

On the motion of curved dislocations in three dimensions: Simplified linearized elasticity

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In this talk we discuss a simplified equilibrium problem for a curved dislocation line in a three-dimensional domain. As the core radius tends to zero, we derive an asymptotic expression to characterize the induced elastic energy. We then obtain the force on the dislocation line as the variation of this expression and identify the highest order terms explicitly. As a main ingredient, we present an explicit asymptotic formula for the induced elastic strain which depends on the curvature of the dislocation line and thus highlights the difference to existing work on straight dislocation lines. Eventually, we present results on the corresponding dynamics. The presented methods are a blueprint for the more physical setting of linearized isotropic elasticity.

This is joint work with I. Fonseca and S. Wojtowytsch.