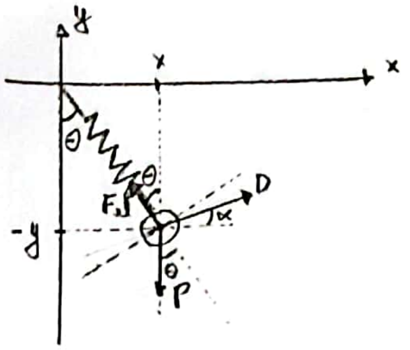
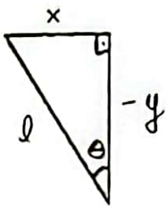
1.



2.

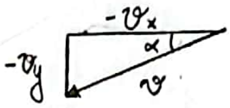
I.



$\rightarrow l = \sqrt{x^2+y^2}$

$\operatorname{sen}\theta = \dfrac{x}{\sqrt{x^2+y^2}}$

$\cos\theta = \dfrac{-y}{\sqrt{x^2+y^2}}$



$v = \sqrt{v_x^2 + v_y^2}$

$\operatorname{sen}\alpha = \dfrac{-v_y}{\sqrt{v_x^2+v_y^2}}$

$\cos\alpha = \dfrac{-v_x}{\sqrt{v_x^2+v_y^2}}$

II.

i) $R_x = m \cdot a_x$

$$m \cdot \frac{dv_x}{dt} = -F_{el}\operatorname{sen}\theta + D\cos\alpha \Rightarrow m\frac{dv_x}{dt} = -k\left(\sqrt{x^2+y^2} - l_0\right) \cdot \frac{x}{\sqrt{x^2+y^2}} + \frac{1}{2}\rho C_d A (v_x^2+v_y^2) \cdot \frac{(-v_x)}{\sqrt{v_x^2+v_y^2}}$$

$F_{el} = k(l - l_0)$

$$D = \frac{1}{2}\rho C_d A v^2 \quad \therefore m\frac{dv_x}{dt} = -kx + \frac{k x l_0}{\sqrt{x^2+y^2}} - \frac{1}{2}\rho C_d A v_x \sqrt{v_x^2+v_y^2}$$

$$\therefore \boxed{\frac{dv_x}{dt} = \left(-kx + \frac{k x l_0}{\sqrt{x^2+y^2}} - \frac{1}{2}\rho C_d A v_x \sqrt{v_x^2+v_y^2}\right) \cdot \frac{1}{m}}$$

ii) $R_y = m \cdot a_y$

$$m \cdot a_y = F_{el} \cdot \cos\theta + D\operatorname{sen}\alpha - mg = k(l - l_0)\cos\theta + \frac{1}{2}\rho C_d A (v_x^2+v_y^2) \cdot \frac{(-v_y)}{\sqrt{v_x^2+v_y^2}} - mg$$

$$\therefore \boxed{\frac{dv_y}{dt} = \left(ky - \frac{k y l_0}{\sqrt{x^2+y^2}} - \frac{1}{2}\rho C_d A v_y \sqrt{v_x^2+v_y^2} - mg\right) \cdot \frac{1}{m}}$$

$$\boxed{\frac{dx}{dt} = v_x} \qquad \boxed{\frac{dy}{dt} = v_y}$$