

Solitary waves in irregular lattice media

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Solitary waves (also called solitons) are localized modes that propagate in nonlinear media while maintaining their shape. They arise in many branches of physics, have important engineering applications, and exhibit fascinating mathematical properties. Lattice solitons are solitons in media that have lattice-type inhomogeneities. Almost all studies of lattice solitons assume perfect regular periodic lattices. In this work I will show that solitons can be computed for the two-dimensional nonlinear Schrodinger (NLS) equation with a-periodic external potentials, which correspond to lattices with vacancy defects, edge dislocations, and quasicrystal structure. The propagation and stability of these solitons is studied by direct numerical simulations of the NLS.