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Analysis of Evolving Deformation Microstructures in Instable Inelastic Solids Based on Energy Relaxation Methods

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An incremental variational formulation for the constitutive response of dissipative materials is applied to the stability analysis of inelastic solids. The material stability is governed by weak convexity properties of an incremental potential obtained from a local minimization problem. As a result of instability deformation microstructures develop and are resolved by energy relaxation methods. We develop relaxation analyses in terms of rank–one–convexifications and investigate the effect of different orders of lamination on the response of the material and the microstructures. The talk also points out the physical relevance of the pattern and the evolution of the microstructures obtained from abstract mathematical relaxation analysis. Furthermore a comperative study on specific laminate type microstructures with fixed orientation, which have a physical relevance for specific problems, is investigated.

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