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Nonlinear Waves in Elastic Solids

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Using a weakly nonlinear perturbation method we derive evolution equations for the amplitudes of nonlinear elastic waves. We obtain some new asymptotic models like e.g. the complex Burgers equation describing the propagation of amplitudes of quasi-shear waves along the diagonal of a cube in a cubic crystal. We also study wave interactions by deriving new formulas for the interaction coefficients, calculating the coefficients explicitly and analyzing them. These new formulas are used in the formulation of a condition which assures global existence of a classical solution to the initial-value problem of nonlinear elastodynamics equations.

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