Simulating Transmission Properties on Metamaterials Surfaces by A Localized
Extrinsic Collocation Method

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Abstract

In this study, the simulating transmission properties of metamaterial-like structures on surfaces are investigated, which can be controlled artificially to obtain certain periodic structures with specific bandgap. The targeted band structures, transmission spectra, and displacement amplitude distributions can be calculated by adjusting various lattice forms, scatterer shapes, dimension and periodic of unit cell. For metamaterial-like structures analysis on smooth surfaces of codimension one embedded in 3D space, the PDEs on surfaces are considered to solve. The Laplace-Beltrami, and the surface gradient operators in tangent space can be expressed as the extrinsic form, then solved by a meshless collocation method in Euclidean space. In addition, the truncated treatments are introduced to deal with the infinite domain.

Key words: Surface operators, periodic structures, truncated treatments, meshless method,