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Kinetic theory based expressions of five shear viscosity components in presence of a magnetic field

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After getting two remarkable scientific upgrades of quark-gluon plasma (QGP) physics - lowest viscous nature and strong magnetic field production, viscous properties of QGP in a strong magnetic field become one of the important matters of research. Instead of one isotropic shear viscosity, as we get in absence of magnetic field, five different components of shear viscosity $\tilde{\eta}_n (n = 0, .., 4)$ can appear due to magnetic fields \[Physical kinetics, Volume 10\]. In the previous decade, Xu-Guang Huang et al. introduced another set of five shear viscosity components η_n. P. Mohanty et al. \[Eur. Phys. J. A 55, 35 (2019)\] in kinetic theory approach and G.S. Denicol et al. \[Phys.Rev.D 98, 076009 (2018)\] in Grad's moment method, provided the expressions of $\tilde{\eta}_n$ and η_n respectively. We \[Pramana 95,125 (2021)\] have explored both sets in a common framework, based on the kinetic theory approach. From the interconnecting relations between them, we have pointed out three physically relevant components - parallel, perpendicular, and Hall, which are conventionally considered in the ADS/CFT calculations \[Phys.Rev.D 90, 066006 (2014)\] and in the calculations for anisotropic unitary Fermi gas \[Phys. Rev. A 96, 053601 (2017)\]. These components are estimated \[Int.J.Mod.Phys.E 30, 06, 2150044 (2021)\] for QCD matter in the entire temperature and magnetic field domain of experimental QGP by mapping LQCD data \[Phys.Rev.D 86, 071502(R) (2012)\], which unfolded the inverse magnetic catalysis phenomena near the quark-hadron phase transition.

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