Global BV Solution for a Non-Local Coupled System Modeling the Dynamics of Dislocation Densities

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Abstract

In this work, we study a non-local coupled system arising in modeling the dynamics of dislocation densities in crystals. For this system, the global existence and uniqueness are available only for continuous viscosity solutions. We investigate the global time existence of this system by considering BV initial data. Based on a fundamental uniform BV estimate and the finite speed of propagation property of this system, we show, in a particular setting, the global existence of discontinuous viscosity solutions of this problem.

Keywords: Hamilton-Jacobi system, non-local Eikonal system, non-local transport system, BV estimate, discontinuous viscosity solution, dislocation dynamics.