Abstract for an Invited Paper
for the APR11 Meeting of
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Aneesur Rahman Prize for Computational Physics Talk: Numerical Modeling of Accretion Disk Dynamos driven by the MRI

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Numerical methods have proved crucial for the study of the nonlinear regime of the magnetorotational instability (MRI) and resulting dynamo action. After a brief introduction to the methods, a variety of results from new simulations of the MRI in both local (shearing box approximation) and global domains will be presented. Previous work on the saturation level and numerical convergence in both stratified and unstratified domains with no net flux (both with and without explicit dissipation) will be described, and the connection to dynamo theory will be mentioned. Results from several groups in which the size of the computational domain, and the vertical boundary conditions, are varied will be discussed. Finally, new work on the direct comparison between high-resolution global and shearing box simulations will be presented, and new studies of stratified disks with radiative transfer will be introduced.