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Stability of Israel-Stewart theory in the presence of heat flow

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In this contribution we investigate the properties of the complete Israel-Stewart equations when perturbed around a global equilibrium state. Such analyses have been previously performed including only the effects of the shear-stress tensor and/or bulk viscous pressure and only using the simplified Israel-Stewart equations (which do not include any second order terms, except the one related to the time derivative of the dissipative current). In our studies, we include for the first time the effects of heat flow and study the consequences of the (linear) second order terms that couple the shear stress tensor to the heat flow 4-current. We show that such terms can affect the stability of the theory in the linear regime and find certain bounds that the transport coefficients associated with such terms have to satisfy. Consequences to the fluctuation-dissipation theorem will also be discussed.

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