Numerical Implementation of Directional Distortional Hardening Models for Metal Plasticity

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ABSTRACT

The presented work gives a thorough insight into numerical implementation of several models of plasticity with directional distortional hardening published by Feigenbaum and Dafalias [1]. The effect of oriented distortion reflects well documented phenomena of various shape evolution and reorientation of the elastic region boundary during kinematic hardening.

Explicit as well as implicit schemes, based on the procedure presented in [2], were implemented and subsequently tested for stability and compared on efficiency. Emphasis was put on generation of high resolution error maps searching for cumulation of error and possible image discontinuities or violation of uniqueness.

In special cases the behavior of the models deserved a deeper examination, where the evolution of internal variables required very fine subincrementation caused either by the property of the kinematic laws or by an unsuitable set of parameters. Ensuring the convexity of the yield surface, as shown in [3], plays a vital role in guaranteeing convergence. Analysis of various return mapping procedures for explicit schemes with correctors was also performed.

REFERENCES

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