?

ω

$-\gamma\dot{q}$

$\ddot{q}+\gamma\dot{q}+\omega^2 q = 0$

(1)

1

$$L(q,\dot{q},t) = \left(\frac{1}{2}m\dot{q}^2 - V(q)\right)e^{\gamma t}$$

(2)

$_equation. :\hat{H} = \frac{p^2}{2m(t)} + \frac{1}{2}m(t)\omega^2 q^2.(3)$

?

$m(t) = m_0 e^{\gamma t}$

$\partial H \overline{\partial p = (p/m_0)e^{-\gamma t}, \dot{p} = -\frac{\partial H}{\partial q} = m_0\omega^2 e^{\gamma t} q}$

$_equation._0 v e^{\gamma t}$

$p_k = m_0 v$

$$(m+\delta m)(v+\delta v) - mv = F\delta t$$

(4)

F

$$\left(\frac{d}{dt}\right)(m(t)v) = F$$

(5)

$\frac{1}{2}m(t)\omega^2 x^2$

$$L = \frac{1}{2}m(t)v^2 - \frac{1}{2}m(t)\omega^2 x^2$$

(6)

$$p = \frac{\partial L}{\partial v} = m(t)v$$

(7)

$$H = pv - L = \frac{p^2}{2m(t)} + \frac{1}{2}m(t)\omega^2 x^2$$

(8)

$\dot{p} = \left(\frac{d}{dt}\right)(m(t)v) = -m(t)\omega^2,$

$\ddot{x} + \gamma\dot{x} + \omega^2 x = 0$

$\Delta x)^2 \simeq (\Delta x)_0^2 e^{-\gamma t}$

$(\Delta p)^2 \simeq (\Delta p)_0^2 e^{\gamma t}$

$\Delta x)^2(\Delta p)^2 \simeq (\Delta x)_0^2(\Delta p)_0^2 \simeq \hbar^2$

$\hat{H}_{CK} = H_{CK}(\hat{q},\hat{p})$

$$[\hat{q},\hat{p}] = i\hbar, [\hat{q},\hat{q}] = [\hat{p},\hat{p}] = 0,$$

(9)

$\hat{Q} = e^{\gamma t/2}\hat{q}$

$\hat{P} = e^{-\gamma t/2}$

$\hat{F}_2(\hat{q},\hat{P},t) = e^{\gamma t}\frac{\hat{P}\hat{q}+\hat{q}\hat{P}}{2}$

$\hat{p} = \frac{\partial \hat{F}_2}{\partial \hat{q}}$

$\hat{Q} = \frac{\partial \hat{F}_2}{\partial \hat{P}}$

$[\hat{Q},\hat{P}] = [\hat{q},\hat{p}]$

$\hat{K} = \hat{H} + \frac{\partial \hat{F}_2}{\partial t}$

$$\hat{K} = \frac{\hat{P}^2}{2m_0} + \frac{1}{4}m_0\omega^2\hat{Q}^2 + \frac{\gamma}{2}(\hat{P}\hat{Q}+\hat{Q}\hat{P}).$$

(10)