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Numerical Investigation of Dynamic Shear Bands in Inelastic Solids as a Problem of Mesomechanics

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The main objective of the present paper is the numerical investigation of dynamic shear bands in inelastic solids during impact–loaded adiabatic processes. An idea of this investigation has been inspired by recent experimental observations performed by Guduru, Rosakis and Ravichandran, *Mechanics of Materials* **33** (2001), 371–402. Their experimental work has brought deep understanding of the initiation and propagation characteristics as well as temperature field evolution of dynamic shear bands in C 300 maraging steel. A photograph of an arrested shear band in the specimen showed that the thickness of the band is about 40 μm (so it is mesoscale size range). Utilizing the finite element method and ABAQUS system for regularized thermo–elasto–viscoplastic constitutive model the numerical investigation of dynamic shear band propagation in an asymmetrically impact–loaded prenotched plate is presented. We idealize the initial boundary value problem investigated experimentally by assuming the velocity boundary condition and different material of the specimen (HY–100 steel). Shear band advance, shear band velocity and the development of the temperature field as a function of time have been determined. Qualitative comparison of numerical results with experimental observation data has been presented.

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