

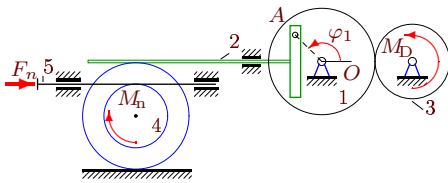
## Кулиса. Уравнение Лагранжа

Кулисный механизм расположен в вертикальной плоскости и состоит из однородных цилиндров, блоков (радиус инерции  $i_k$ ), штока и груза<sup>1</sup>. Используя уравнение Лагранжа 2-го рода, получить уравнение движения механизма. Найти значение углового ускорения  $\ddot{\varphi}_1$  при  $t = 0$ . Кинетическую энергию представить в форме  $T = (\dot{\varphi}^2/2)(A + B \sin^2 \varphi)$  или  $T = (\dot{\varphi}^2/2)(A + B \cos^2 \varphi)$  (варианты помечены \*)

Кирсанов М.Н. **Решebник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. – 384 с. (с.307.)

### Задача 31.1.

Антонов Вадим Эдуардович



$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \quad \varphi_{1,0} = 1.1, \quad \omega_{1z,0} = 0.4 \frac{1}{c},$$

$$M_0 = 7 \text{ Нм}, \quad k = 14 \text{ Нмс},$$

$$\nu = 40 \text{ Нс/м}, \quad \mu = 15 \text{ Нмс},$$

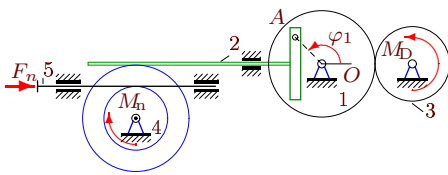
$$I_1 = 4 \text{ кгм}^2, \quad m_2 = 14 \text{ кг}, \quad m_3 = 32 \text{ кг},$$

$$m_4 = 24 \text{ кг}, \quad R_1 = 37 \text{ см}, \quad r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 13 \text{ см}.$$

### Задача 31.2.

Бондарев Александр Игоревич



$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \quad \varphi_{1,0} = 1.5, \quad \omega_{1z,0} = 0.5 \frac{1}{c},$$

$$M_0 = 11 \text{ Нм}, \quad k = 15 \text{ Нмс},$$

$$\nu = 20 \text{ Нс/м}, \quad \mu = 11 \text{ Нмс},$$

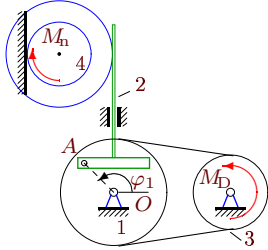
$$I_1 = 8 \text{ кгм}^2, \quad m_2 = 18 \text{ кг}, \quad m_3 = 36 \text{ кг},$$

$$m_4 = 28 \text{ кг}, \quad R_1 = 38 \text{ см}, \quad r_1 = 27 \text{ см},$$

$$R_3 = 28 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 17 \text{ см}.$$

### Задача 31.3.

Бугакова Анна Геннадьевна



$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$\varphi_{1,0} = 1.3, \quad \omega_{1z,0} = 0.5 \frac{1}{c},$$

$$M_0 = 10 \text{ Нм}, \quad k = 15 \text{ Нмс},$$

$$\mu = 13 \text{ Нмс},$$

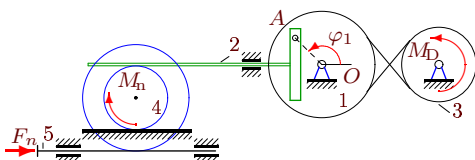
$$I_1 = 9 \text{ кгм}^2, \quad m_2 = 16 \text{ кг}, \quad m_3 = 34 \text{ кг},$$

$$m_4 = 26 \text{ кг}, \quad R_1 = 38 \text{ см}, \quad r_1 = 27 \text{ см},$$

$$R_3 = 28 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 15 \text{ см}.$$

### Задача 31.4.

Быков Михаил Алексеевич



$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \quad \varphi_{1,0} = 1.4, \quad \omega_{1z,0} = 0.2 \frac{1}{c},$$

$$M_0 = 12 \text{ Нм}, \quad k = 12 \text{ Нмс},$$

$$\nu = 8 \text{ Нс/м}, \quad \mu = 11 \text{ Нмс},$$

$$I_1 = 15 \text{ кгм}^2, \quad m_2 = 17 \text{ кг}, \quad m_3 = 35 \text{ кг},$$

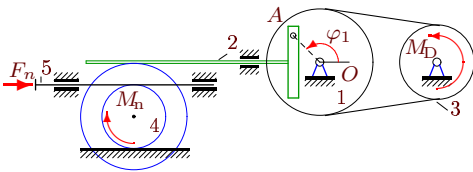
$$m_4 = 27 \text{ кг}, \quad R_1 = 35 \text{ см}, \quad r_1 = 24 \text{ см},$$

$$R_3 = 25 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 16 \text{ см}.$$

<sup>1</sup>В некоторых вариантах содержатся не все элементы.

**Задача 31.5.**

*Васильцов Иван Дмитриевич*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.2, \omega_{1z,0} = 0.1 \frac{1}{c},$$

$$M_0 = 9 \text{ Нм}, k = 11 \text{ Нмс},$$

$$\nu = 50 \text{ Нс/м}, \mu = 14 \text{ Нмс},$$

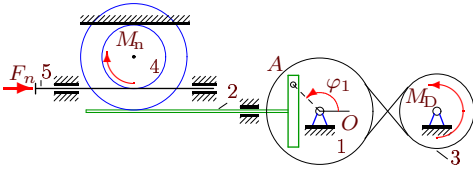
$$I_1 = 7 \text{ кгм}^2, m_2 = 15 \text{ кг}, m_3 = 33 \text{ кг},$$

$$m_4 = 25 \text{ кг}, R_1 = 34 \text{ см}, r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 14 \text{ см}.$$

**Задача 31.6.**

*Володин Илья Сергеевич*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.5, \omega_{1z,0} = 0.2 \frac{1}{c},$$

$$M_0 = 13 \text{ Нм}, k = 12 \text{ Нмс},$$

$$\nu = 35 \text{ Нс/м}, \mu = 11 \text{ Нмс},$$

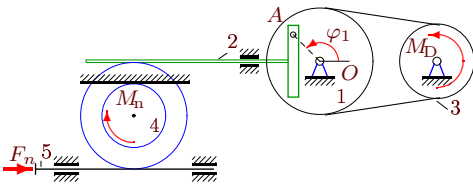
$$I_1 = 18 \text{ кгм}^2, m_2 = 18 \text{ кг}, m_3 = 36 \text{ кг},$$

$$m_4 = 28 \text{ кг}, R_1 = 35 \text{ см}, r_1 = 24 \text{ см},$$

$$R_3 = 25 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 17 \text{ см}.$$

**Задача 31.7.**

*Галкин Антон Дмитриевич*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.5, \omega_{1z,0} = 0.3 \frac{1}{c},$$

$$M_0 = 12 \text{ Нм}, k = 13 \text{ Нмс},$$

$$\nu = 20 \text{ Нс/м}, \mu = 11 \text{ Нмс},$$

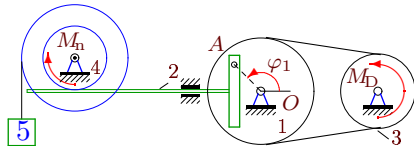
$$I_1 = 13 \text{ кгм}^2, m_2 = 18 \text{ кг}, m_3 = 36 \text{ кг},$$

$$m_4 = 28 \text{ кг}, R_1 = 36 \text{ см}, r_1 = 25 \text{ см},$$

$$R_3 = 26 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 17 \text{ см}.$$

**Задача 31.8.**

*Голубев Ростислав Александрович*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 12 \text{ Нм}, k = 11 \text{ Нмс},$$

$$\varphi_{1,0} = 1.5, \omega_{1z,0} = 0.1 \frac{1}{c},$$

$$\mu = 10 \text{ Нмс}, I_1 = 13 \text{ кгм}^2,$$

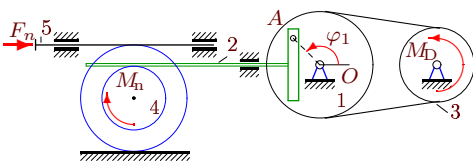
$$m_2 = 18 \text{ кг}, m_3 = 36 \text{ кг}, m_4 = 28 \text{ кг},$$

$$m_5 = 6 \text{ кг}, R_1 = 34 \text{ см}, r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 17 \text{ см}.$$

**Задача 31.9.**

*Демин Руслан Олегович*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.1, \omega_{1z,0} = 0.1 \frac{1}{c},$$

$$M_0 = 8 \text{ Нм}, k = 11 \text{ Нмс},$$

$$\nu = 30 \text{ Нс/м}, \mu = 15 \text{ Нмс},$$

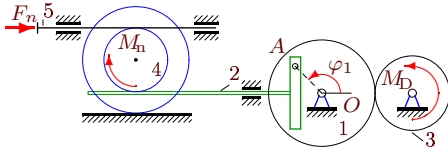
$$I_1 = 5 \text{ кгм}^2, m_2 = 14 \text{ кг}, m_3 = 32 \text{ кг},$$

$$m_4 = 24 \text{ кг}, R_1 = 34 \text{ см}, r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 13 \text{ см}.$$

**Задача 31.10.**

*Зайцев Григорий Сергеевич*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.3, \omega_{1z,0} = 0.4 \frac{1}{c},$$

$$M_0 = 9 \text{ Нм}, k = 14 \text{ Нмс},$$

$$\nu = 30 \text{ Нс/м}, \mu = 12 \text{ Нмс},$$

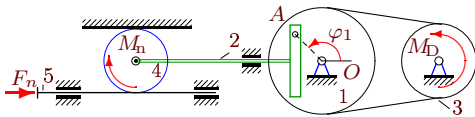
$$I_1 = 6 \text{ кгм}^2, m_2 = 16 \text{ кг}, m_3 = 34 \text{ кг},$$

$$m_4 = 26 \text{ кг}, R_1 = 37 \text{ см}, r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 15 \text{ см}.$$

**Задача 31.11.**

*Зеболова Анна Сергеевна*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.4, \omega_{1z,0} = 0.1 \frac{1}{c},$$

$$M_0 = 11 \text{ Нм}, k = 11 \text{ Нмс},$$

$$\nu = 40 \text{ Нс/м}, \mu = 11 \text{ Нмс},$$

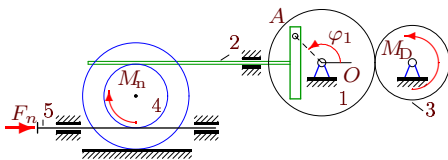
$$I_1 = 11 \text{ кгм}^2, m_2 = 17 \text{ кг}, m_3 = 35 \text{ кг},$$

$$m_4 = 27 \text{ кг}, R_1 = 34 \text{ см}, r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, R_4 = 12 \text{ см}.$$

**Задача 31.12.**

*Короткова Юлия Александровна*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.2, \omega_{1z,0} = 0.3 \frac{1}{c},$$

$$M_0 = 8 \text{ Нм}, k = 13 \text{ Нмс},$$

$$\nu = 8 \text{ Нс/м}, \mu = 13 \text{ Нмс},$$

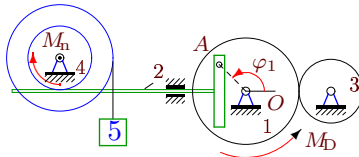
$$I_1 = 5 \text{ кгм}^2, m_2 = 15 \text{ кг}, m_3 = 33 \text{ кг},$$

$$m_4 = 25 \text{ кг}, R_1 = 36 \text{ см}, r_1 = 25 \text{ см},$$

$$R_3 = 26 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 14 \text{ см}.$$

**Задача 31.13.**

*Краюшкин Сергей Константинович*



$$M_{Dz} = M_0 - k\omega_{1z}, M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 14 \text{ Нм}, k = 13 \text{ Нмс},$$

$$\varphi_{1,0} = 1.5, \omega_{1z,0} = 0.3 \frac{1}{c},$$

$$\mu = 10 \text{ Нмс}, I_1 = 23 \text{ кгм}^2,$$

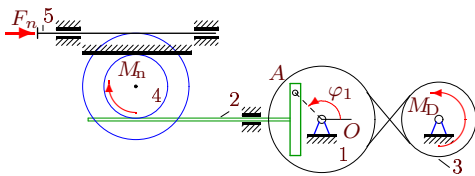
$$m_2 = 18 \text{ кг}, m_3 = 36 \text{ кг}, m_4 = 28 \text{ кг},$$

$$m_5 = 8 \text{ кг}, R_1 = 36 \text{ см}, r_1 = 25 \text{ см},$$

$$R_3 = 26 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 17 \text{ см}.$$

**Задача 31.14.**

*Кузьмина Елена Александровна*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.3, \omega_{1z,0} = 0.4 \frac{1}{c},$$

$$M_0 = 11 \text{ Нм}, k = 14 \text{ Нмс},$$

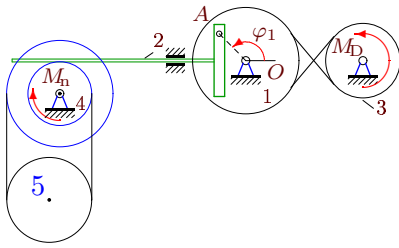
$$\nu = 8 \text{ Нс/м}, \mu = 12 \text{ Нмс},$$

$$I_1 = 12 \text{ кгм}^2, m_2 = 16 \text{ кг}, m_3 = 34 \text{ кг},$$

$$m_4 = 26 \text{ кг}, R_1 = 37 \text{ см}, r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 15 \text{ см}.$$

**Задача 31.15.**



*Литвинов Илья Олегович*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 13 \text{ Нм}, \quad k = 14 \text{ Нмс},$$

$$\varphi_{1,0} = 1.5, \quad \omega_{1z,0} = 0.4 \frac{1}{\text{с}},$$

$$\mu = 10 \text{ Нмс}, \quad I_1 = 18 \text{ кгм}^2,$$

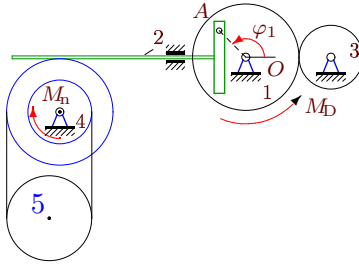
$$m_2 = 18 \text{ кг}, \quad m_3 = 36 \text{ кг}, \quad m_4 = 28 \text{ кг},$$

$$m_5 = 70 \text{ кг}, \quad R_1 = 37 \text{ см}, \quad r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 17 \text{ см},$$

$$r_5 = 16 \text{ см}.$$

**Задача 31.16.**



*Мадюков Никита Евгеньевич*

$$M_{Dz} = M_0 - k\omega_{1z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 14 \text{ Нм}, \quad k = 14 \text{ Нмс},$$

$$\varphi_{1,0} = 1.5, \quad \omega_{1z,0} = 0.4 \frac{1}{\text{с}},$$

$$\mu = 11 \text{ Нмс}, \quad I_1 = 23 \text{ кгм}^2,$$

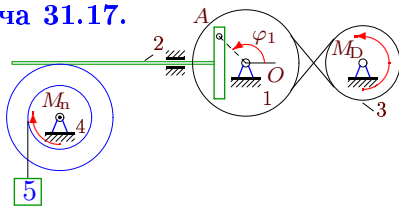
$$m_2 = 18 \text{ кг}, \quad m_3 = 36 \text{ кг}, \quad m_4 = 28 \text{ кг},$$

$$m_5 = 90 \text{ кг}, \quad R_1 = 37 \text{ см}, \quad r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 17 \text{ см},$$

$$r_5 = 16 \text{ см}.$$

**Задача 31.17.**



*Матросов Сергей Михайлович*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 9 \text{ Нм}, \quad k = 12 \text{ Нмс},$$

$$\varphi_{1,0} = 1.1, \quad \omega_{1z,0} = 0.2 \frac{1}{\text{с}},$$

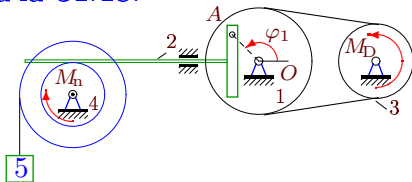
$$\mu = 15 \text{ Нмс}, \quad I_1 = 6 \text{ кгм}^2,$$

$$m_2 = 14 \text{ кг}, \quad m_3 = 32 \text{ кг}, \quad m_4 = 24 \text{ кг},$$

$$m_5 = 4 \text{ кг}, \quad R_1 = 35 \text{ см}, \quad r_1 = 24 \text{ см},$$

$$R_3 = 25 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 13 \text{ см}.$$

**Задача 31.18.**



*Мещеряков Артем Николаевич*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 9 \text{ Нм}, \quad k = 13 \text{ Нмс},$$

$$\varphi_{1,0} = 1.2, \quad \omega_{1z,0} = 0.3 \frac{1}{\text{с}},$$

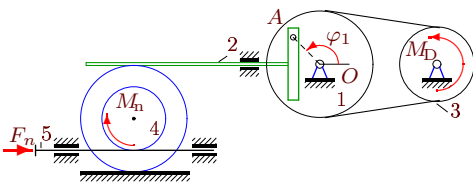
$$\mu = 13 \text{ Нмс}, \quad I_1 = 7 \text{ кгм}^2,$$

$$m_2 = 15 \text{ кг}, \quad m_3 = 33 \text{ кг}, \quad m_4 = 25 \text{ кг},$$

$$m_5 = 3 \text{ кг}, \quad R_1 = 36 \text{ см}, \quad r_1 = 25 \text{ см},$$

$$R_3 = 26 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 14 \text{ см}.$$

**Задача 31.19.**



*Пешехонова Валерия Вячеславовна*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \quad \varphi_{1,0} = 1.4, \quad \omega_{1z,0} = 0.1 \frac{1}{\text{с}},$$

$$M_0 = 11 \text{ Нм}, \quad k = 11 \text{ Нмс},$$

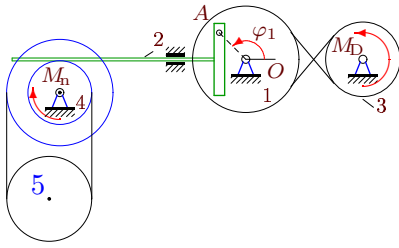
$$\nu = 8 \text{ кНс/м}, \quad \mu = 11 \text{ Нмс},$$

$$I_1 = 11 \text{ кгм}^2, \quad m_2 = 17 \text{ кг}, \quad m_3 = 35 \text{ кг},$$

$$m_4 = 27 \text{ кг}, \quad R_1 = 34 \text{ см}, \quad r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 16 \text{ см}.$$

**Задача 31.20.**



*Свист Дмитрий Дмитриевич*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 9 \text{ Нм}, \quad k = 12 \text{ Нмс},$$

$$\varphi_{1,0} = 1.1, \quad \omega_{1z,0} = 0.2 \frac{1}{\text{с}},$$

$$\mu = 14 \text{ Нмс}, \quad I_1 = 6 \text{ кгм}^2,$$

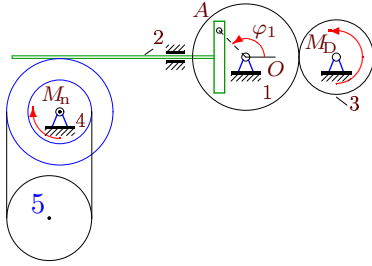
$$m_2 = 14 \text{ кг}, \quad m_3 = 32 \text{ кг}, \quad m_4 = 24 \text{ кг},$$

$$m_5 = 30 \text{ кг}, \quad R_1 = 35 \text{ см}, \quad r_1 = 24 \text{ см},$$

$$R_3 = 25 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 13 \text{ см},$$

$$r_5 = 16 \text{ см}.$$

**Задача 31.21.**



*Соловьев Александр Алексеевич*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 11 \text{ Нм}, \quad k = 14 \text{ Нмс},$$

$$\varphi_{1,0} = 1.5, \quad \omega_{1z,0} = 0.4 \frac{1}{\text{с}},$$

$$\mu = 11 \text{ Нмс}, \quad I_1 = 8 \text{ кгм}^2,$$

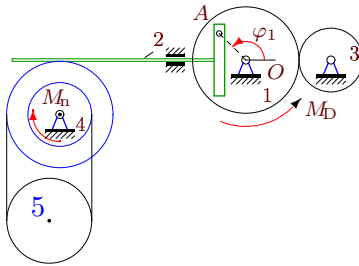
$$m_2 = 18 \text{ кг}, \quad m_3 = 36 \text{ кг}, \quad m_4 = 28 \text{ кг},$$

$$m_5 = 60 \text{ кг}, \quad R_1 = 37 \text{ см}, \quad r_1 = 26 \text{ см},$$

$$R_3 = 27 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 17 \text{ см},$$

$$r_5 = 16 \text{ см}.$$

**Задача 31.22.**



*Тишкин Павел Игоревич*

$$M_{Dz} = M_0 - k\omega_{1z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$M_0 = 12 \text{ Нм}, \quad k = 12 \text{ Нмс},$$

$$\varphi_{1,0} = 1.3, \quad \omega_{1z,0} = 0.2 \frac{1}{\text{с}},$$

$$\mu = 13 \text{ Нмс}, \quad I_1 = 15 \text{ кгм}^2,$$

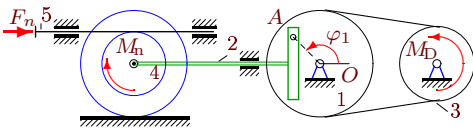
$$m_2 = 16 \text{ кг}, \quad m_3 = 34 \text{ кг}, \quad m_4 = 26 \text{ кг},$$

$$m_5 = 70 \text{ кг}, \quad R_1 = 35 \text{ см}, \quad r_1 = 24 \text{ см},$$

$$R_3 = 25 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 15 \text{ см},$$

$$r_5 = 16 \text{ см}.$$

**Задача 31.23.**



*Фирсунина Сабина Назировна*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{n_x} = -\nu v_{5_x}, \quad \varphi_{1,0} = 1.1, \quad \omega_{1z,0} = 0.1 \frac{1}{\text{с}},$$

$$M_0 = 8 \text{ Нм}, \quad k = 11 \text{ Нмс},$$

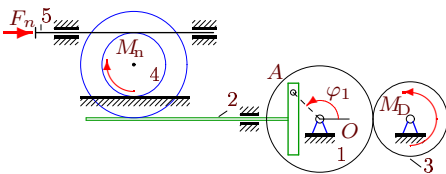
$$\nu = 40 \text{ Нс/м}, \quad \mu = 15 \text{ Нмс},$$

$$I_1 = 5 \text{ кгм}^2, \quad m_2 = 14 \text{ кг}, \quad m_3 = 32 \text{ кг},$$

$$m_4 = 24 \text{ кг}, \quad R_1 = 34 \text{ см}, \quad r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 13 \text{ см}.$$

**Задача 31.24.**



*Черненко Андрей Витальевич*

$$M_{Dz} = M_0 - k\omega_{3z}, \quad M_{nz} = -\mu\omega_{4z},$$

$$F_{n_x} = -\nu v_{5_x}, \quad \varphi_{1,0} = 1.5, \quad \omega_{1z,0} = 0.1 \frac{1}{\text{с}},$$

$$M_0 = 11 \text{ Нм}, \quad k = 11 \text{ Нмс},$$

$$\nu = 35 \text{ Нс/м}, \quad \mu = 10 \text{ Нмс},$$

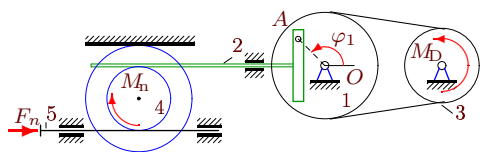
$$I_1 = 8 \text{ кгм}^2, \quad m_2 = 18 \text{ кг}, \quad m_3 = 36 \text{ кг},$$

$$m_4 = 28 \text{ кг}, \quad R_1 = 34 \text{ см}, \quad r_1 = 23 \text{ см},$$

$$R_3 = 24 \text{ см}, \quad R_4 = 20 \text{ см}, \quad r_4 = 12 \text{ см}, \quad i_4 = 17 \text{ см}.$$

**Задача 31.25.**

*Якушева Елена Игоревна*



$$M_{Dz} = M_0 - k\omega_{3z}, M_{nz} = -\mu\omega_{4z},$$

$$F_{nx} = -\nu v_{5x}, \varphi_{1,0} = 1.5, \omega_{1z,0} = 0.3 \frac{1}{c},$$

$$M_0 = 12 \text{ Нм}, k = 13 \text{ Нмс},$$

$$\nu = 20 \text{ Нс/м}, \mu = 10 \text{ Нмс},$$

$$I_1 = 13 \text{ кгм}^2, m_2 = 18 \text{ кг}, m_3 = 36 \text{ кг},$$

$$m_4 = 28 \text{ кг}, R_1 = 36 \text{ см}, r_1 = 25 \text{ см},$$

$$R_3 = 26 \text{ см}, R_4 = 20 \text{ см}, r_4 = 12 \text{ см}, i_4 = 17 \text{ см}.$$