Sustituyendo, se tienen (para las 3 componentes) (9)

$$\frac{d}{dt}\langle \hat{p}_y \rangle = 0 \Rightarrow \langle \hat{p}_y \rangle = \text{cte}$$

$$\frac{d}{dt}\langle \hat{p}_z \rangle = 0 \Rightarrow \langle \hat{p}_z \rangle = \text{cte}$$

$$\frac{d}{dt}\langle y \rangle = \frac{\langle \hat{p}_y \rangle}{m} = v_y = \text{cte.}$$

$$\frac{d}{dt}\langle z \rangle = \frac{\langle \hat{p}_z \rangle}{m} = v_z = \text{cte}$$

$$\frac{d}{dt}\langle x \rangle = \frac{\langle p_x \rangle}{m} \quad (1)$$

$$\frac{d}{dt}\langle p_x \rangle = -\frac{eB_0}{m}\langle \hat{p}_y \rangle - eE_0 - \frac{(eB_0)^2}{m}\langle x \rangle \quad (2)$$

Tomando la derivada temporal de (1):

$$\frac{d^2}{dt^2}\langle x \rangle = \frac{1}{m}\frac{d}{dt}\langle p_x \rangle$$

$$= -\left(\frac{eB_0}{m}\right)\frac{\langle \hat{p}_y \rangle}{m} - \frac{eE_0}{m} - \left(\frac{eB_0}{m}\right)^2 \langle x \rangle$$

$$\Rightarrow \boxed{\frac{d^2 x}{dt^2} + \omega_c^2 \langle x \rangle = \frac{\langle F_x \rangle}{m}}$$