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Soft-mode and Anderson-like localization in two-phase disordered media (EDMOND) TINGTAO ZHOU, California Institute of Technology Caltech, DIMITRIOS FRAGGEDAKIS, FAN WANG, Massachusetts Institute of Technology — Wave localization is ubiquitous in disordered media – from amorphous materials, where soft-mode localization is closely related to materials failure, to semiconductors, where Anderson localization leads to metal-insulator transition. Our main understanding, though, is based on discrete models. Here, we provide a continuum perspective on the wave localization in two-phase disordered elastic media by studying the scalar wave equation with heterogeneous modulus and/or density. At low frequencies, soft modes arise as a result of disordered elastic modulus, which can also be predicted by the localization landscape. At high frequencies, Anderson-like localization occurs due to disorder either in density or modulus. For the latter case, we demonstrate how the vibrational dynamics changes from plane waves to diffusons with increasing frequency. Finally, we discuss the implications of our findings on the design of architected soft materials.

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