$$\int_{-\infty}^{\infty} dt \left\{ \frac{1}{2m}\left[-\frac{i\hbar}{\alpha}\frac{\delta}{\delta\chi(t)} - m\frac{d\chi(t)}{dt}\right]^2 - \frac{m}{2}\left[\frac{d\chi(t)}{dt}\right]^2 \right\}\Phi[\chi]=0$$

| | | |
|---|---|---|
| 離散化 | $\sum_{k=-\infty}^{\infty} \varepsilon \left\{ \frac{1}{2m}\left(-\frac{i\hbar}{\alpha}\frac{1}{\varepsilon}\frac{\partial}{\partial\chi(k\varepsilon)} - m\frac{\chi(k\varepsilon+\varepsilon)-\chi(k\varepsilon)}{\varepsilon}\right)^2 - \frac{m}{2}\left[\frac{\chi(k\varepsilon+\varepsilon)-\chi(k\varepsilon)}{\varepsilon}\right]^2\right\}\Phi(\cdot\cdot\cdot,\chi(\varepsilon),\chi(2\varepsilon),\cdot\cdot\cdot)=0$ | |
| ハミルトニアン | $H(p;x) = Q\phi(x) + [1/(2M)]\ \Sigma_k\ [p^k - QA^k(x)]^2$<br>$x^k \equiv \chi(k\varepsilon)$<br>$M = m\varepsilon\alpha^2,\ Q = m;$<br>$A^k(x) = \alpha(x^{k+1} - x^k),$<br>$\phi(x) = -[1/(2\varepsilon)]\ \Sigma_k\ (x^{k+1} - x^k)^2$ | |
| 正準方程式 | $\frac{dx^j}{d\tau} = \frac{\partial H}{\partial p^j}$ | $\frac{dx^j}{d\tau} = \frac{1}{M}[p^j - QA^j(x)]$ $t = j\varepsilon$ |
| | $\frac{dp^j}{d\tau} = -\frac{\partial H}{\partial x^j}$ | $\frac{dp^j}{d\tau} = -Q\partial_j\phi(x) + \frac{Q}{M}\Sigma_k\ [p^k - QA^k(x)]\partial_j A^k(x)$ |

$$\frac{d^2x^j}{d\tau^2} = \frac{1}{\varepsilon\alpha}\left(\frac{dx^{j-1}}{d\tau} - \frac{dx^{j+1}}{d\tau}\right) + \frac{2}{\varepsilon^2\alpha^2}\left[x^j - \frac{1}{2}(x^{j-1} + x^{j+1})\right]$$