

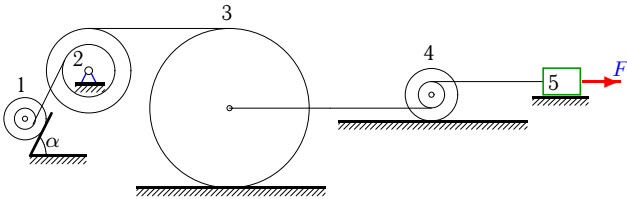
Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел 1, 2, 3, 4 и 5, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции ρ даны для блоков, цилиндры считать однородными. Горизонтальный стержень, находящийся в зацеплении с блоками, считать невесомым. Массы даны в килограммах, радиусы — в сантиметрах. Вычислить приведенную массу системы μ в формуле $T = \mu v_1^2/2$, где v_1 — скорость груза 1 (или центра цилиндра 1).

Кирсанов М.Н. Задачи по теоретической механике с решениями в **Maple** 11. — М.: ФИЗМАТЛИТ, 2010. — 264 с. (с.111)

Задача D-33.1.

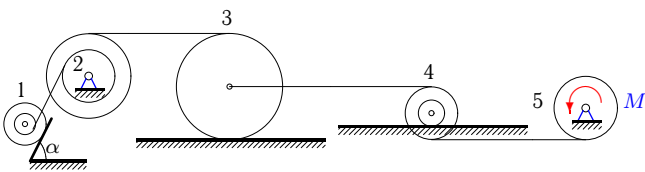
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$$\begin{aligned} R_1 &= 2, r_1 = 1, \rho_1 = 1, \\ R_2 &= 4, r_2 = 2, \rho_2 = 3, \\ R_3 &= 6, \\ R_4 &= 2, r_4 = 1, \rho_4 = 1, \\ m_1 &= 4, m_2 = 16, \\ m_3 &= 32, m_4 = 12, \\ m_5 &= 8. \end{aligned}$$

Задача D-33.2.

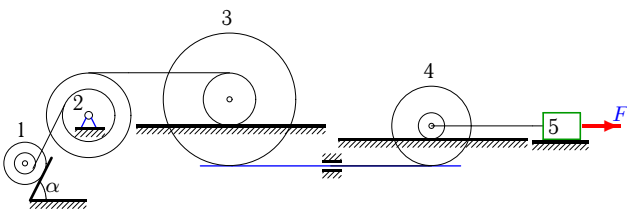
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$$\begin{aligned} R_1 &= 2, r_1 = 1, \rho_1 = 2, \\ R_2 &= 4, r_2 = 2, \rho_2 = 2, \\ R_3 &= 4, \\ R_4 &= 2, r_4 = 1, \rho_4 = 1, \\ m_1 &= 4, m_2 = 96, \\ m_3 &= 32, m_4 = 54, \\ m_5 &= 144. \end{aligned}$$

Задача D-33.3.

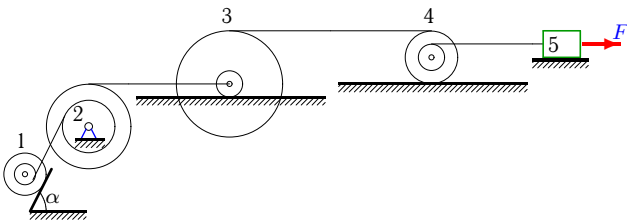
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$$\begin{aligned} R_1 &= 2, r_1 = 1, \rho_1 = 1, \\ R_2 &= 4, r_2 = 2, \rho_2 = 2, \\ R_3 &= 5, r_3 = 2, \rho_3 = 4, \\ R_4 &= 3, r_4 = 1, \rho_4 = 2, \\ m_1 &= 4, m_2 = 32, \\ m_3 &= 16, m_4 = 192, \\ m_5 &= 128. \end{aligned}$$

Задача D-33.4.

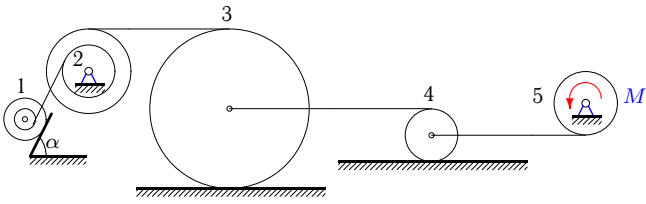
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$$\begin{aligned} R_1 &= 2, r_1 = 1, \rho_1 = 1, \\ R_2 &= 4, r_2 = 2, \rho_2 = 3, \\ R_3 &= 4, r_3 = 1, \rho_3 = 3, \\ R_4 &= 2, r_4 = 1, \rho_4 = 1, \\ m_1 &= 4, m_2 = 96, \\ m_3 &= 4, m_4 = 16, \\ m_5 &= 16. \end{aligned}$$

Задача D-33.5.

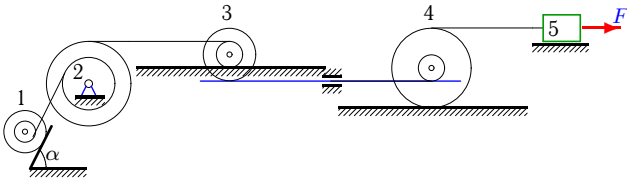
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 6, \\
 R_4 &= 2, \\
 m_1 &= 8, m_2 = 96, \\
 m_3 &= 40, m_4 = 128, \\
 m_5 &= 96.
 \end{aligned}$$

Задача D-33.6.

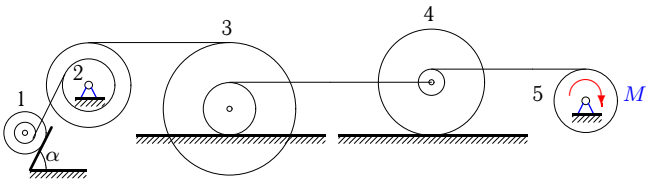
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 8, m_4 = 48, \\
 m_5 &= 8.
 \end{aligned}$$

Задача D-33.7.

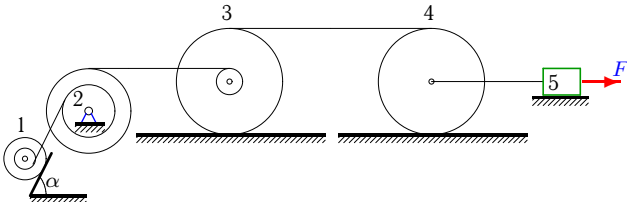
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 5, r_3 = 2, \rho_3 = 4, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 48, \\
 m_3 &= 196, m_4 = 147, \\
 m_5 &= 196.
 \end{aligned}$$

Задача D-33.8.

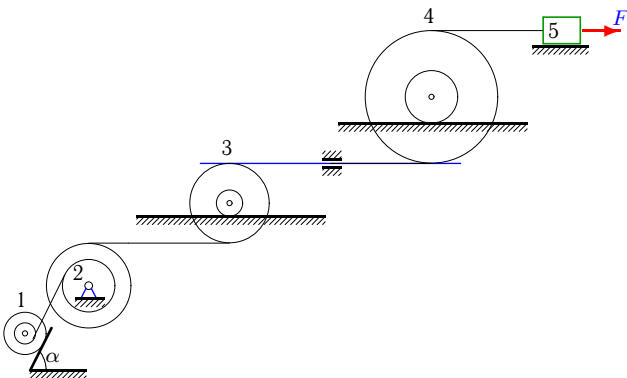
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 4, \\
 m_1 &= 12, m_2 = 80, \\
 m_3 &= 6, m_4 = 125, \\
 m_5 &= 100.
 \end{aligned}$$

Задача D-33.9.

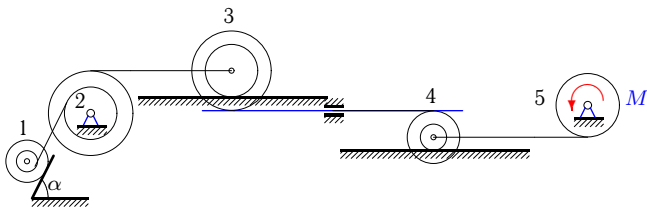
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 5, r_4 = 2, \rho_4 = 4, \\
 m_1 &= 4, m_2 = 48, \\
 m_3 &= 16, m_4 = 27, \\
 m_5 &= 9.
 \end{aligned}$$

Задача D-33.10.

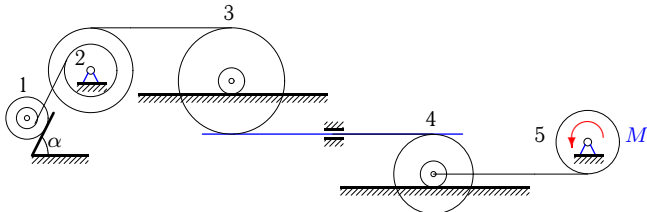
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 2, \rho_3 = 2, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 4, m_2 = 96, \\
 m_3 &= 4, m_4 = 54, \\
 m_5 &= 144.
 \end{aligned}$$

Задача D-33.11.

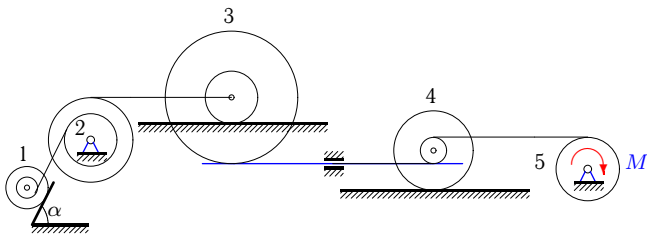
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 20, m_4 = 240, \\
 m_5 &= 800.
 \end{aligned}$$

Задача D-33.12.

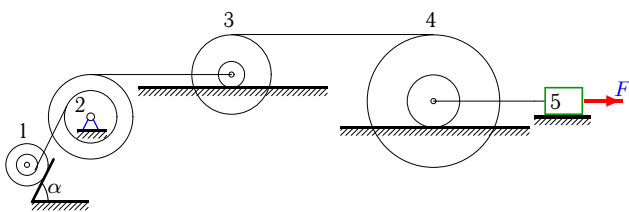
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 5, r_3 = 2, \rho_3 = 4, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 8, m_2 = 32, \\
 m_3 &= 5, m_4 = 64, \\
 m_5 &= 6.
 \end{aligned}$$

Задача D-33.13.

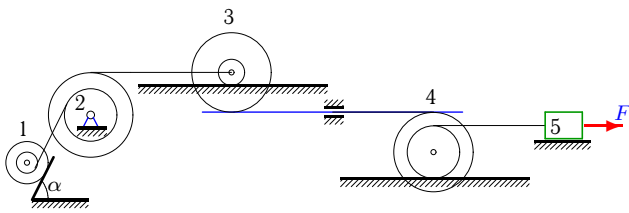
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 5, r_4 = 2, \rho_4 = 4, \\
 m_1 &= 20, m_2 = 48, \\
 m_3 &= 8, m_4 = 49, \\
 m_5 &= 294.
 \end{aligned}$$

Задача D-33.14.

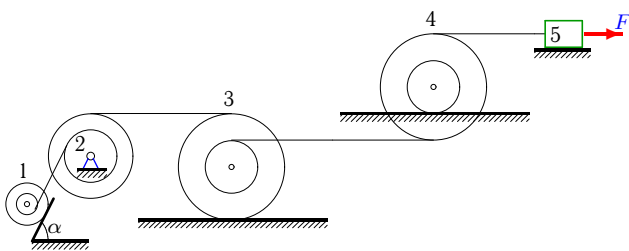
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 3, r_4 = 2, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 96, \\
 m_3 &= 4, m_4 = 75, \\
 m_5 &= 50.
 \end{aligned}$$

Задача D-33.15.

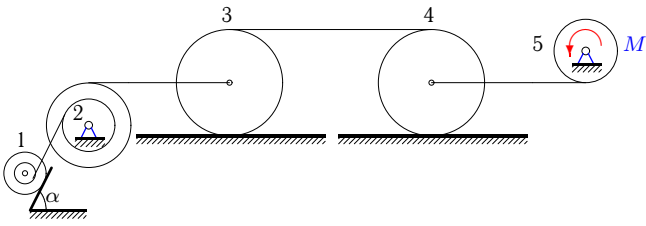
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 2, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 256, m_4 = 192, \\
 m_5 &= 32.
 \end{aligned}$$

Задача D-33.16.

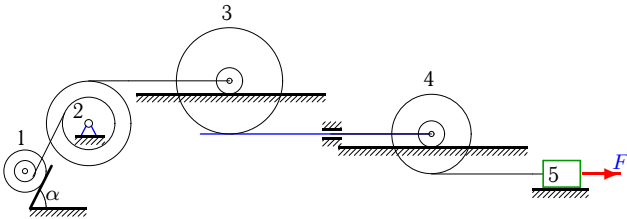
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, \\
 R_4 &= 4, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 8, m_4 = 6, \\
 m_5 &= 4.
 \end{aligned}$$

Задача D-33.17.

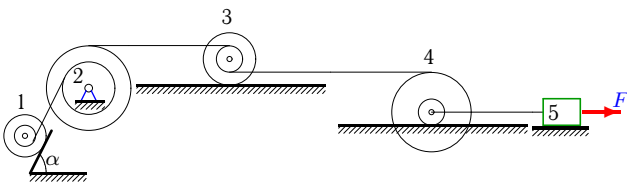
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 32, \\
 m_3 &= 4, m_4 = 3, \\
 m_5 &= 2.
 \end{aligned}$$

Задача D-33.18.

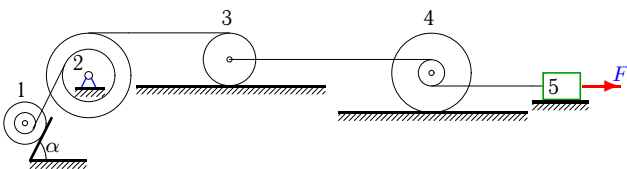
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 20, m_2 = 32, \\
 m_3 &= 72, m_4 = 144, \\
 m_5 &= 144.
 \end{aligned}$$

Задача D-33.19.

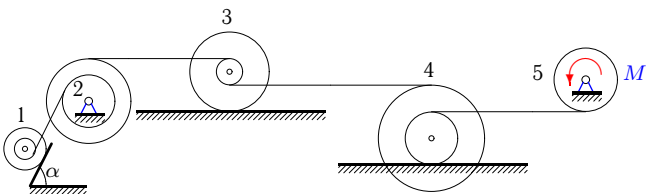
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 2, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 32, m_4 = 192, \\
 m_5 &= 32.
 \end{aligned}$$

Задача D-33.20.

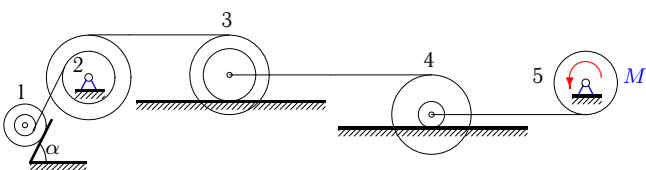
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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 64, m_4 = 144, \\
 m_5 &= 36.
 \end{aligned}$$

Задача D-33.21.

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$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 2, \rho_3 = 2, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 32, \\
 m_3 &= 100, m_4 = 60, \\
 m_5 &= 200.
 \end{aligned}$$

D-33 Ответы.**Кинетическая энергия системы. Приведенные массы** 30.05.2013

№	μ_1	μ_2	μ_3	μ_4	μ_5	$\sum_{k=1}^5 \mu_k$
1	5	9	12	15	18	59
2	8	24	12	3	2	49
3	5	8	20	135	18	186
4	5	54	40	125	225	449
5	10	54	15	12	3	94
6	8	45	4	39	18	114
7	5	27	80	75	50	237
8	15	45	6	120	64	250
9	5	12	20	240	196	473
10	8	24	8	3	2	45
11	5	20	8	27	9	69
12	10	18	25	468	27	548
13	25	12	40	320	384	781
14	5	24	20	96	128	273
15	5	20	100	351	162	638
16	5	45	12	9	2	73
17	5	8	40	135	72	260
18	40	8	40	5	1	94
19	8	45	12	39	2	106
20	5	20	52	13	2	92
21	8	8	32	3	1	52

D-33 файл о33d55C