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**Kinetic formulation and global existence for the Hall-magneto-hydrodynamics system.** (English) [Zbl 1251.35076](#)

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**Summary:** This paper deals with the derivation and analysis of the the Hall Magneto-Hydrodynamic equations. We first provide a derivation of this system from a two-fluids Euler-Maxwell system for electrons and ions, through a set of scaling limits. We also propose a kinetic formulation for the Hall-MHD equations which contains as fluid closure different variants of the Hall-MHD model. Then, we prove the existence of global weak solutions for the incompressible viscous resistive Hall-MHD model. We use the particular structure of the Hall term which has zero contribution to the energy identity. Finally, we discuss particular solutions in the form of axisymmetric purely swirling magnetic fields and propose some regularization of the Hall equation.

**MSC:**

[35Q35](#) PDEs in connection with fluid mechanics  
[35D30](#) Weak solutions to PDEs  
[35L60](#) First-order nonlinear hyperbolic equations  
[76W05](#) Magnetohydrodynamics and electrohydrodynamics

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**Keywords:**

Hall-MHD; kinetic formulation; entropy dissipation; generalized ohm's law; incompressible viscous flow; resistivity; global weak solutions; KMC waves

**Full Text:** [DOI](#) [arXiv](#)