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Open boundary conditions for dissipative MHD[1] ERIC MEIER, U. Washington, ALAN GLASSER, U. Wash., VYACHESLAV LUKIN, Naval Research Laboratory, URI SHUMLAK, U. Wash., PSI-CENTER COLLABORATION — In modeling magnetic confinement, astrophysics, and plasma propulsion, representing the entire physical domain is often difficult or impossible, and artificial, or "open" boundaries are appropriate. A novel open boundary condition (BC) for dissipative MHD, called Lacuna-based open BC (LOBC), is presented. LOBC, based on the idea of lacuna-based truncation originally presented by V.S. Ryaben'kii and S.V. Tsynkov [1], provide truncation with low numerical noise and minimal reflections. For hyperbolic systems, characteristic-based BC (CBC) exist for separating the solution into outgoing and incoming parts. In the hyperbolic-parabolic dissipative MHD system, such separation is not possible, and CBC are numerically unstable. LOBC are applied in dissipative MHD test problems including a translating FRC, and coaxial-electrode plasma acceleration. Solution quality is compared to solutions using CBC and zero-normal derivative BC. LOBC are a promising new open BC option for dissipative MHD.

[1] V.S. Ryabenkii et al., J. Comput. Phys., 174 (2001) 712

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