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Momentum transport and magnetic field generation by magnetorotational instability in the Hall-MHD regime FATIMA EBRAHIMI, A. BHATTACHARJEE, C.B. FOREST, University of Wisconsin, B. LEFEBVRE, Center for Magnetic Self-Organization, University of New Hampshire — The two-fluid Hall effect can be important in astrophysical plasmas, such as weakly ionized disks, as well as in laboratory rotating plasmas. We show that the flow-driven Magnetorotational Instability (MRI) and its contribution to the nonlinear dynamics of these plasmas are affected by the Hall term. First it is shown that momentum transport and the saturated level of Maxwell and Reynolds stresses strongly depend on the magnetic Prandtl number and the direction of magnetic field in the Hall-MHD regime. Second, the possibility of magnetic field generation and its role on the MRI saturation are investigated in both MHD and Hall regimes. In an earlier study, we have shown that a large-scale magnetic field is generated through the correlated product of velocity and magnetic field fluctuations (the alpha effect) and causes the MRI mode to saturate. Here, the correlation of current and magnetic field fluctuations (the Hall effect) as a means to generate magnetic field will also be examined. Compressible nonlinear computations are performed in the configuration of the Madison Plasma Couette flow Experiment (MPCX) using the extended MHD code NIMROD. The stresses and dynamo terms are also analytically calculated in the quasilinear regime. Supported by NSF grant PHY0962244.

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