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Nonlinear Simulations of the kinetic MRI PRATEEK SHARMA, GREGORY W. HAMMETT, Princeton Plasma Physics Laboratory, ELIOT QUATAERT, Dept. Astronomy, UC Berkeley, JAMES M. STONE, Dept. Astrophysical Sc., Princeton — We present results of local shearing box simulations of turbulence driven by the magnetorotational instability (MRI) in the collisionless regime. MHD equations have been generalized to include anisotropic pressure and heat conduction along the field lines. We use an approximate form of a fluid closure that was chosen to model Landau damping (Snyder et al, Phys. Plasmas, 4, 3974 (1997)). The motivation is to study MRI turbulence and transport in radiatively inefficient accretion flows (one striking example is accretion on to the $\sim 3 \times 10^6 M_0$ black hole in the center of our galaxy), where the mean free path is believed to be much larger than the system size. Invariance of $\mu = v_\perp^2/2B$ implies that as the field is amplified, the plasma becomes more anisotropic ($p_\perp > p_\|$). This gives rise to anisotropic stress which has been shown to be an important component of the total stress. Upper limits on pressure anisotropy due to mirror and cyclotron microinstabilities are used that are motivated by linear theory and particle simulations.

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