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Transport coefficients for bulk viscous evolution in the relaxation-time approximation

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"We derive the form of the viscous corrections to the phase-space distribution function due to bulk viscous pressure and shear stress using the iterative Chapman-Enskog method. We then calculate the transport coefficients necessary for the second-order hydrodynamic evolution of the bulk viscous pressure and the shear stress tensor. We demonstrate that the transport coefficients obtained using the Chapman-Enskog method are different than those obtained previously using 14-moment approximation for finite particle mass. Specializing to the case of boost-invariant and transversally homogeneous longitudinal expansion, we show that the transport coefficients obtained using the Chapman-Enskog method result in better agreement with the exact solution of the Boltzmann equation compared to results obtained in the 14-moment approximation. Finally, we demonstrate that, within second-order viscous hydrodynamics, the inclusion of the full set of kinetic coefficients, particularly the shear-bulk couplings, is necessary to properly describe the time evolution of the bulk pressure.

Talk based on:
A.Jaiswal, R.Ryblewski, M.Strickland, arXiv:1407.7231, submitted to PRC
G.S. Denicol, W.Florkowski, R.Ryblewski, M.Strickland, arXiv:1407.4767, accepted to PRC"

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