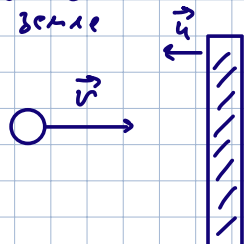
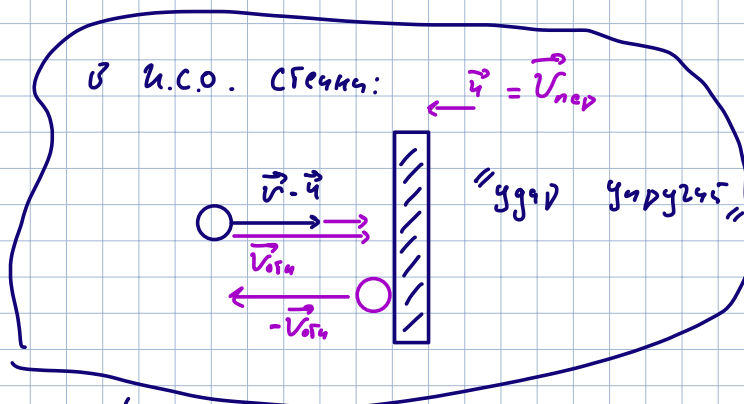


$$\begin{array}{|l} \hline \text{N 4.70} \\ \hline v, u \\ u < v \\ \hline \Delta K, \Delta P \\ \hline \end{array}$$

В и.с.о.
Земли



В и.с.о. Спечки:



$$\begin{aligned} \vec{v}_{\text{rel}} = \vec{u} - \vec{v}_{\text{train}} &= \vec{u} - \vec{v} \\ \vec{v}' &= 2\vec{u} - \vec{v} \end{aligned}$$

В и.с.о.
Земли

$$\vec{v}_{\text{rel}} = \vec{v}_{\text{train}} + \vec{v}_{\text{wall}}$$

До столкновения: \vec{v}

После столкновения: $2\vec{u} - \vec{v}$

$$1) \Delta K = K_1 - K_0 = \frac{m}{2}(2u-v)^2 - \frac{m}{2}v^2$$

$$\Delta K = \frac{m}{2}(4u^2 - 4uv + v^2 - v^2)$$

$$\Delta K = 2m(u^2 - uv)$$

$$\Delta K = 2mu(u-v) < 0$$

$$2) \Delta P = m(2u-v) - mv = 2m(u-v) < 0$$

$$3) v' = 0 \Rightarrow 2u - v = 0$$

$$2u = v$$

$$\frac{u}{v} = \frac{1}{2}$$

2

$$V(r) = V_0 \cdot \left[\left(\frac{a}{r} \right)^{12} - \left(\frac{a}{r} \right)^6 \right]$$

$$F(r) = \frac{dV}{dr} = V_0 \cdot \left[12 \cdot \left(\frac{a}{r} \right)^{11} \cdot \left(-\frac{a}{r^2} \right) - 6 \cdot \left(\frac{a}{r} \right)^5 \cdot \left(-\frac{a}{r^2} \right) \right] = 0$$

$$F(r) = V_0 \left[6 \cdot \frac{a^6}{r^7} - 12 \cdot \frac{a^{12}}{r^{13}} \right]$$

$$F(r_0) = 0 \quad \Leftrightarrow \quad 6 \cdot \frac{a^6}{r_0^7} - 12 \cdot \frac{a^{12}}{r_0^{13}} = 0$$

$$\frac{a^6}{r_0^7} = 2 \cdot \frac{a^{12}}{r_0^{13}}$$

$$r_0^6 = 2 a^6$$

$$r_0 = \sqrt[6]{2} \cdot a$$