

Influence of heat bath and disorder on Davydov solitons. Foerner, Wolfgang; Ladik, Janos

Abstract

The dynamics of Davydov solitons is investigated with the help of the $|D_2\rangle$ state vector ansatz. The soliton remains stable against aperiodicity in the sequence of masses, spring constants, and coupling constants. However, already a small aperiodicity in the sequence of dipole interaction energies ($\geq \pm 2.5\%$) destroys the soliton. For values of the parameters typical for polypeptide α -helices the soliton is stable up to 30K. For a temp. of $T = 300\text{K}$ stable solitons can be found only for spring constants $W \geq 40\text{N/m}$ and coupling constants $X \geq 50\text{ pN}$. These values of W are much larger than those usually accepted for proteins ($W = 13\text{ N/m}$).