

An Integrated Study of Modeling, Discretization and Preconditioning for Magnetohydrodynamics

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I will report some recent works on structure-preserving and stable discretization of magnetohydrodynamics and robust preconditioning methods for the resulting algebraic systems. In particular, judging from theoretical and/or numerical analysis of several mathematical models for magnetohydrodynamics (MHD) which involve the coupling of Navier-Stokes with Maxwell equations, I will argue that some more complicated models may be easier to simulate than some simplified models that have been often used in practice.