Analytical investigation of 2D phononic crystals with imperfect interface

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Abstract

A numerical simulation based on the boundary element method has been proposed to investigate the propagation of acoustic and elastic waves in the phononic crystals with imperfect interfaces. The interface spring model is introduced to simulate the interface conditions between the host material and scatter. According to the periodic boundary conditions and interface conditions, a linear eigen-value equation can be obtained, and therefore the relationship between the wave-vector and frequencies can be derived. The effects of interface spring stiffness, volume ratios, and the shape of the scatter on the band gap have been analyzed. From analytical investigation, it can be concluded that the interface imperfection has a significant effect on the wave's propagation behavior in the phononic crystals.