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Homogenization of time-dependent systems of dislocations

Abstract

It is well known that plastic, or permanent, deformation in metals is caused by the concerted movement of many curve-like defects in the crystal lattice, called dislocations. What is not yet known is how to use this insight to predict behaviour at continuum scales. In this talk I will present a rigorous upscaling result for a discrete system of moving edge dislocations in two dimensions with slip-plane confinement. In the continuum limit we obtain an evolution law for the dislocation density. This is a joint work with Mark A. Peletier (Eindhoven) and Lucia Scardia (Bath).