

Micro-to-macro homogenization for elasto-plasticity driven by dislocation motion

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The homogenization problem in elasto-plasticity concerns the passage from discrete to fields of dislocations. While much consensus exists on what the physical laws are for the individual dislocations, it is not clear - and in fact one of the most pressing open problems of solid mechanics - how to formulate laws for the movement of dislocation fields and the corresponding elasto-plastic effects. I will present some recent results showing that in a prototypical model of small-strain, geometrically linear plasticity in single crystals and with rate-independent dynamics, such a homogenization procedure from discrete dislocation lines to dislocation fields can indeed be carried out.