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## Perturbative calculation in 1+1 dimensional relativistic viscous hydrodynamics

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We discuss the evolution of the fluctuation in the initial conditions of entropy densities (energy densities) using 1+1 dimensional hydrodynamic calculations. We explore not only the evolution of the fluctuation but also the origin of it. If the local thermal equilibrium is established at early time of the heavy ion collision and the mean free path of produced particles is sufficiently short, then the later evolution of the system may be described by relativistic hydrodynamics. Most of studies have been performed with ideal hydrodynamics, but it is necessary to take into account of viscosity effect in hydrodynamical expansion to understand experimental data in detail. In particular, we focus on the dynamics along the collision axis and investigate how the viscous effects appear in evolution of the fluctuation in the framework of perturbation with respect to the bulk and shear viscosities. Assuming that the bulk and shear viscosities are small we calculate the entropy production during hydrodynamic evolution and the initial condition dependence of it. Here we use the Bjorken's solution for the ideal part (0th-order) in our perturbative approach and show detail calculated results.

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