A hyperbolic theory of relativistic conformal dissipative fluids

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ABSTRACT

We develop a complete description of the class of conformal relativistic dissipative fluids of divergence form, following the formalism carried out by Geroch and Lindblom in the early 90's. These theories are described in terms of evolution variables whose dynamics is governed by total divergence-type equations. More specifically, we give a characterization of the whole family of conformal fluids in terms of a single master scalar function up to second order in dissipative variables. We identify the equilibrium states of the theory, and derive the corresponding constitutive relations, as well as a Fourier-like law for heat conduction. Finally, we prove that these type of theories is symmetric hyperbolic, implying that, under certain algebraic conditions, there exists a well posed initial value problem for the evolution equations.

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