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Magneto-rotational instability and turbulent angular momentum transport.[1] ALEKSANDR OBABKO, FAUSTO CATTANEO, University of Chicago, PAUL FISCHER, Argonne National Lab — We present numerical simulations of magnetized-Couette flow between concentric rotating cylinders in axisymmetric and fully three-dimensional geometry. This work complements the Princeton liquid gallium experiment by Goodman and Ji to study the Magneto-Rotational Instability (MRI). The simulations are carried out with a spectral element code incorporating realistic hydro boundary conditions at the upper and lower boundaries and consisting of differentially rotating rings aimed at minimization of the effects of Ekman circulation. We have studied changes in the flow structure and in the mechanism for angular momentum transport in the magnetic and non-magnetic cases as well as the impact of the boundary conditions (periodic vs. finite container). The angular momentum transport by Reynolds stresses and comparable viscous and ohmic dissipation were observed in the inner region of the annulus while the flow in the outer region was dominated by Maxwell stresses and exhibit a tendency toward constant AZIMUTHAL velocity with the increase of the external axial magnetic field.

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