Contribution ID: **12** Type: **not specified**

Effect of Coriolis Force on Shear Viscosity : A Non-Relativistic Description

Wednesday, 18 October 2023 15:30 (20 minutes)

We have addressed that during the transition from zero to finite rotation picture, a transition from isotropic to anisotropic nature of shear viscosity coefficients can be found due to Coriolis force as expected due to Lorentz force at a finite magnetic field in earlier studies on the topics of relativistic matter like quark-gluon plasma. We have done it for non-relativistic matters for simplicity, with a future proposal to extend it towards a relativistic description. Introducing the Coriolis force term in relaxation time approximated Boltzmann transport equation, we have found different effective relaxation times along the parallel, perpendicular, and Hall directions in terms of actual relaxation time and rotating time period. Comparing the present formalism with the finite magnetic field picture, we have shown the equivalence of roles between the rotating and cyclotron time periods, which define the rotating time period as the inverse of 2 times angular velocity.

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Session Classification: Section 1