MODELING STRAIN LOCALIZATION IN GEOMATERIALS USING A STRONG DISCONTINUITY APPROACH WITH RATE- AND STATE-DEPENDENT FRICTION

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Understanding and modeling the phenomenon of strain localization has long been of interest to those who study geologic materials. With the intense straining across a narrow area and the associated loss of strength, it is important both for capturing the deformation and 'failure' of geotechnical structures.

One approach to modeling strain localization within the finite element context is the strong discontiuty approach using an enhanced strain element [1]. Previous work within this approach has used a constant friction angle. However, slip mechanisms in geological structures have been shown to be influenced by friction angles that change with varying slip speed as well as the state of the material, including wear and healing along the surfaces. A model that captures these behaviors, developed by Dieterich and Linker [2], among others, is embedded in the enhanced strain element. Numerical examples are presented to show the effect of the friction model on the post-bifurcation response of geotechnical structures.

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References

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