

# HAMILTONIAN INCLUSIONS WITH CONVEX DISSIPATION WITH A VIEW TOWARDS APPLICATIONS\*

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## Abstract

We propose a generalization of Hamiltonian mechanics, as a Hamiltonian inclusion with convex dissipation function. We obtain a dynamical version of the approach of Mielke to quasistatic rate-independent processes. Then we show that a class of models of dynamical brittle damage can be formulated in this setting.

**MSC:** 34G25; 70H05; 74R05

**keywords:** Hamiltonian methods; nonlocal damage; convex dissipation

## 1 Introduction

We are interested in the modification of the Hamiltonian formalism by adding the subdifferential of a convex dissipation function. In the Lagrangian formalism this can be traced back to Rayleigh and Kelvin (cf. Thomson and Tait [28] or Chetayev [11]). For the case of autonomous Hamiltonian systems with a Rayleigh dissipation function added see the paper of Bloch,

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