

Increased mobility of discrete breather in lattices with odd inter-site and on-site anharmonic potentials

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The mobility of high-frequency discrete breathers in monatomic chains with on-site and inter-site potentials taking into account the nearest neighbors interactions is numerically investigated. It was found that the odd (cubic and fifth-order) interatomic anharmonic interaction strongly affects the mobility of breathers, sharply increasing the distance that it propagates without being trapped. The enlargement of propagating distance can exceed many thousands times. It was also found that the correctly chosen fifth anharmonicity leads to an inversion of stability between the bond-centered and site-centered breathers and to the low-radiative propagation of discrete breathers along the chain. According to our preliminary study, these conclusions hold also for discrete breathers in iron, copper, niobium and other simple metals. We also found a strong increase of mobility of discrete breathers by even on-site anharmonic potential; this increase may also exceed many thousands.

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