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A calculation of transport coefficients in 2-nd order hydrodynamics

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Based on the Nakajima-Zubarev type non-equilibrium density operator, we derive a 2-nd order hydrodynamic equation. Microscopic Kubo-formulas for all coefficients in the equation are systematically obtained. Coefficients βi and αi in the Israel-Stewart equation are given as current-weighted correlation lengths which are to be calculated in statistical mechanics. We also numerically evaluate the coefficients by using a hadro-molecular simulation and discuss the temperature dependences and the baryon number density dependences.

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