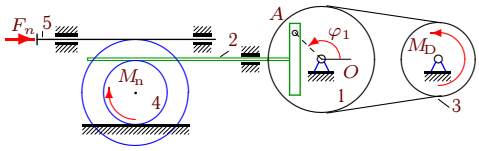
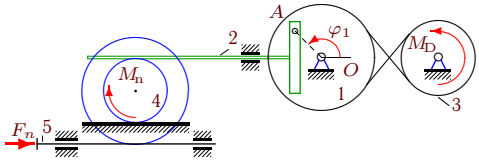
Получить уравнение движения кулисного механизма. Найти значение углового ускорения $\ddot{\varphi}_1$ при $t = 0$.

Вариант 1



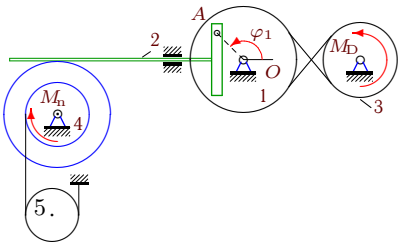
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 10$Нм, $k = 15$Нмс,
$\nu = 30$Нс/м, $\mu = 13$Нмс,
$I_1 = 9$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 2



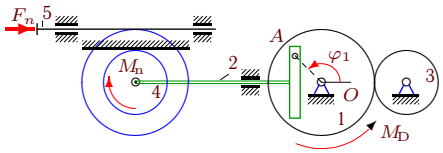
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 13$Нмс,
$\nu = 8$кНс/м, $\mu = 10$Нмс,
$I_1 = 18$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 3



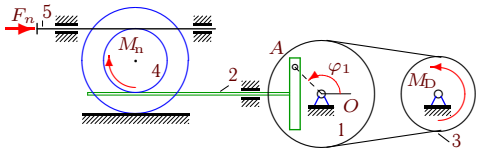
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм,$k = 13$Нмс,
$\mu = 13$Нмс, $I_1 = 12$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 6$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 12$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 4



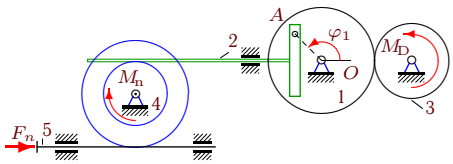
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 11$Нмс,
$\nu = 8$кНс/м, $\mu = 12$Нмс,
$I_1 = 19$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 5



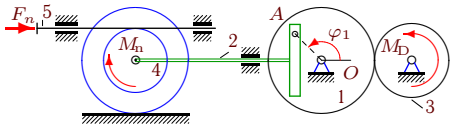
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 15$Нмс,
$\nu = 40$Нс/м, $\mu = 14$Нмс,
$I_1 = 5$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 6



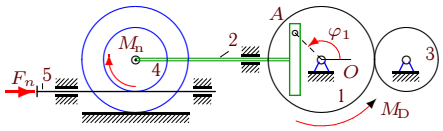
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 7$Нм, $k = 14$Нмс,
$\nu = 8$кНс/м, $\mu = 14$Нмс,
$I_1 = 4$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 7



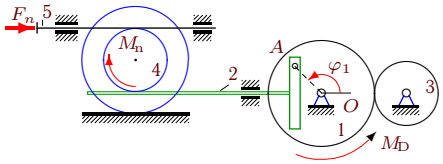
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 12$Нмс,
$\nu = 20$Нс/м, $\mu = 11$Нмс,
$I_1 = 8$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0}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

Вариант 8



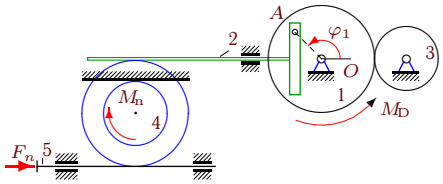
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 11$Нмс,
$I_1 = 19$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 9



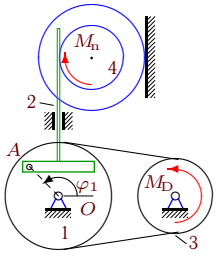
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 15$Нмс,
$\nu = 35$Нс/м, $\mu = 13$Нмс,
$I_1 = 11$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 10



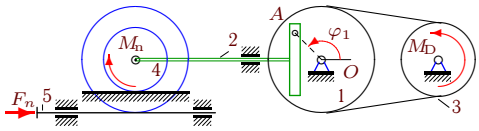
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 14$Нмс,
$\nu = 35$Нс/м, $\mu = 14$Нмс,
$I_1 = 11$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 11



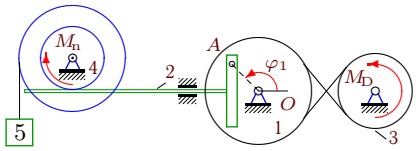
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 9$Нм, $k = 13$Нмс,
$\mu = 13$Нмс,
$I_1 = 7$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 12



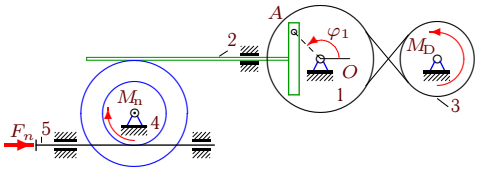
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 15$Нмс,
$\nu = 8$кНс/м, $\mu = 13$Нмс,
$I_1 = 7$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 13



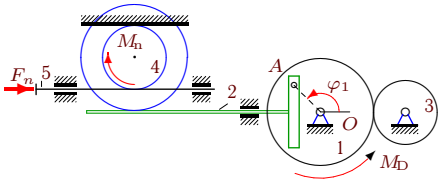
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм, $k = 15$Нмс,
$\mu = 11$Нмс, $I_1 = 15$кгм^2,
$m_2 = 17$кг, $m_3 = 35$кг,
$m_4 = 27$кг, $m_5 = 6$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 14



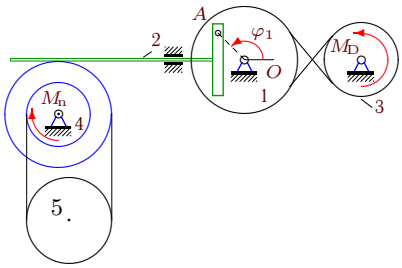
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 14$Нмс,
$\nu = 8$кНс/м, $\mu = 10$Нмс,
$I_1 = 18$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 15



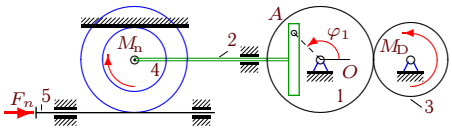
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 14$Нмс,
$\nu = 45$Нс/м, $\mu = 13$Нмс,
$I_1 = 15$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 16



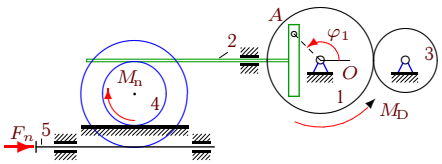
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм,$k = 12$Нмс,
$\mu = 13$Нмс, $I_1 = 12$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 60$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 16$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 17



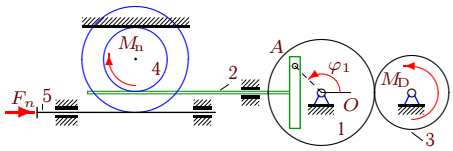
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 15$Нмс,
$\nu = 35$Нс/м, $\mu = 13$Нмс,
$I_1 = 5$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 18



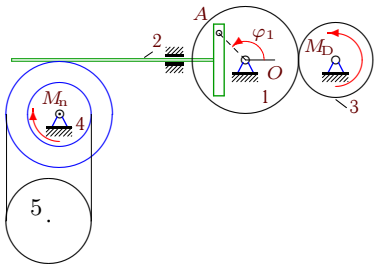
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 14$Нм, $k = 13$Нмс,
$\nu = 8$кНс/м, $\mu = 10$Нмс,
$I_1 = 23$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 19



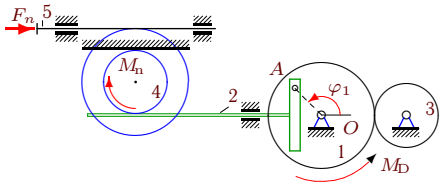
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 10$Нм, $k = 12$Нмс,
$\nu = 25$Нс/м, $\mu = 11$Нмс,
$I_1 = 7$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 20



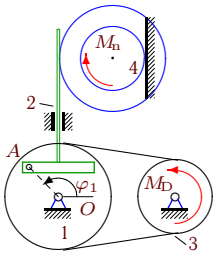
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм,$k = 13$Нмс,
$\mu = 12$Нмс, $I_1 = 7$кгм^2,
$m_2 = 17$кг, $m_3 = 35$кг,
$m_4 = 27$кг, $m_5 = 50$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$r_5 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 21



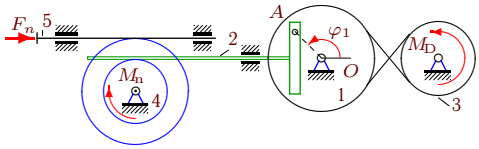
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 14$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 10$Нмс,
$I_1 = 23$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 22



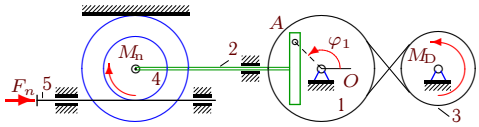
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм, $k = 12$Нмс,
$\mu = 11$Нмс,
$I_1 = 13$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 23



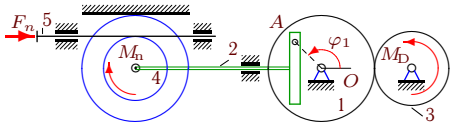
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 14$Нмс,
$\nu = 25$Нс/м, $\mu = 12$Нмс,
$I_1 = 15$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 24



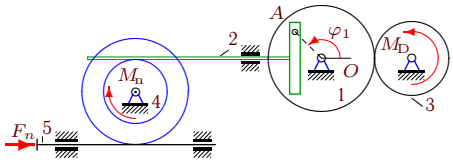
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 14$Нмс,
$\nu = 25$Нс/м, $\mu = 11$Нмс,
$I_1 = 15$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 25



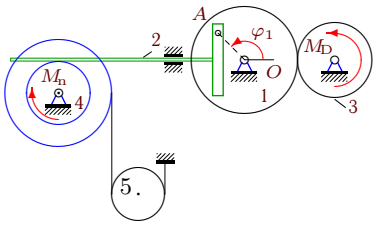
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 14$Нмс,
$\nu = 8$кНс/м, $\mu = 11$Нмс,
$I_1 = 8$кгм^2, $m_2 = 18$кг,
$m_3 = 36$кг, $m_4 = 28$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 26



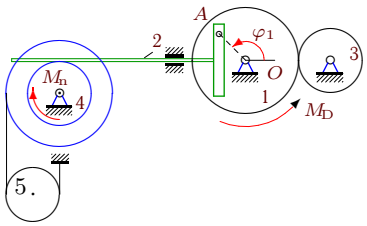
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 13$Нмс,
$I_1 = 5$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 27



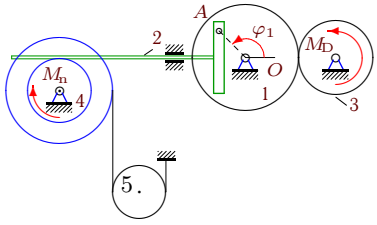
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 8$Нм,$k = 11$Нмс,
$\mu = 13$Нмс, $I_1 = 5$кгм^2,
$m_2 = 15$кг, $m_3 = 33$кг,
$m_4 = 25$кг, $m_5 = 2$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$r_5 = 10$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 28



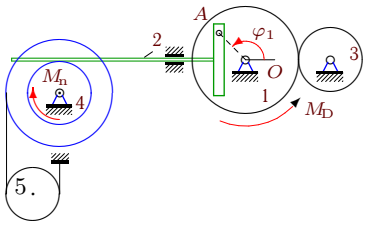
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм,$k = 12$Нмс,
$\mu = 12$Нмс, $I_1 = 15$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 6$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 13$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 29



$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 8$Нм,$k = 11$Нмс,
$\mu = 13$Нмс, $I_1 = 5$кгм^2,
$m_2 = 15$кг, $m_3 = 33$кг,
$m_4 = 25$кг, $m_5 = 2$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,
$r_5 = 10$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 30



$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 14$Нм,$k = 14$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,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 17$см,
$r_5 = 13$см,
$\varphi_{1,0} = 1.5$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Ответы

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

	A	B	Q	ε
1	11.455	2.381	-9.685	-0.720
2	20.333	2.441	-45.299	-1.991
3	14.203	2.028	-23.403	-1.458
4	21.023	4.867	-10.647	-0.414
5	7.310	16.576	-84.814	-4.224
6	6.190	1.828	-44.419	-5.828
7	10.205	3.815	-23.843	-1.704
8	21.144	3.530	-6.796	-0.278
9	13.383	18.066	-78.549	-2.754
10	13.259	9.992	-59.138	-2.720
11	9.138	1.847	-22.544	-2.397
12	9.383	5.397	-142.768	-10.179
13	17.527	5.953	-83.240	-3.582
14	20.464	2.032	-38.622	-1.719
15	17.327	1.715	2.577	0.132
16	14.083	3.008	-50.803	-3.012
17	7.383	5.397	-61.137	-5.103
18	25.333	2.441	-9.722	-0.351
19	9.144	2.059	-21.338	-1.916
20	9.268	3.268	-2.617	-0.214
21	25.205	2.249	-0.579	-0.021
22	15.205	1.719	7.343	0.483
23	17.396	2.417	-33.598	-1.705
24	17.396	4.143	-35.863	-1.680
25	10.464	4.477	-67.427	-4.523
26	7.021	1.714	-27.058	-3.182
27	6.907	2.704	-21.195	-2.291
28	17.082	3.782	13.731	0.665
29	6.907	2.704	-21.195	-2.291
30	25.464	5.830	9.222	0.293