Elastoplastic models of relaxation, deformation and creep in disordered materials

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In this talk I will review a description of deformation in disordered materials based on the notion that this deformation is based on a combination of local irreversible events (often described as "shear transformations") that interact through elastic interactions, leading to a complex collective behavior. A number of features observed in the rheology and relaxation of gels and emulsions can be understood from the study of simple lattice models that incorporate this scenario, either within a numerical implementation or in a simplified mean field version. I will discuss in particular:

- The relation between elastic interactions and compressed exponential relaxation [1].

- Factors that lead to permanent strain localisation and fracture [2–4].

- The statistics of stress drops at very low strain rates [5].

- The description of creep behavior using a simplified mean field description [6].

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