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Shear Band Insertion for Capturing Strain Localization JONATHAN MARGRAF, Lawrence Livermore Natl Lab — The localization of shear strain into narrow bands is a common failure mechanism under dynamic loading, and we present an approach to capture this behavior in a numerical framework. The approach employs a mixture theory for embedding the band material. An iterative solver for traction balance is used, and this strategy for treating material interfaces has advantages across a wider class of problems. The traction balance methodology solves the appropriate compatibility and stress equilibrium conditions between the shear band and the bulk material within a given computational zone. The propensity for strain localization thus affects the macroscopic behavior of the zone without the need to fully discretize the shear band's geometric features that are often on the scale of micrometers. For general loading scenarios, the code must be able to detect elements in which shear bands might form and the orientation of such bands. A novel shear band insertion approach has been developed for this task. Example applications of the traction balance methodology coupled with shear band insertion will be shown. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 (LLNL-ABS-768682).

Jonathan Margraf
Lawrence Livermore Natl Lab

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