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Numerical modeling of anisotropic effective moduli of media with microcrack damage DAN SU, MICHAEL SANTARE, University of Delaware, GEORGE GAZONAS, U.S. Army Research Laboratory — A generalized self-consistent method (GSCM) is used to calculate the anisotropic effective moduli of a medium containing damage consisting of microcracks with an arbitrary degree of alignment. Computational finite element methods are also used to determine the anisotropic effective moduli of the damaged medium and are found to be in excellent agreement with those determined using the GSCM. Since cracks respond differently under tension and compression, the moduli under both types of loads are evaluated and shown to be significantly different. Computational finite element methods are used to investigate the influence of crack face contact and friction on the resulting effective moduli of the medium. If the crack faces are frictionless, a particular medium under tensile loads can be anisotropic while the same material is isotropic when compressive loads are applied. As a result, waves propagating through the medium under different loading conditions will show different wave speeds. Several examples are shown in the presentation.

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