
Lattice systems with frontiers possessing contrasting periodicity: wave scattering and transmission

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Abstract

We consider wave scattering in discrete systems by boundaries and interfaces whose periodicity, elastic and inertial properties differ from those used in composing the interior of the system. We focus on the anti-plane motion of a discrete system represented by a square cell lattice formed from periodically placed masses interconnected by elastic rods. In particular, we derive the Green's function for a lattice half-plane and dissimilar lattice with an N-periodic boundary and interface, through the application of the Fourier transform. Special attention is given to the case of lattices with diatomic boundaries and interfaces in numerical simulations. These demonstrate the effectiveness of our approach and illustrate how different dynamic regimes that can be realised through tuning contrast in the inertial and elastic properties of the system.

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