96. Zwei Himmelskörper

$$\vec{v}_1 = \begin{pmatrix} v_1 \\ 0 \end{pmatrix} \qquad \vec{v}_2 = \begin{pmatrix} 0 \\ v_2 \end{pmatrix} \qquad \vec{v}_E = \frac{1}{m_1+m_2} \begin{pmatrix} m_1 v_1 \\ m_2 v_2 \end{pmatrix}$$

$$|v_1| = v_1 \qquad |v_2| = v_2 \qquad |v_E| = \frac{\sqrt{(m_1 v_1)^2+(m_2 v_2)^2}}{m_1+m_2}$$

a) $\underline{\underline{\alpha = \arctan\left(\frac{m_2 v_2}{m_1 v_1}\right)}}$

b) $K_1 := E_{kin}$ vor dem Stoß ; $K_2 := E_{kin}$ nach dem Stoß

$$K_1 = K_2 + \Delta E$$

$$\frac{m_1 {v_1}^2}{2} + \frac{m_2 {v_2}^2}{2} = \frac{1}{2}(m_1+m_2)\left(\frac{\sqrt{(m_1 v_1)^2+(m_2 v_2)^2}}{m_1+m_2}\right)^2 + \Delta E$$

$$\Delta E = \frac{(m_1 v_1)^2+(m_2 v_2)^2+m_1 m_2 {v_1}^2+m_1 m_2 {v_2}^2-(m_1 v_1)^2-(m_2 v_2)^2}{2(m_1+m_2)}$$

$$\Delta E = \underline{\underline{\frac{m_1 m_2\left({v_1}^2+{v_2}^2\right)}{2(m_1+m_2)}}}$$

c) Für $m_1 = m_2 = m$

$\underline{\underline{\Delta E = \frac{1}{4} m\left({v_1}^2 + {v_2}^2\right)}}$

Für $m_1 \gg m_2$

$\underline{\underline{\Delta E = \frac{1}{2} m_2\left({v_1}^2 + {v_2}^2\right)}}$