

## Vacuum free boundary problems in ideal compressible MHD

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In this talk we first discuss the different plasma-vacuum interface problems of ideal Magneto-Hydrodynamics for incompressible or compressible fluids. Then we focus on the plasma-vacuum interface problem for ideal relativistic Magneto-Hydrodynamics (RMHD) in three-dimensional Minkowski spacetime. The plasma flow is governed by the two-dimensional RMHD equations, while the vacuum magnetic and electric fields satisfy the Maxwell's equations. The plasma and vacuum magnetic fields are tangential to the interface; this renders a nonlinear hyperbolic free boundary problem with the boundary being non-uniformly characteristic. We prove the local-in-time existence and uniqueness of solutions for this nonlinear free boundary problem, provided that the plasma and vacuum magnetic fields do not vanish simultaneously at each point of the initial interface. This is a joint work with Y. Trakhinin (Novosibirsk) and T. Wang (Wuhan).

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