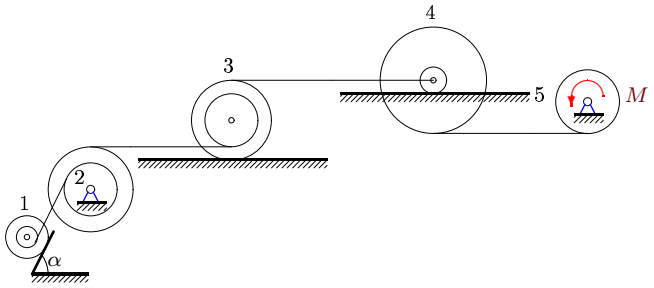
Кинетическая энергия системы. Приведенные массы

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.

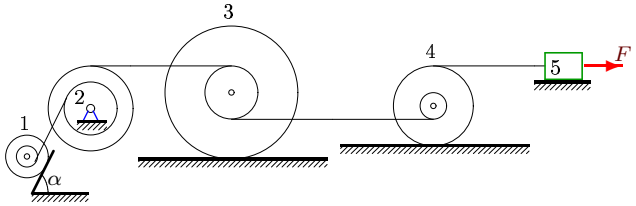
113



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 16$, $m_2 = 48$,
$m_3 = 7$, $m_4 = 1$,
$m_5 = 2$.

Задача D-33.2.

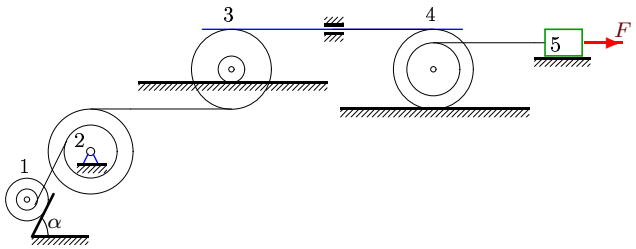
113



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 32$,
$m_3 = 196$, $m_4 = 196$,
$m_5 = 98$.

Задача D-33.3.

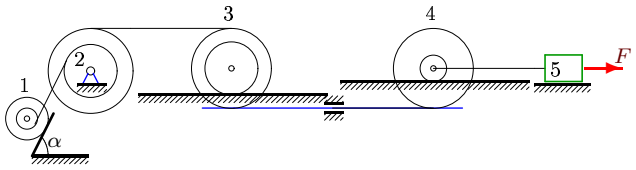
113



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 12$, $m_2 = 16$,
$m_3 = 24$, $m_4 = 45$,
$m_5 = 36$.

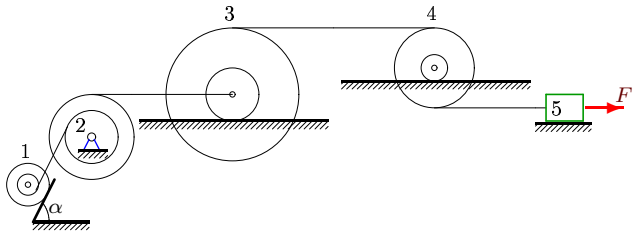
Задача D-33.4.

113



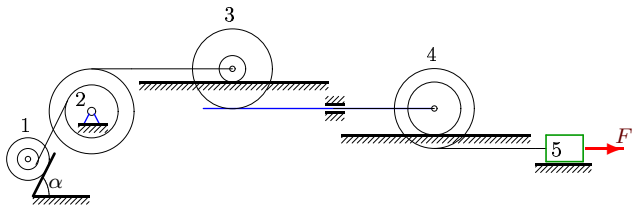
$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 3$, $r_3 = 2$, $\rho_3 = 2$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 32$,
$m_3 = 100$, $m_4 = 60$,
$m_5 = 100$.

Задача D-33.5.



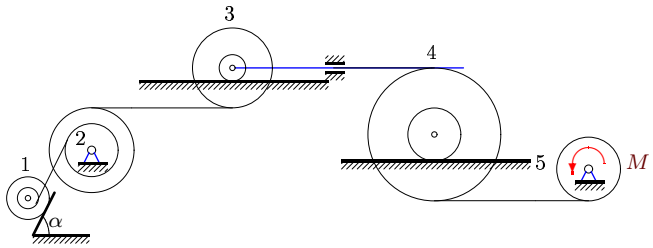
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 4,\ m_4 = 64,$
$m_5 = 32.$

Задача D-33.6.



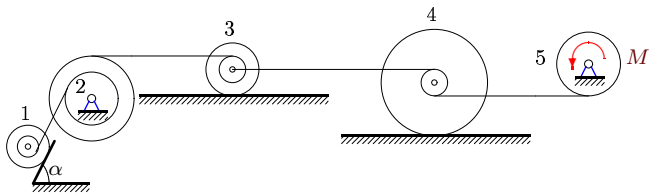
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 3,\ r_3 = 1,\ \rho_3 = 2,$
$R_4 = 3,\ r_4 = 2,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 96,$
$m_3 = 4,\ m_4 = 3,$
$m_5 = 2.$

Задача D-33.7.



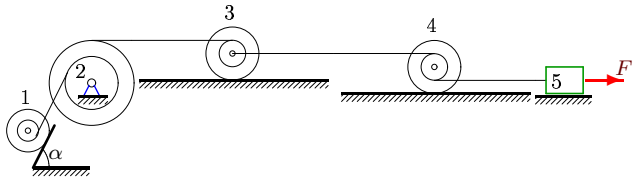
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 3,\ r_3 = 1,\ \rho_3 = 2,$
$R_4 = 5,\ r_4 = 2,\ \rho_4 = 4,$
$m_1 = 4,\ m_2 = 48,$
$m_3 = 16,\ m_4 = 147,$
$m_5 = 392.$

Задача D-33.8.



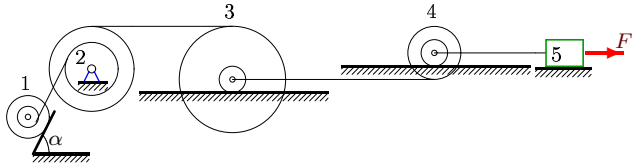
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 36,\ m_4 = 27,$
$m_5 = 100.$

Задача D-33.9.



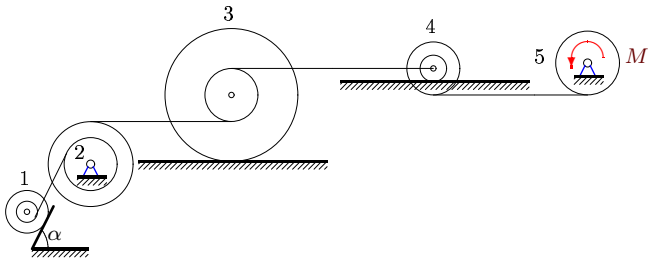
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 16,$
$m_3 = 36,\ m_4 = 243,$
$m_5 = 162.$

Задача D-33.10.



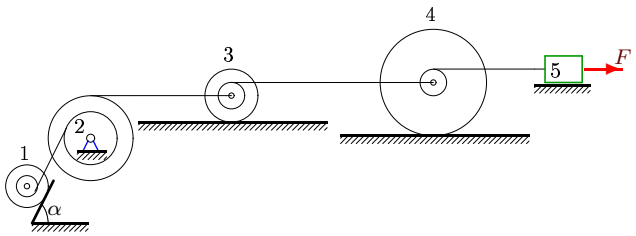
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 16,$
$m_3 = 20,\ m_4 = 75,$
$m_5 = 50.$

Задача D-33.11.



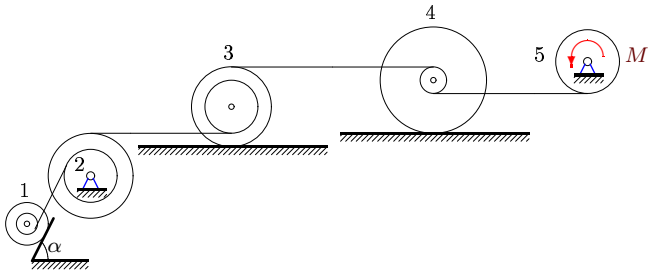
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 16,\ m_2 = 16,$
$m_3 = 63,\ m_4 = 54,$
$m_5 = 90.$

Задача D-33.12.



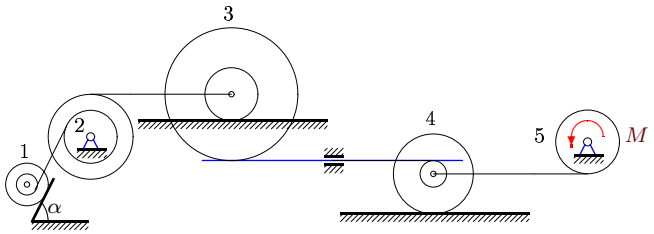
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 16,\ m_4 = 64,$
$m_5 = 64.$

Задача D-33.13.



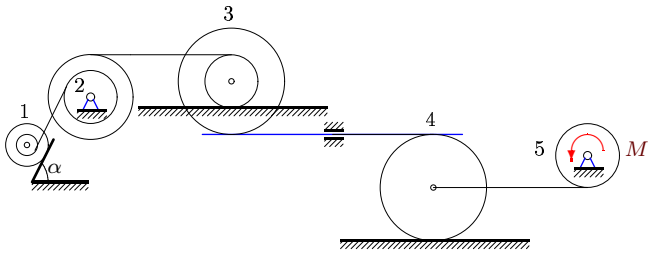
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 3,\ r_3 = 2,\ \rho_3 = 2,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 48,$
$m_3 = 4,\ m_4 = 3,$
$m_5 = 50.$

Задача D-33.14.



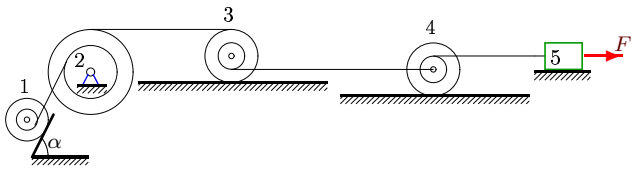
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 4,\ m_4 = 192,$
$m_5 = 128.$

Задача D-33.15.



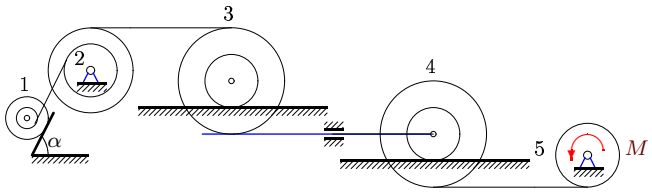
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 4,\ r_3 = 2,\ \rho_3 = 3,$
$R_4 = 4,$
$m_1 = 4,\ m_2 = 32,$
$m_3 = 64,\ m_4 = 96,$
$m_5 = 64.$

Задача D-33.16.



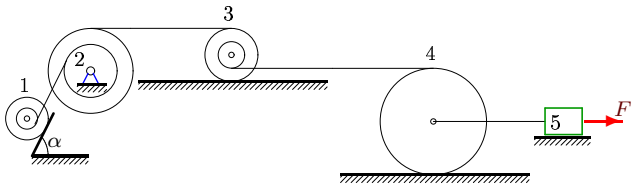
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 20,\ m_2 = 16,$
$m_3 = 128,\ m_4 = 448,$
$m_5 = 384.$

Задача D-33.17.



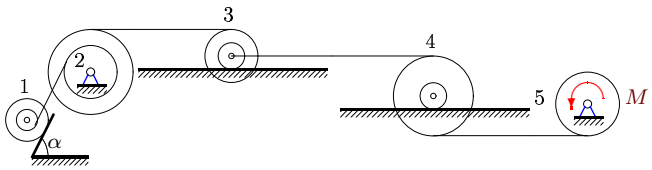
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 2,\ \rho_3 = 3,$
$R_4 = 4,\ r_4 = 2,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 144,\ m_4 = 108,$
$m_5 = 36.$

Задача D-33.18.



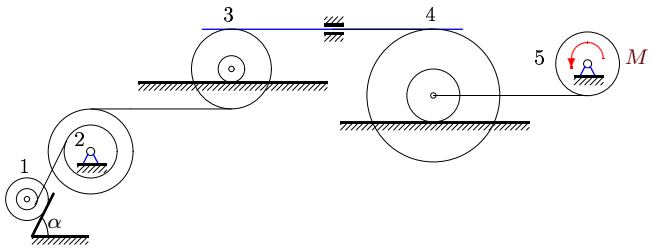
$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 4,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 64,\ m_4 = 128,$
$m_5 = 128.$

Задача D-33.19.



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 32,$
$m_3 = 36,\ m_4 = 144,$
$m_5 = 144.$

Задача D-33.20.



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 3,\ r_3 = 1,\ \rho_3 = 2,$
$R_4 = 5,\ r_4 = 2,\ \rho_4 = 4,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 16,\ m_4 = 147,$
$m_5 = 196.$