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Finite element based micromechanical modeling of brittle materials under compressive loading REUBEN KRAFT, The Johns Hopkins University, JEAN-FRANÇOIS MOLINARI, Ecole Normale Superieure de Cachan, K.T. RAMESH, The Johns Hopkins University — The performance of brittle materials is tightly linked to damage mechanisms at microstructural length scales. Thus, robust micro-level models are needed to adequately describe macro-level performance for materials many times subjected to extreme loading conditions. With a focus on brittle failure under compressive loading, this presentation discusses the results of a numerical framework designed to model damage evolution at the microstructural level. A two-dimensional plane strain finite element model has been developed in which intergranular cracking is explicitly modeled using cohesive interfaces with well-characterized material parameters and an optimized contact algorithm. Effects of confinement, friction, strain rate, and spatial distribution of flaws on the macroscopic strength will be presented. In addition, the inhomogenity of damage evolution is observed through use of the microstructure's dual graph providing valuable insight into the damage process.

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