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# GLOBAL EXISTENCE OF A DIFFUSION LIMIT WITH DAMPING FOR THE COMPRESSIBLE RADIATIVE EULER SYSTEM COUPLED TO AN ELECTROMAGNETIC FIELD

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*Dedicated to the memory of Professor Marek Burnat*

Abstract. We study the Cauchy problem for a system of equations corresponding to a singular limit of radiative hydrodynamics, namely the 3D radiative compressible Euler system coupled to an electromagnetic field through the MHD approximation. Assuming the presence of damping together with suitable smallness hypotheses for the data, we prove that this problem admits a unique global smooth solution.

## 1. Introduction

In [4], following the study of Buet and Després [5] we considered a singular limit for a compressible inviscid radiative flow. The motion of the fluid was governed by the Euler system with damping for the evolution of the density $\varrho = \varrho(t,x)$, the velocity field $\overrightarrow{u} = \overrightarrow{u}(t,x)$, and the absolute temperature $\vartheta = \vartheta(t,x)$ as functions of the time $t$ and the Eulerian spatial coordinate $x \in \mathbb{R}^3$. A damping term was added to the momentum equation. We proved that the

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