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Lacunae-based open boundary conditions for dissipative MHD[1]
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Hyperbolic-based open boundary conditions have proven to be inadequate for modeling dissipative MHD systems, especially when diffusive effects are dominant at the boundary, as is common, for example, at the ends of an FRC or a mirror plasma. Lacunae-based open boundary conditions (LOBC) are under development for modeling open boundaries in mixed hyperbolic-parabolic systems. Initial work on Lacunae-based BC was done by V.S. Ryaben'kii, S.V. Tsynkov et al. [1]. Lacunae are still regions behind trailing fronts that exist in wave-type solutions. To implement LOBC, a buffer region is appended to the domain of interest. In this buffer region, by taking advantage of the lacunae in the solution, outgoing waves are damped and reflection is prevented. Diffusive behavior is bounded by a Dirichlet or Neumann condition at the edge of the buffer region. Wave reflection is prevented and parabolic behavior is properly bounded. Progress developing LOBC in the SEL/HiFi spectral element code is presented.

[1] V.S. Ryaben'kii et al., Global discrete artificial boundary conditions for time-dependent wave propagation, J. Comp. Phys., 174 (2001) 712

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