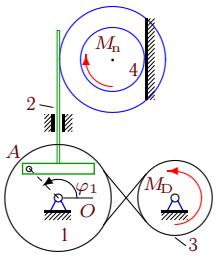
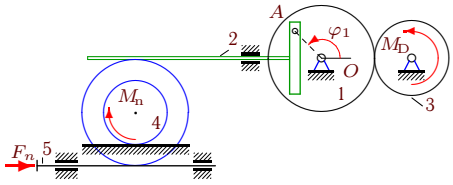
Получить уравнение движения кулисного механизма. Найти значение углового ускорения $\ddot{\varphi}_1$ при $t = 0$.

Вариант 1



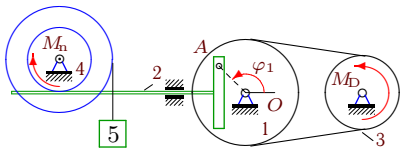
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 9$Нм, $k = 15$Нмс,
$\mu = 15$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 2



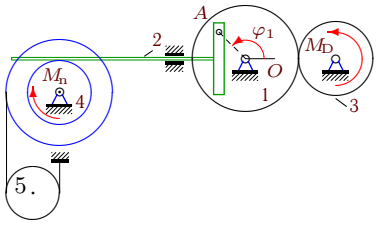
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 12$Нмс,
$I_1 = 6$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 3



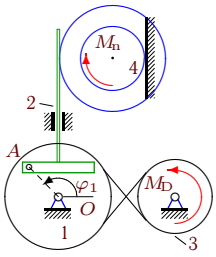
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм, $k = 15$Нмс,
$\mu = 12$Нмс, $I_1 = 9$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 4$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 4



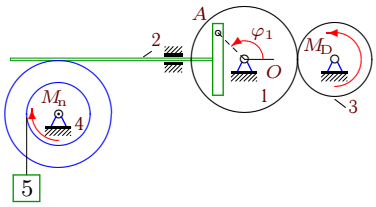
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм,$k = 13$Нмс,
$\mu = 11$Нмс, $I_1 = 7$кгм^2,
$m_2 = 17$кг, $m_3 = 35$кг,
$m_4 = 27$кг, $m_5 = 4$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$r_5 = 10$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 5



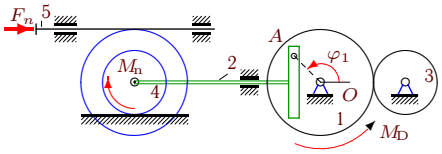
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм, $k = 13$Нмс,
$\mu = 13$Нмс,
$I_1 = 12$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 6



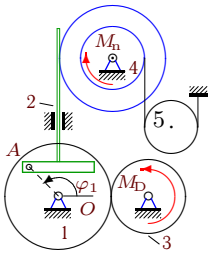
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм, $k = 11$Нмс,
$\mu = 12$Нмс, $I_1 = 7$кгм^2,
$m_2 = 17$кг, $m_3 = 35$кг,
$m_4 = 27$кг, $m_5 = 5$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 7



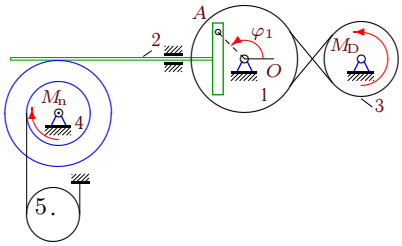
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 12$Нмс,
$\nu = 30$Нс/м, $\mu = 13$Нмс,
$I_1 = 15$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 8



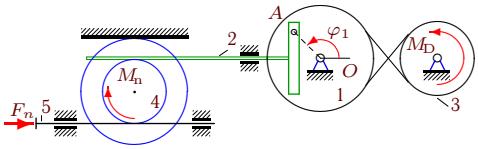
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 9$Нм,$k = 11$Нмс,
$\mu = 13$Нмс, $I_1 = 6$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 4$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 10$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 9



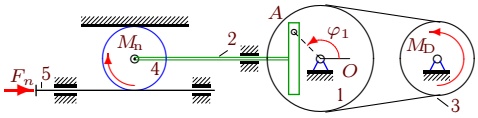
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм,$k = 11$Нмс,
$\mu = 12$Нмс, $I_1 = 15$кгм^2,
$m_2 = 17$кг, $m_3 = 35$кг,
$m_4 = 27$кг, $m_5 = 7$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$r_5 = 12$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 10



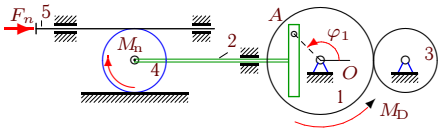
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 12$Нмс,
$\nu = 40$Нс/м, $\mu = 14$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0}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

Вариант 11



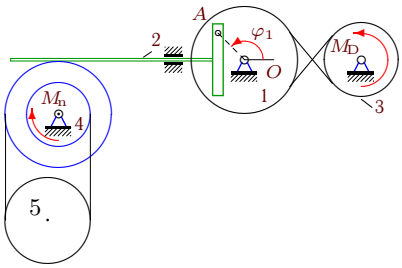
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 13$Нмс,
$\nu = 40$Нс/м, $\mu = 11$Нмс,
$I_1 = 11$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 12$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 12



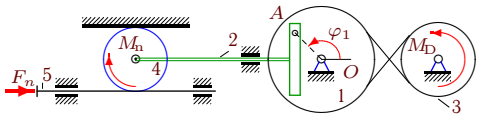
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 11$Нмс,
$\nu = 40$Нс/м, $\mu = 12$Нмс,
$I_1 = 19$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 12$см,
$\varphi_{1,0} = 1.4$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 13



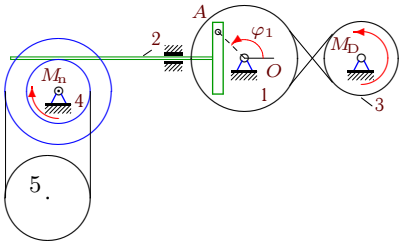
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм,$k = 14$Нмс,
$\mu = 13$Нмс, $I_1 = 12$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 60$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 16$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 14



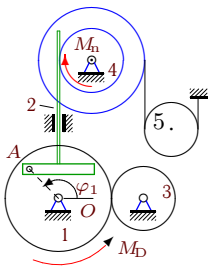
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 14$Нмс,
$\nu = 55$Нс/м, $\mu = 14$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 12$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 15



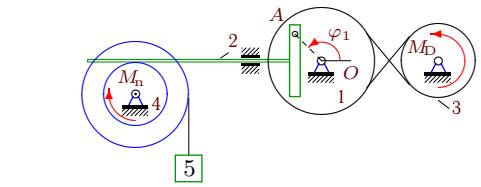
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм,$k = 14$Нмс,
$\mu = 12$Нмс, $I_1 = 12$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 50$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 16$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 16



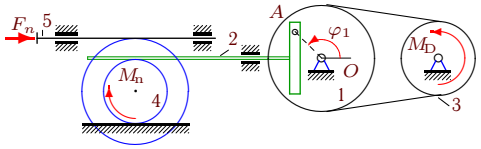
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 12$Нм,$k = 14$Нмс,
$\mu = 12$Нмс, $I_1 = 15$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 6$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$r_5 = 13$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 17



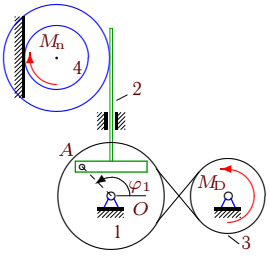
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм, $k = 12$Нмс,
$\mu = 12$Нмс, $I_1 = 12$кгм^2,
$m_2 = 16$кг, $m_3 = 34$кг,
$m_4 = 26$кг, $m_5 = 5$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 18



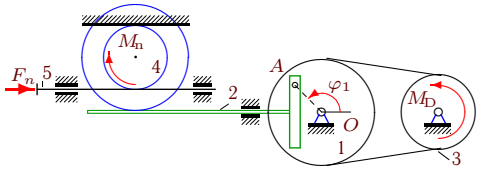
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 14$Нмс,
$\nu = 35$Нс/м, $\mu = 14$Нмс,
$I_1 = 7$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 19



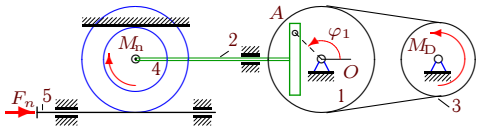
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм, $k = 11$Нмс,
$\mu = 13$Нмс,
$I_1 = 12$кгм^2, $m_2 = 16$кг,
$m_3 = 34$кг, $m_4 = 26$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 15$см,
$\varphi_{1,0} = 1.3$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 20



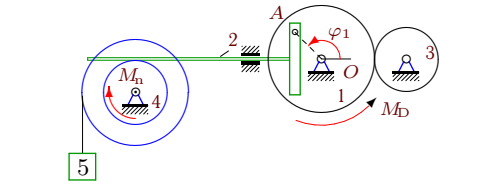
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 12$Нмс,
$\nu = 50$Нс/м, $\mu = 14$Нмс,
$I_1 = 7$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 21



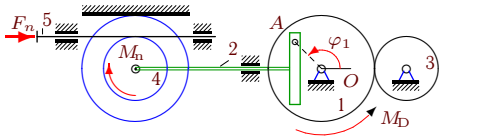
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 14$Нмс,
$\nu = 25$Нс/м, $\mu = 11$Нмс,
$I_1 = 11$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0}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

Вариант 22



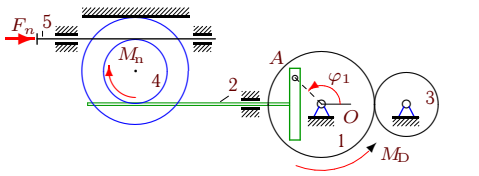
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм, $k = 14$Нмс,
$\mu = 13$Нмс, $I_1 = 11$кгм^2,
$m_2 = 15$кг, $m_3 = 33$кг,
$m_4 = 25$кг, $m_5 = 5$кг,
$R_1 = 37$см, $r_1 = 26$см,
$R_3 = 27$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.4\frac{1}{c}$.

Вариант 23



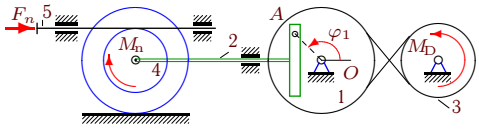
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 11$Нм, $k = 12$Нмс,
$\nu = 8$кНс/м, $\mu = 14$Нмс,
$I_1 = 11$кгм^2, $m_2 = 15$кг,
$m_3 = 33$кг, $m_4 = 25$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 24



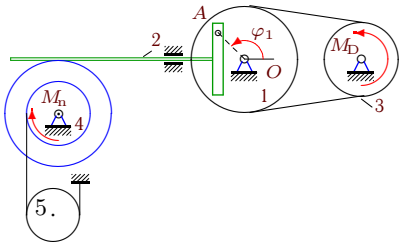
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 13$Нм, $k = 11$Нмс,
$\nu = 8$кНс/м, $\mu = 11$Нмс,
$I_1 = 19$кгм^2, $m_2 = 17$кг,
$m_3 = 35$кг, $m_4 = 27$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 16$см,
$\varphi_{1,0}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

Вариант 25



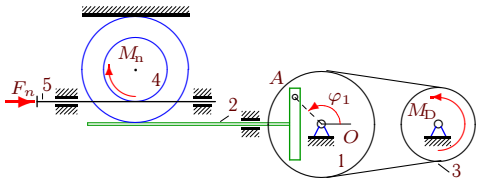
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 9$Нм, $k = 11$Нмс,
$\nu = 40$Нс/м, $\mu = 15$Нмс,
$I_1 = 6$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 34$см, $r_1 = 23$см,
$R_3 = 24$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.1\frac{1}{c}$.

Вариант 26



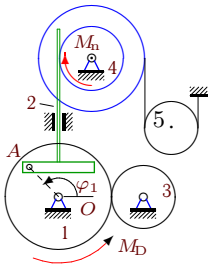
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 8$Нм,$k = 15$Нмс,
$\mu = 15$Нмс, $I_1 = 5$кгм^2,
$m_2 = 14$кг, $m_3 = 32$кг,
$m_4 = 24$кг, $m_5 = 3$кг,
$R_1 = 38$см, $r_1 = 27$см,
$R_3 = 28$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$r_5 = 11$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.5\frac{1}{c}$.

Вариант 27



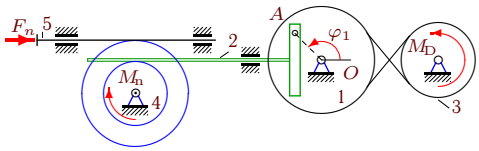
$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 8$Нм, $k = 13$Нмс,
$\nu = 40$Нс/м, $\mu = 15$Нмс,
$I_1 = 5$кгм^2, $m_2 = 14$кг,
$m_3 = 32$кг, $m_4 = 24$кг,
$R_1 = 36$см, $r_1 = 25$см,
$R_3 = 26$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Вариант 28



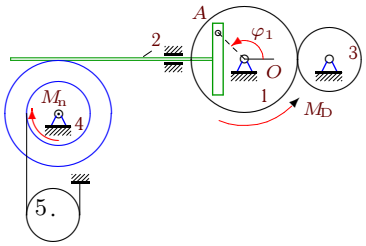
$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 11$Нм,$k = 12$Нмс,
$\mu = 13$Нмс, $I_1 = 11$кгм^2,
$m_2 = 15$кг, $m_3 = 33$кг,
$m_4 = 25$кг, $m_5 = 5$кг,
$R_1 = 35$см, $r_1 = 24$см,
$R_3 = 25$см, $R_4 = 20$см,
$r_4 = 12$см, $i_4 = 14$см,
$r_5 = 13$см,
$\varphi_{1,0} = 1.2$, $\omega_{1_z,0} = 0.2\frac{1}{c}$.

Вариант 29



$M_{D_z} = M_0 - k\omega_{3_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$F_{n_x} = -\nu v_{5_x}$,
$M_0 = 12$Нм, $k = 12$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,
$R_1 = 35$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 30



$M_{D_z} = M_0 - k\omega_{1_z}$,
$M_{n_z} = -\mu\omega_{4_z}$,
$M_0 = 10$Нм,$k = 13$Нмс,
$\mu = 15$Нмс, $I_1 = 7$кгм^2,
$m_2 = 14$кг, $m_3 = 32$кг,
$m_4 = 24$кг, $m_5 = 5$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,
$r_5 = 13$см,
$\varphi_{1,0} = 1.1$, $\omega_{1_z,0} = 0.3\frac{1}{c}$.

Ответы

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

	A	B	Q	ε
1	8.310	1.555	-54.760	-6.327
2	8.083	1.461	-23.905	-2.534
3	11.455	4.938	-11.429	-0.732
4	9.268	4.323	-27.176	-2.023
5	14.203	1.586	-39.771	-2.775
6	9.023	1.909	-11.245	-1.034
7	17.082	4.759	-2.338	-0.111
8	7.965	1.649	-24.013	-2.970
9	17.023	1.925	-15.301	-0.810
10	7.960	13.097	-43.175	-2.363
11	13.268	3.594	-9.069	-0.544
12	21.023	3.042	6.797	0.283
13	14.327	3.530	-4.258	-0.250
14	8.190	3.380	-48.454	-4.476
15	14.327	7.208	-5.550	-0.278
16	17.327	4.250	-2.717	-0.144
17	14.083	4.062	-47.922	-2.687
18	9.259	2.012	-5.354	-0.496
19	13.965	1.342	-33.381	-2.374
20	9.021	1.342	6.246	0.611
21	13.396	6.219	-20.169	-1.046
22	13.259	4.253	4.005	0.223
23	13.021	3.010	-7.712	-0.496
24	21.023	1.814	8.780	0.385
25	7.850	2.547	-16.963	-1.719
26	7.310	1.816	-11.512	-1.336
27	7.074	1.408	1.823	0.216
28	13.021	3.124	-2.008	-0.146
29	17.144	2.059	-24.332	-1.272
30	9.074	1.619	4.614	0.440