Anand, L.; **Kothari, M.**

A computational procedure for rate-independent crystal plasticity. (English) Zbl 1054.74549

J. Mech. Phys. Solids 44, No. 4, 525-558 (1996).

Summary: In the rate-independent theory of crystal elasto-plasticity there have been three long-standing problems. The first is to determine which slip systems are active, and the second is to determine the increments of shear on the active slip systems. Third, because of the typical multiplicity of slip systems in ductile crystals, the selection of slip systems required to produce an arbitrary deformation increment is not necessarily unique. The purpose of this paper is to present a robust calculation scheme which determines a unique set of active slip systems and the corresponding shear increments in a rate-independent theory. We show by comparing the predictions from our computational procedure for the rate-independent theory against corresponding predictions from a procedure for a similar but rate-dependent theory (with a low value of the rate sensitivity parameter) that the results from the two procedures are essentially indistinguishable.

MSC:

74E15 Crystalline structure
74C15 Large-strain, rate-independent theories of plasticity (including nonlinear plasticity)
74S99 Numerical and other methods in solid mechanics

Software:

ABAQUS

Full Text: DOI

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