
Achieving negative reflection

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Abstract

The possibility to govern mechanical wave propagation opens the possibility to build devices that can protect region from dangerous excitations or harvest the energy in particular regions.

Here, we give demonstration of negative reflection in a simple mechanical system. The transmission problem in a linear elastic homogeneous medium with a grating interface composed of a regular square distribution of circular pinned inclusions is studied.

The conditions for which an oblique incident anitplane shear wave impinging the interface with an angle

θ_I is quasi totally reflected with a negative reflection angle

$\theta_R < 0$ are derived and discussed. They are deduced from the combined analysis of dispersion properties of the interface grating and the homogeneous matrix; while the amount of reflection is obtained in term of relative power flux, computed from a numerical analysis with an imposed incident gaussian beam.

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