Abstract Submitted
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Spectral Basis Functions for Ideal and Extended MHD[1] C.R. SOVINEC, University of Wisconsin-Madison — The ability to reliably reproduce and distinguish various modes of ideal and extended MHD in numerical computation depends sensitively on the choice of spatial representation. The original development of ideal-MHD eigenvalue solvers [Gruber and Rappaz, Springer-Verlag (1985), for example] provides a numerical foundation. However, the interactions of transport with magnetic topology evolution in nonlinear simulations impose additional criteria that favor high-order and spectral representations. We compare global spectral representations and spectral-element representations for several possible systems of variables in ideal and non-ideal cylindrical eigenvalue computations. While many of the conclusions from the original low-order eigenvalue computations hold for second-order systems for displacement, first-order systems for all physical components are more representative of time- dependent computations and have distinct numerical properties. As expected, global representations converge slowly for localized modes, but placing borders of spectral elements at rational surfaces leads to rapid convergence.

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