Alvarez, O.; **Cardaliaguet, P.**; **Monneau, R.**

Existence and uniqueness for dislocation dynamics with nonnegative velocity. (English)

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The authors study the new model of dislocation dynamics in crystals suggested in [*D. Rodney, Y. Le Bouar* and *A. Finel*, "Phase field methods and dislocations", Acta Mater. 51, 17–30 (2003)]. In this model the dislocation line in the crystal moves in its slop plane with a normal velocity, proportional to the acting on this line Peach-Koehler force, which may have two possible contributions.

The first one is the self-force created by the elastic field generated by the dislocation line itself; the second one is the force created by everything exterior to the dislocation line, like the exterior stress applied to the material, or the force created by other defects. Mathematically this model is presented by a geometric and nonlocal eikonal equation not preserving the inclusion. In the framework of discontinuous viscosity solutions an existence and uniqueness theorem is proved. It is shown that the solution satisfies some variational properties, allows to prove the nonincreasing of the energy associated to the dislocation dynamics.

Reviewer: Boris V. Loginov (Ul'yanovsk)

MSC:

35Q72	Other PDE from mechanics (MSC2000)
74N20	Dynamics of phase boundaries in solids
49L25	Viscosity solutions to Hamilton-Jacobi equations in optimal control and differential games

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