Energy harvesting elastic edge waves via the topological rainbow effect

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Abstract

This work is about the topological beam splitting for surface elastic waves and eventually, the challenge is to get a topological rainbow effect in order to localise symmetry protected edge waves. We combine two different fields, topological physics and metamaterials to design a topological metasurface, in order to control and redirect elastic waves. We strategically design a two-dimensional crystalline perforated elastic plate that hosts symmetry-induced topological edge states. By concurrently allowing the elastic substrate to spatially vary in-depth, we are able to convert the incident slow-wave into a series of robust modes, with differing envelope modulations. This adiabatic transition localises the incoming energy into a concentrated region where it can then be damped or extracted.

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