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Numerical Simulation of Anomalous Hydrodynamics

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Anomaly induced transport effects, like the Chiral Magnetic Effect or the Chiral Separation Effect, have recently attracted much attention and are expected to be observed in ultra-relativistic heavy-ion collisions. So far, the evidence in the experiments has been elusive, mainly due to the lack of quantitative theoretical predictions. In order to asses the contributions from anomalous transport in heavy-ion collisions, we consider a hydrodynamic model in the presence of anomaly. We numerically solve the anomalous hydrodynamic equations under a background electromagnetic field and calculate the propagation of the chiral magnetic wave in an expanding quark-gluon plasma. The charge-dependent elliptic flow $(v_2^{\pm})$ is recently proposed as a signal of the chiral magnetic effect. We calculate the charge-dependent particle distributions and estimate the contribution from anomaly to $v_2^{\pm}$.

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