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Statistical modeling of athermal micromechanical yielding in amorphous solids and mean-field approaches STEFANOS PAPANIKOLAOU, Johns Hopkins University — We investigate the micromechanical properties of non-equilibrium yielding under stress of an amorphous solid, modeled in terms of shear-transformation zones. First, we investigate in detail the possible mean-field limits of such models and their capacity to capture the character of the original micromechanical model. For this purpose, we utilize exact as well as numerical solutions. Second, we study the dynamical features of such models when short-time relaxation effects (induced by beta-relaxation modes) are incorporated in simple ways: we demonstrate that shear-banding and stick-slip serrated plastic flow are generic outcomes of such features. Finally, we discuss the relation of this mechanism with the self-induced stochastic resonance effects in non-linear dynamical systems.

Stefanos Papanikolaou
Johns Hopkins University

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