

Singular kernels, multiscale decomposition of microstructure, and dislocation models

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Abstract: We consider a model for dislocations in crystals introduced by Kosłowski, Cuitiño and Ortiz, which includes elastic interactions via a singular kernel behaving as the $H^{1/2}$ norm of the slip. We obtain a sharp-interface limit of the model within the framework of Γ convergence. From an analytical point of view, our functional is a vector-valued generalization of the one studied by Alberti, Bouchitté and Seppecher to which their rearrangement argument no longer applies. Instead we show that the microstructure must be approximately one-dimensional on most length scales and exploit this property to derive a sharp lower bound.

This is joint work with S. Conti and A. Garroni.