FSM3S_11140

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Constitutive Equations of Mesoelastic Deformation

Lev Steinberg

Department of Mathematics, University of Puerto Rico, Mayaguez, USA

We study deformations of mesoelastic materials that display different types of imperfections with a typical size of 1μm. Stress-strain relationships of these materials depend on the processing history and exhibit common behaviour, including non-linearity, hysteresis, etc. We focus our study on the continuous distribution of singularities in the deformation field, which are described in terms of dislocation densities and fluxes. We define the mass mesodensity tensor and deduce the constitutive relationship between the dislocation current and the linear mesomomentum. Based on the modification of Peach-Koehler formula we propose the constitutive relationship between the line mesostress tensor and the dislocation density. These constitutive relationships allow us to model stresses in mesoelastic materials.

View the extended summary