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, Lindblom and Pennisi. This type of theories is fully described in terms of evolution variables whose dynamics is governed by total divergence-type conservation laws. Specifically, we give a characterization of the whole family of conformal fluids in terms of a single master scalar function defined up to second order corrections in dissipative effects, which we explicitly find in general form. This allows us to identify the equilibrium states of the theory, as well as to derive constitutive relations and a Fourier-like law for the corresponding first-order theory heat flux. Finally, we show that among this class of theories-- and near equilibrium configurations-- there exist symmetric hyperbolic ones, implying that for them one can define well posed initial value problems.