

Quasi-Periodic Breathers in Newton's Cradle

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Abstract

Quasi-periodic breathers are important coherent structures in infinite-dimensional Hamiltonian systems that are spatially localized and temporally quasi-periodic. In the real analytic case, they are well understood, but the finitely smooth case, including granular chains and Newton's cradles with Hertzian contact potentials, had been long-open. This talk will present a recent result on the existence of quasi-periodic breathers in a broad class of finitely smooth Hamiltonian lattices and networks. To overcome obstacles in applying KAM method due to the finite smoothness of potentials and to obtain a sharp estimate of the localization rate of the quasi-periodic breathers, the proof of the result uses the Jackson-Moser-Zehnder analytic approximation technique but with refined estimates on error bounds, depending on the smoothness and dimension, which provide crucial controls on the convergence of KAM iterations.