f05

Wednesday, December 16, 2020 10:30 AM

$$\frac{\partial F}{\partial q} = p \qquad \frac{\partial F}{\partial P} = q - \frac{eE}{m\omega^2}$$

$$p \to P \qquad q \to q - \frac{eE}{m\omega^2} = Q$$

$$H(Q,P,t) = \frac{P^2}{2m} + \frac{1}{2}m\omega^2\left(Q + \frac{eE}{m\omega^2}\right)^2 - eE\left(Q + \frac{eE}{m\omega^2}\right)$$

$$= \frac{P^2}{2m} + \frac{1}{2}m\omega^2 Q^2 + \frac{1}{2}\frac{e^2E^2}{m\omega^2} + QeE - eEQ - \frac{1}{2}\frac{e^2E^2}{m\omega^2}$$

$$= \frac{P^2}{2m} + \frac{1}{2}m\omega^2 Q^2 - \frac{e^2E^2}{2m\omega^2}$$

$$\dot{Q} = \frac{\partial H}{\partial P} = \frac{P}{m} \qquad m\ddot{Q} = m\omega^2 Q$$

$$\dot{P} = -\frac{\partial H}{\partial Q} = m\omega^2 Q \qquad \ddot{Q} - \omega^2 Q = 0$$

$$Q(t) = A\cos(\omega t + \delta)$$

$$q(t) = A\cos(\omega t + \delta) + \frac{eE}{m\omega^2}$$

$$p(t) = -\omega A \sin(\omega t + \delta)\, m$$