Abstract Submitted
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Spontaneous shear localization in a model brittle solid[1] CRAIG E. MALONEY, MARK O. ROBBINS, Physics and Astronomy, Johns Hopkins — A better understanding of the failure of brittle materials is practically important in situations ranging in scale from nano-indentation to earthquake physics. Recent discrete models of this failure focused on geometries such as uniaxial tension or anti-plane strain where creation of free surfaces dominates. They are not appropriate for modeling the formation of shearing systems where frictional sliding of material in intimate contact and plastic deformation are important. We present results on a novel approach which introduces damage directly into particle based simulations. When loaded, the model exhibits a period of bursts of spatially correlated damage accumulation followed by a period of catastrophic weakening during which a geometrically complex through-going fault network forms, strikingly reminiscent of both laboratory experiments and geophysical observations at the field scale. We will discuss: spatial correlations in damage, evolution of the geometry of the fault system, and the dependece on confining pressures.

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