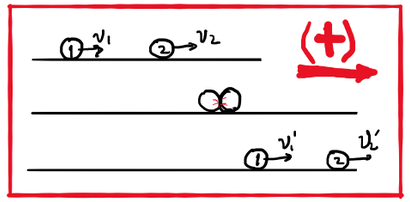
9-11-2020



ΑΔΟ: $\vec{P}_{0\Lambda} = \vec{P}'_{0\Lambda} \Rightarrow \vec{P}_1 + \vec{P}_2 = \vec{P}'_1 + \vec{P}'_2 \Rightarrow$

$\Rightarrow P_1 + P_2 = P'_1 + P'_2 \Rightarrow m_1 v_1 + m_2 v_2 = m_1 v'_1 + m_2 v'_2 \Rightarrow$

$\Rightarrow m_1 v_1 - m_1 v'_1 = m_2 v'_2 - m_2 v_2 \Rightarrow \boxed{m_1 (v_1 - v'_1) = m_2 (v'_2 - v_2)}$ (1)

ΑΔΜΕ $\hookrightarrow v_{\alpha\kappa} = 0$ } ΑΔΚΕ: $K_1 + K_2 = K'_1 + K'_2 \Rightarrow \cancel{\tfrac{1}{2}} m_1 v_1^2 + \cancel{\tfrac{1}{2}} m_2 v_2^2 = \cancel{\tfrac{1}{2}} m_1 v'^2_1 + \cancel{\tfrac{1}{2}} m_2 v'^2_2 \Rightarrow$

$\Rightarrow m_1 v_1^2 - m_1 v'^2_1 = m_2 v'^2_2 - m_2 v_2^2 \Rightarrow m_1 (v_1^2 - v'^2_1) = m_2 (v'^2_2 - v_2^2) \Rightarrow$

$\Rightarrow \underbrace{\cancel{m_1 (v_1 - v'_1)}(v_1 + v'_1) = \cancel{m_2 (v'_2 - v_2)}}_{(1)} (v'_2 + v_2) \Rightarrow \boxed{v_1 + v'_1 = v'_2 + v_2}$ (2)

(2): $\underbrace{v'_2 = v_1 + v'_1 - v_2}_{(*)} \xrightarrow{(1)} m_1 (v_1 - v'_1) = m_2 (\underbrace{v_1 + v'_1 - v_2}_{2v_2} - v_2) \Rightarrow$

$\Rightarrow m_1 v_1 - m_1 v'_1 = m_2 v_1 + m_2 v'_1 - 2 m_2 v_2 \Rightarrow$

$\Rightarrow -m_2 v'_1 - m_1 v'_1 = m_2 v_1 - 2 m_2 v_2 - m_1 v_1 \Rightarrow$

$\Rightarrow -(m_2 + m_1) v'_1 = (m_2 - m_1) v_1 - 2 m_2 v_2 \Rightarrow$

$\Rightarrow (m_2 + m_1) v'_1 = (m_1 - m_2) v_1 + 2 m_2 v_2 \Rightarrow$

$\Rightarrow \boxed{v'_1 = \frac{m_1 - m_2}{m_1 + m_2} v_1 + \frac{2 m_2}{m_1 + m_2} v_2}$ (A)

(*)/(A): $v'_2 = v_1 + \frac{m_1 - m_2}{m_1 + m_2} v_1 + \frac{2 m_2}{m_1 + m_2} v_2 - v_2 \Rightarrow$

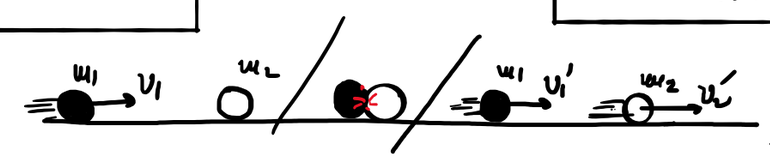
$\Rightarrow v'_2 = \left(1 + \frac{m_1 - m_2}{m_1 + m_2}\right) v_1 + \left(\frac{2 m_2}{m_1 + m_2} - 1\right) v_2 \Rightarrow$

$\Rightarrow v'_2 = \frac{m_1 + \cancel{m_2} + m_1 - \cancel{m_2}}{m_1 + m_2} v_1 + \frac{2 m_2 - m_1 - m_2}{m_1 + m_2} v_2$

$\Rightarrow \boxed{v'_2 = \frac{2 m_1}{m_1 + m_2} v_1 + \frac{m_2 - m_1}{m_1 + m_2} v_2}$ (B)

$v_2 = 0 \Rightarrow \boxed{v'_1 = \frac{m_1 - m_2}{m_1 + m_2} v_1}$

$v_2 = 0 \Rightarrow \boxed{v'_2 = \frac{2 m_1}{m_1 + m_2} v_1}$



$v'_2 > 0$

$m_1 < m_2 \Rightarrow v'_1 < 0$ δηλ. η m_1 κινείται προς τα αριστερά.

$m_1 > m_2 \Rightarrow v'_1 > 0$ " " " " " " προς δεξιά

$m_1 = m_2 \Rightarrow v'_1 = 0$ " " " ακινητοποιείται.

ανάλυση περιπτώσεων: $\rightarrow v'_1 = 0 \ (= v_2)$, $\rightarrow v'_2 = v_1$