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Abstract

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How the least action principle for Hamiltonian PDEs can be modified to handle dissipative phenomena

A prototype for our discussion is the inviscid Burgers equation. It is well known that the Cauchy problem is well-posed in the class of "entropy" (Kruzhkov) solutions. Typically, entropy solutions become singular in finite time and dissipate energy. They cannot be recovered from the classical least action principle which rules out any dissipation of energy. We show how the action can be modified in order to recover entropy solutions. This work is motivated by the EUR (early universe reconstruction) problem in cosmology, which amounts to minimizing a suitable action for a pressure less gravitational Euler-Poisson model in which dissipative concentration effects have to be taken into account.
