Strain Localization in Three-Invariant Plasticity Models with Isotropic and Kinematic Hardening

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Strain localization, such as the formation of shear and compaction bands, is an important deformation mechanism in geotechnical structures, and often leads to dramatic failure.

Localized deformation modes are related to the overall constitutive behavior of the material, which can be quite complex. Tamagnini et al. (2002) and Borja et al. (2003) have developed efficient methods for the implicit implementation of general three-invariant models with isotropic hardening using a principal-stress decomposition. We extend this algorithm to models that employ both isotropic and kinematic hardening.

The onset of localization is tracked using the bifurcation condition, the appearance of a zero eigenmode in the acoustic tensor. Using constitutive models that include kinematic hardening, we attempt capture localization behavior in reverse loading.

References

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