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**Numerical Calculation of Nonlinear Seismic Pulse Propagation in a Hysteretic Elastic Material** DAN KOSIK, Butler University — The stress-strain relation for materials such as soil and sand exhibit hysteretic elastic behavior and are modeled using the Preisach-Mayergoyz method for a numerical calculation of a propagating seismic pulse. The source pulse is taken to be the result of pressure applied to the inner surface of a cylindrical cavity in order to simulate a two dimensional dynamite source. The nonlinear differential equation of motion that is solved includes traditional nonlinear elasticity terms appropriate to materials with atomic elasticity and the dominant anelastic terms appropriate to consolidated materials that exhibit hysteretic elastic behavior. For parameters characteristic of sand at the Earth's surface, a comparison of nonlinear to linear seismic pulse propagation gives a nonlinear pulse with a much larger amplitude and slower propagation speed than a corresponding linear pulse. These results have important implications for the detailed behavior of strong seismic waves moving in soft sediments, their dominant frequencies, amplitudes, and methods by which they may be attenuated will depend on getting the detailed pulse structure right.

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