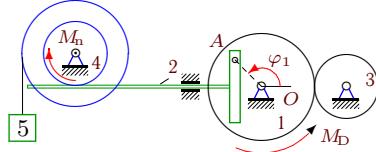
Вариант 12

$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 14$Нм, $k = 12$Нмс,
$\mu = 10$Нмс, $I_1 = 23$кгм^2,
$m_2 = 18$кг, $m_3 = 36$кг,
$m_4 = 28$кг, $m_5 = 8$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.
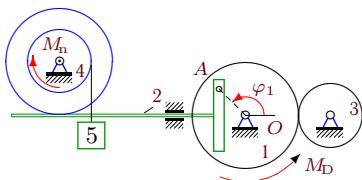
Вариант 13

$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм, $k = 14$Нмс,
$\mu = 13$Нмс, $I_1 = 15$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 7$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
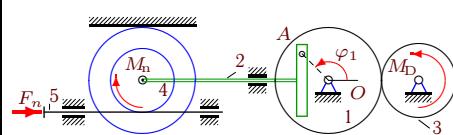
Вариант 14

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 12$Нмс,
$\nu = 20$Нс/м, $\mu = 10$Нмс,
$I_1 = 8$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.
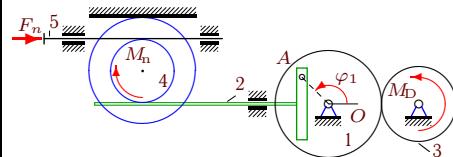
Вариант 15

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 13$Нмс,
$\nu = 8$кНс/м, $\mu = 13$Нмс,
$I_1 = 5$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.
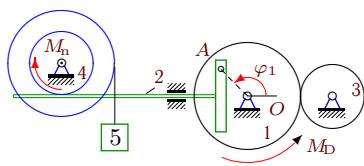
Вариант 16

$M_{D_z} = M_0 - k\omega_{1_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$M_0 = 11\text{Нм}, \ k = 15\text{Нмс},$
$\mu = 13\text{Нмс}, \ I_1 = 11\text{кгм}^2,$
$m_2 = 15\text{кг}, \ m_3 = 33\text{кг},$
$m_4 = 25\text{кг}, \ m_5 = 5\text{кг},$
$R_1 = 38\text{см}, \ r_1 = 27\text{см},$
$R_3 = 28\text{см}, \ R_4 = 20\text{см},$
$r_4 = 12\text{см}, \ i_4 = 14\text{см},$
$\varphi_{1,0} = 1.2, \ \omega_{1_z,0} = 0.5\frac{1}{c}.$
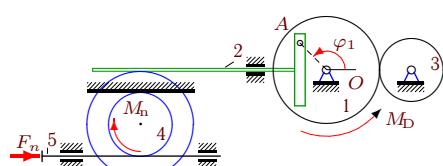
Вариант 17

$M_{D_z} = M_0 - k\omega_{1_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 13\text{Нм}, \ k = 12\text{Нмс},$
$\nu = 40\text{Нс/м}, \ \mu = 11\text{Нмс},$
$I_1 = 19\text{кгм}^2, \ m_2 = 17\text{кг},$
$m_3 = 35\text{кг}, \ m_4 = 27\text{кг},$
$R_1 = 35\text{см}, \ r_1 = 24\text{см},$
$R_3 = 25\text{см}, \ R_4 = 20\text{см},$
$r_4 = 12\text{см}, \ i_4 = 16\text{см},$
$\varphi_{1,0} = 1.4, \ \omega_{1_z,0} = 0.2\frac{1}{c}.$
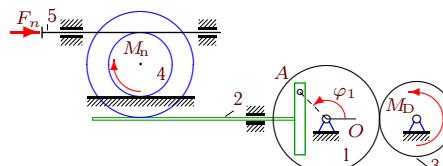
Вариант 18

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 8\text{Нм}, \ k = 11\text{Нмс},$
$\nu = 50\text{Нс/м}, \ \mu = 13\text{Нмс},$
$I_1 = 5\text{кгм}^2, \ m_2 = 15\text{кг},$
$m_3 = 33\text{кг}, \ m_4 = 25\text{кг},$
$R_1 = 34\text{см}, \ r_1 = 23\text{см},$
$R_3 = 24\text{см}, \ R_4 = 20\text{см},$
$r_4 = 12\text{см}, \ i_4 = 14\text{см},$
$\varphi_{1,0} = 1.2, \ \omega_{1_z,0} = 0.1\frac{1}{c}.$
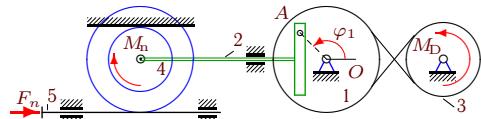
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 11$Нмс,
$\nu = 20$Нс/м, $\mu = 10$Нмс,
$I_1 = 18$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.
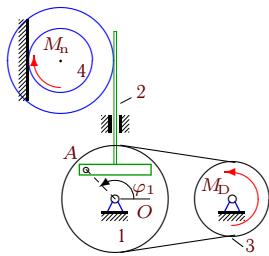
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм, $k = 15$Нмс,
$\mu = 13$Нмс,
$I_1 = 9$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.
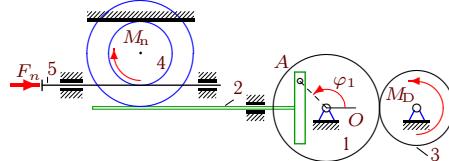
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 14$Нмс,
$\nu = 50$Нс/м, $\mu = 14$Нмс,
$I_1 = 5$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
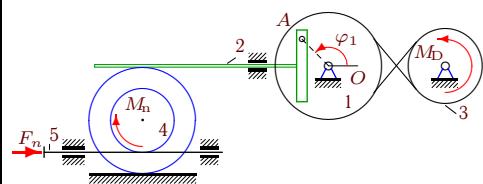
Вариант 22

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 15$Нмс,
$\nu = 8$кНс/м, $\mu = 10$Нмс,
$I_1 = 18$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.
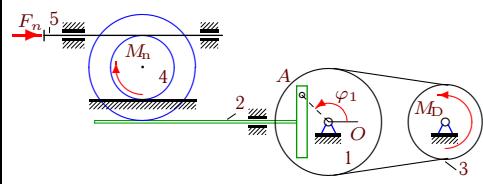
Вариант 23

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 15$Нмс,
$\nu = 35$Нс/м, $\mu = 10$Нмс,
$I_1 = 13$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.
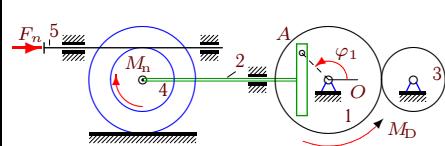
Вариант 24

$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 11$Нмс,
$\nu = 35$Нс/м, $\mu = 14$Нмс,
$I_1 = 11$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.
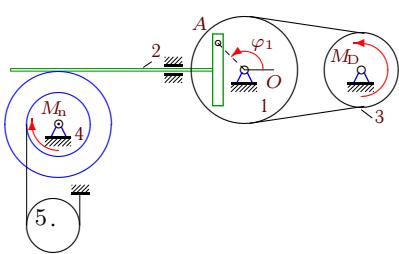
Вариант 25

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$M_0 = 10$Нм,$k = 11$Нмс,
$\mu = 13$Нмс, $I_1 = 9$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 5$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 11$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.
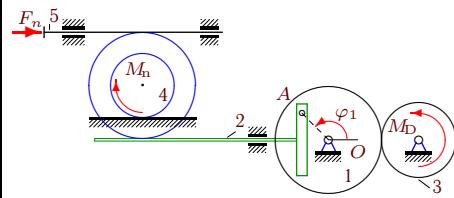
Вариант 26

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 7$Нм, $k = 12$Нмс,
$\nu = 40$Нс/м, $\mu = 15$Нмс,
$I_1 = 4$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.
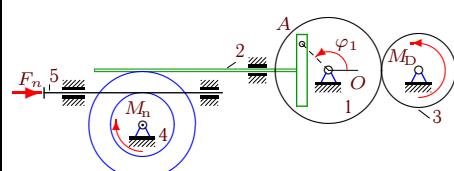
Вариант 27

$M_{D_z} = M_0 - k\omega_{3_z},$
$M_{n_z} = -\mu\omega_{4_z},$
$F_{n_x} = -\nu v_{5_x},$
$M_0 = 9$Нм, $k = 13$Нмс,
$\nu = 30$Нс/м, $\mu = 13$Нмс,
$I_1 = 6$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.
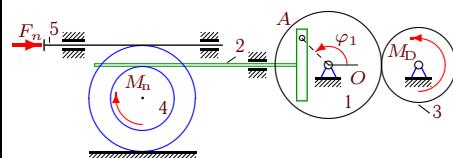
Вариант 28

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 14$Нмс,
$\nu = 20$Нс/м, $\mu = 13$Нмс,
$I_1 = 6$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.
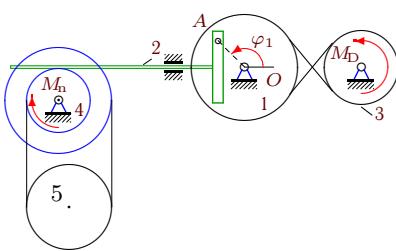
Вариант 29

$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 9$Нм,$k = 12$Нмс,
$\mu = 14$Нмс, $I_1 = 6$кгм^2,
$m_2 = 14$кг, $m_3 = 32$кг,
$m_4 = 24$кг, $m_5 = 30$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$r_5 = 16$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 30

$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 12$Нмс,
$I_1 = 19$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

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Ответы

$T = (\dot\varphi^2/2)(A + B\sin^2\varphi)$

	A	B	Q	ε
1	9.190	1.442	-9.484	-0.927
2	20.081	2.027	-23.377	-1.163
3	9.396	4.143	-33.122	-2.477
4	13.383	2.169	-6.166	-0.416
5	7.383	1.699	-29.891	-3.391
6	7.960	13.097	-43.175	-2.363
7	9.310	3.072	-31.962	-2.746
8	5.850	1.129	-12.870	-1.908
9	13.023	1.814	0.368	0.028
10	8.190	1.442	-36.734	-3.945
11	6.074	14.211	-59.277	-3.444
12	25.205	5.554	-27.673	-0.901
13	17.327	2.241	8.563	0.436
14	10.205	3.815	-23.556	-1.683
15	7.138	1.847	-28.766	-3.297
16	13.383	4.587	-4.513	-0.282
17	21.144	10.699	-12.655	-0.404
18	6.907	7.819	-24.943	-1.823
19	20.081	5.406	-25.028	-0.983
20	11.455	1.849	-18.818	-1.614
21	7.259	1.575	-25.351	-2.948
22	20.599	2.191	-45.329	-1.992
23	15.599	15.122	-65.621	-2.150
24	12.907	2.764	7.880	0.514
25	10.965	1.688	13.896	1.108
26	5.960	7.567	-41.805	-3.503
27	8.203	1.635	-21.687	-2.235
28	8.327	2.154	-26.821	-2.606
29	7.960	4.157	-47.182	-4.196
30	21.144	5.299	-38.499	-1.466