

Quasi-Periodic Breathers for Klein-Gordon Chains and Discrete Nonlinear Schrödinger Equations with Quasi-Periodic Potential

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Abstract

We study whiskered quasi-periodic breathers for nonlinear Klein-Gordon chains with tangent potential or Maryland potential. Remarkably, nonlinear Klein-Gordon chains not only lose gauge invariance of the perturbation, but also they have infinite normally-hyperbolic directions. Using orthogonal transformation technique of linear operator and Kolmogorov-Arnold-Moser(KAM) iteration mechanism together with decay property of perturbation, we obtain the whiskered quasi-periodic breathers with positive measurable subset of spatial parameter. We also investigate multi-dimensional, discrete nonlinear Schrödinger equations, which carry quasi-periodic, analytic potentials(non-constant) with general form. By using KAM approach, the nonlinear Schrödinger equations with small perturbations admit the existence of small-amplitude quasi-periodic solutions.