作业七

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4 - 1

由牛二，$T_1 - mg = ma, 2mg - T_2 = 2ma, T_2 r - Tr = J\beta, Tr - T_1 r = J\beta, \beta r = a$, 解得 $a = \frac{1}{4}g, T = \frac{11}{8}mg.$

4 - 2

(1) $M_f = \int r \mathrm{d}f = 2\int_0^{l/2} r\mu \frac{m}{l} g \mathrm{d}r = \frac{1}{4}\mu mgl.$ 垂直桌面向下.

(2) $J = \frac{1}{12}ml^2$, $t = \frac{\omega_0}{\beta} = \frac{\omega_0 l}{3\mu g}$

4 - 3

由牛二，$mg - T = ma, TR = J\beta$, 有 $a = \beta R = \frac{2m}{M+m}g$, 故 $v = at = \frac{2m}{M+2m}gt$

4 - 4

对重物 $T_2 - \frac{1}{4}Mg = \frac{1}{4}Ma$, 对人 $T_1 - Mg = Ma$, 对滑轮 $T_1 R - T_2 R = J\beta = J\frac{a}{R}$ 得 $a = \frac{1}{2}g$

补充题

(1) $T = \frac{mv_0^2}{R_0}$

(2) $2T = \frac{mv^2}{R_0}$, $v = \sqrt{2}v_0$