Wandering breathers in coupled nonlinear chains: classical counterpart of quantum tunneling

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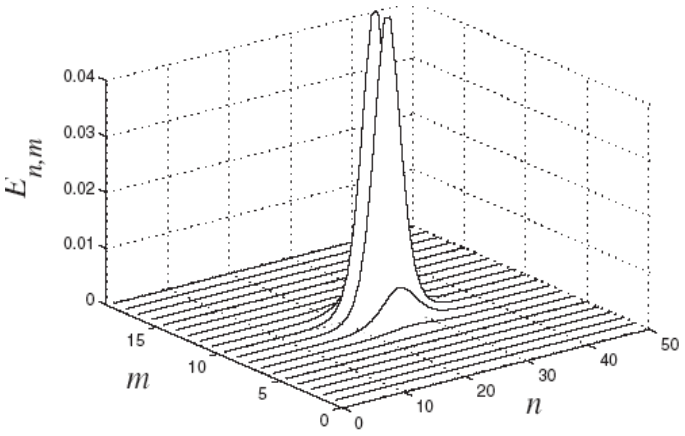
Delocalizing transition of a 1D breather in a 2D system of a large number of parallel-coupled nonlinear chains is described, in which the breather, initially excited in a given chain, abruptly spreads its vibrational energy in the whole 2D system upon decreasing breather frequency or amplitude below the threshold one. The threshold breather frequency is above the cutoff phonon frequency in the 2D system, the threshold breather amplitude scales as the square root of the interchain coupling constant, and the breather vibrational energy is localized mainly in one chain at the delocalization threshold. A similar delocalizing transition for 1D breathers should also occur in 3D arrays of parallel-coupled nonlinear oscillator chains. The delocalizing transition of discrete vibrational breathers in 2D and 3D systems of coupled nonlinear oscillator chains has an analogy with the delocalizing transition for Bose-Einstein condensates in 2D and 3D optical lattices.



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