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Anomalous Magnetohydrodynamics with finite conductivity and chiral magnetic effect

Summary

We study relativistic magnetohydrodynamics with longitudinal boost invariance in the presence of chiral magnetic effects and finite electric conductivity. With initial magnetic fields parallel or anti-parallel to electric fields, we derive the analytic solutions of electromagnetic fields and the chiral number and energy density in an expansion of several parameters determined by initial conditions. The numerical solutions show that such analytic solutions work well in weak fields or large chiral fluctuations. We also discuss the properties of electromagnetic fields in the laboratory frame.

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