$$\frac{1}{2}ky_2^2 = \frac{1}{2}ky_3^2 + m_a g(y_1 + y_2)$$

$$y_3 - y_1 = y_1 - y_2$$

$$-y_2 = \frac{(2m_a + m_b)g}{k}$$

由状态 1 到状态 2 应用能量守恒定律得：

$$\frac{1}{2}ky_2^2 = \frac{1}{2}ky_1^2 + m_a g(y_1 + y_2) + \frac{1}{2}m_a v_a^2$$

将 $y_1$， $y_2$， $y_3$ 带入化简得

$$m_a v_a^2 = \frac{(m_a + m_b)^2}{k}g^2$$

所以： $I = m_a v_a - m_a \times 0 = (m_a + m_b)g\sqrt{\frac{m_a}{k}}$