

$$H = \sum_{n=1}^N \left[\frac{p_n^2}{2} + \frac{1}{2} \Omega_0^2 u_n^2 + g u_n^4 \right] + \frac{1}{2} \omega_0^2 \sum_{n=1}^N (u_n - u_{n+1})^2.$$