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Numerical Analysis of Nonlocal Anisotropic Continuum Damage

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The presentation deals with nonlocal anisotropic continuum damage in ductile metals. The model relies on the introduction of metric transformation tensors. The kinematic description employs the consideration of damaged as well as fictitious undamaged con-figurations related via metric transformation tensors which allow for the interpretation of damage tensors. A nonlocal yield condition and a nonlocal damage criterion are in-troduced which lead to a system of partial differential equations which are solved using the finite difference method. Since this requires no additional boundary conditions, the displacement-based finite element procedure is governed by the standard principle of virtual work. Numerical simulations of the elastic-plastic deformation behavior of dam-aged solids demonstrate the efficiency of the formulation. Large strain damage-elastic-plastic problems including severe localization are presented and the influence of various model parameters on the prediction of the deformation and localization of ductile metals is discussed.

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