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Carlos Palenzuela*, palen@cita.utoronto.ca. *Hyperbolic-relaxation systems in Astrophysics: going beyond ideal MHD.*

Hyperbolic systems with relaxation terms appears naturally in many astrophysical scenarios involving matter fields. Depending on the nature of the stiff terms, these systems can be solved in a straightforward way by using the Implicit-Explicit (IMEX) Runge-Kutta time integrators. In this talk I will describe the General-Relativistic Resistive Magnetohydrodynamics (GR-RMHD) equations, a very common hyperbolic-relaxation system in astrophysics, and how to exploit the properties of the IMEX Runge-Kutta methods to deal with the stiffness of the electric current. The implementation is verified by using tests in 1D, 2D and 3D, showing that the method is robust and recovers the ideal-MHD limit in regimes of very high conductivity. Moreover, the results illustrate that the code is capable of describing physical setups in all ranges of conductivities. (Received July 09, 2012)