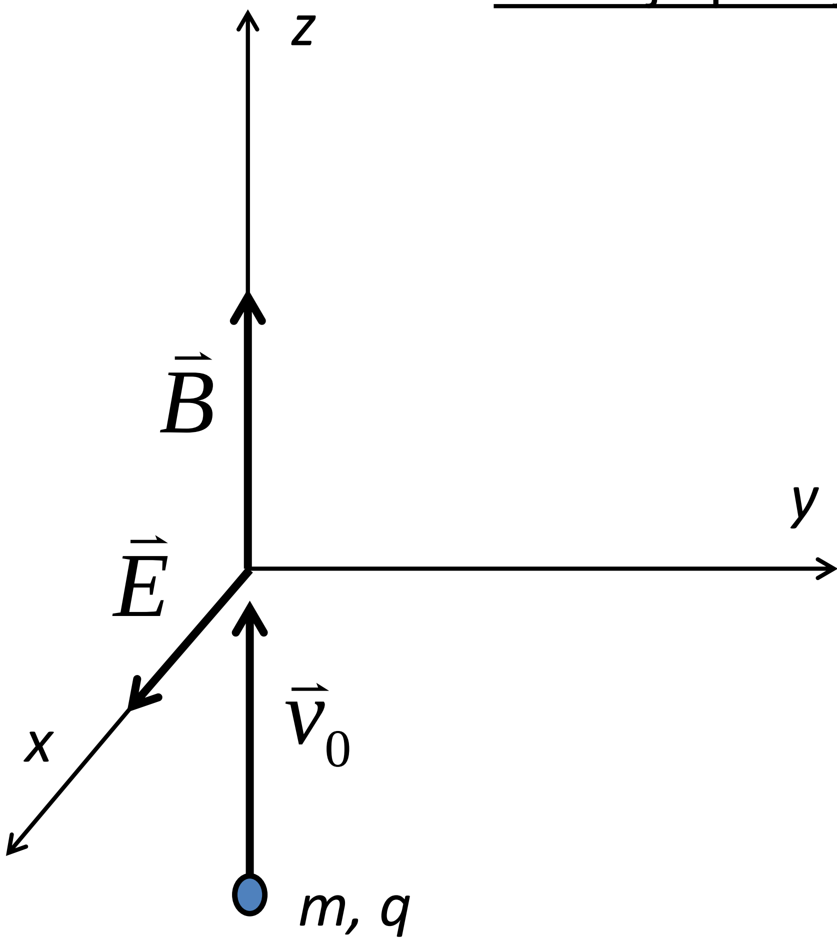
Gibanje po vijačnici



$$\vec{E} = (E,0,0); \quad \vec{B} = (0,0,B)$$

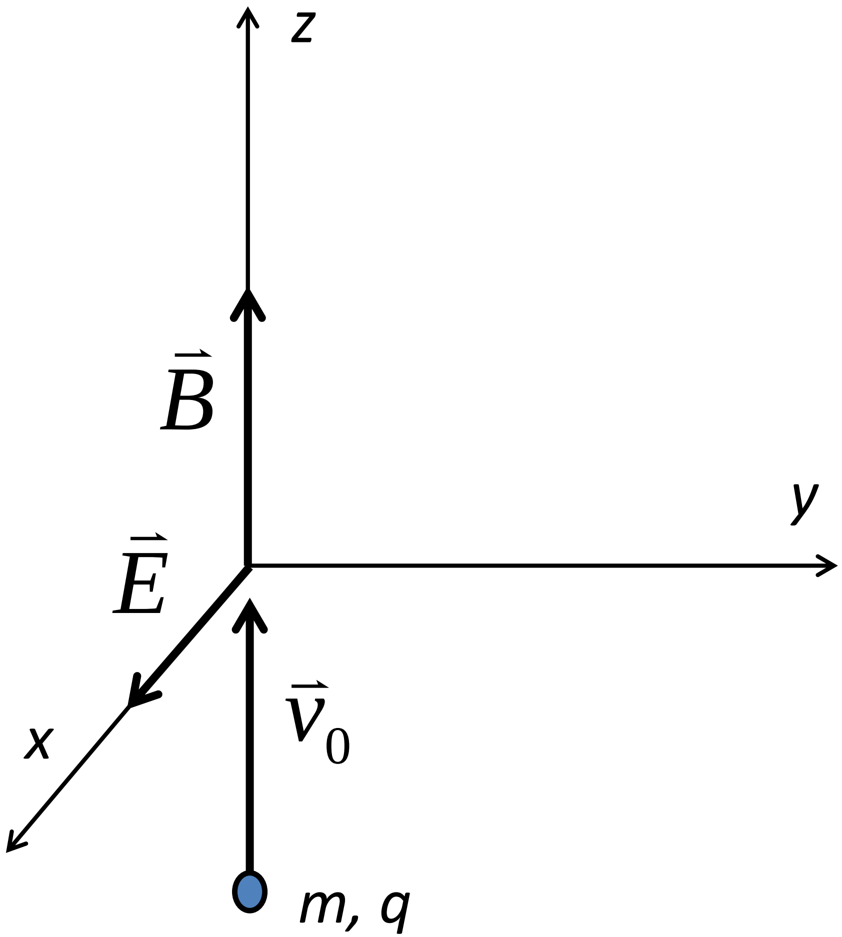
$$\vec{F} = q\vec{E} + q\vec{v} \times \vec{B} = m\dot{\vec{v}}$$

$$(E,0,0) + (v_y B, -v_x B, 0) = \frac{m}{q}(\dot{v}_x, \dot{v}_y, \dot{v}_z)$$

$$E + v_y B = \frac{m}{q}\dot{v}_x \longrightarrow$$ še enkrat odvajamo

$$-v_x B = \frac{m}{q}\dot{v}_y$$

$$0 = \frac{m}{q}\dot{v}_z \quad \Rightarrow \quad v_z = v_{z0}$$



$$\dot{v}_y B = \frac{m}{q}\ddot{v}_x$$

$$-\frac{q}{m} v_x B = \dot{v}_y$$

$$\ddot{v}_x + \frac{q^2 B^2}{m^2} v_x = 0$$

$$v_x = A\sin(\omega t)$$

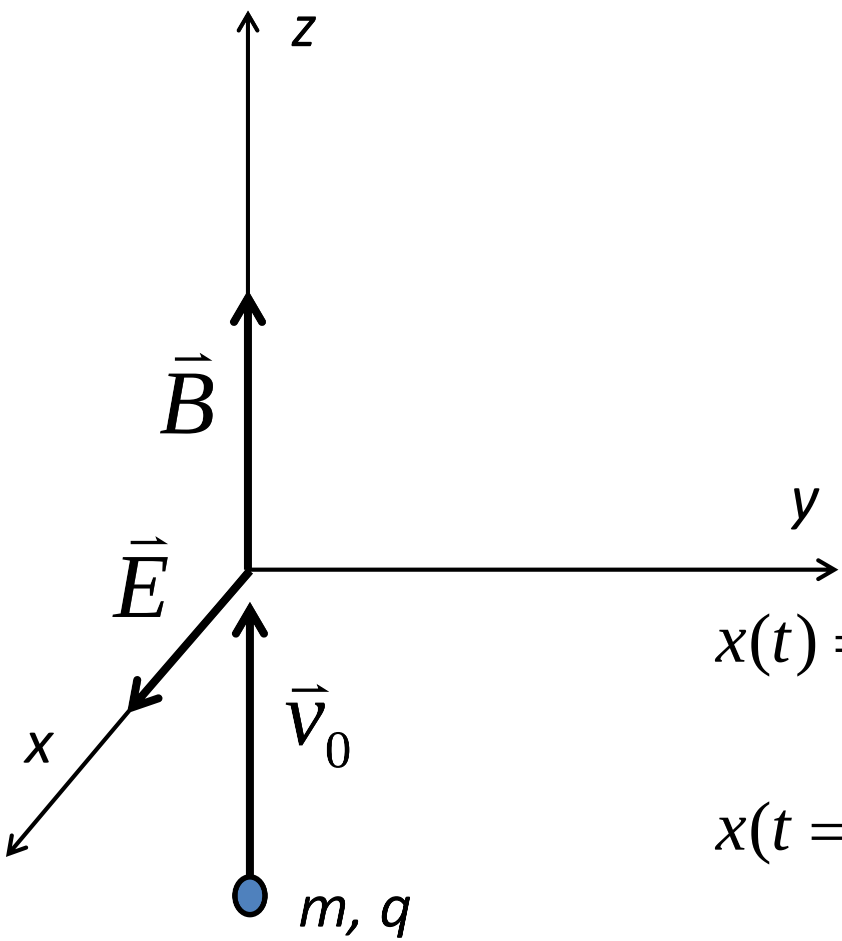
vstavimo v enačbo

$$\omega = \frac{qB}{m}$$

$$v_y = A\cos(\omega t) - \frac{E}{B}$$

$$v_y(t=0)=0 \Rightarrow A=\frac{E}{B}$$

$$v_y=\frac{E}{B}\left[\cos(\omega t)-1\right]$$

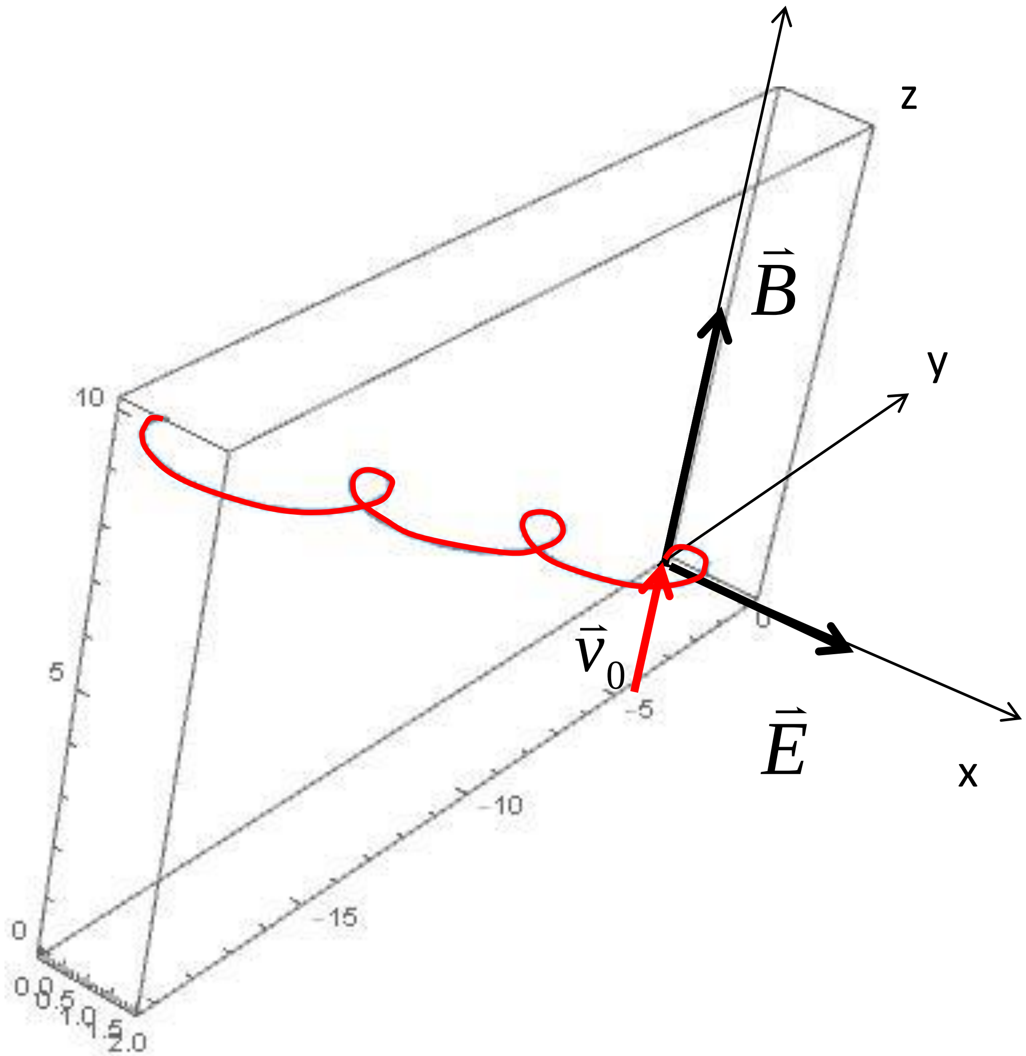


$$x(t)=\int v_x(t)dt=-\frac{E}{B\omega}\cos(\omega t)+x_0$$

$$x(t=0)=0 \Rightarrow x(t)=\frac{E}{B\omega}\left(1-\cos(\omega t)\right)$$

$$y(t)=\frac{E}{B\omega}\sin(\omega t)-\omega t$$

$$z(t)=v_{z0}t$$

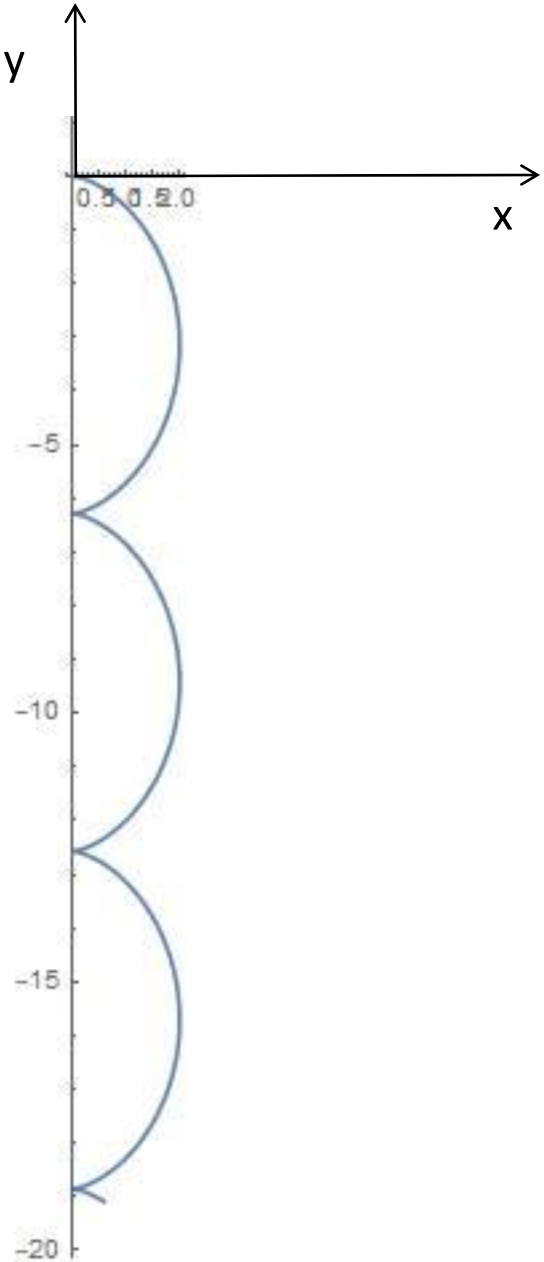


$$x(t) = \frac{E}{B\omega}\left(1 - \cos(\omega t)\right)$$

$$y(t) = \frac{E}{B\omega}\sin(\omega t) - \omega t$$

$$z(t) = v_{z0} t$$

ta člen ne „pripada“ vijačnici



cikloida