

Continuum mechanics with Eulerian formulations of constitutive equations

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Abstract

This course will review basis Cartesian tensor analysis, nonlinear kinematics of a continuum, the balance laws, invariance under superposed rigid body motions, and a definition of the rate of material dissipation within the context of the purely mechanical theory. Constitutive equations for nonlinear elastic solids are discussed, contrasting the Lagrangian and Eulerian formulations. Constitutive equations are presented for rate-independent and rate-dependent materials with a smooth elastic-inelastic transition. Also, robust, strongly objective numerical algorithms are discussed for integrating the evolution equations for inelastic response.