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**Two-dimensional partially-ionized magnetohydrodynamic turbulence** SANTIAGO BENAVIDES, GLENN FLIERL, Massachusetts Institute of Technology — Ionization occurs in the upper atmospheres of Hot Jupiters and in the interiors of Gas Giant Planets, leading to Magnetohydrodynamic (MHD) effects which couple the momentum and the magnetic field, thereby significantly altering the dynamics. In regions of moderate temperatures the gas is only partially ionized, which leads to interactions with neutral molecules. To explore the turbulent dynamics of these regions we utilize Partially-Ionized MHD (PIMHD), a two-fluid model – one neutral and one ionized – coupled by a collision term proportional to the difference in velocities. Motivated by planetary settings where rotation constrains the large-scale motions to be mostly two-dimensional, we perform a suite of simulations to examine the parameter space of 2D PIMHD turbulence and pay particular attention to collisions and their role in the dynamics, dissipation, and energy exchange between the two species. We arrive at, and numerically confirm, an expression for the energy loss due to collisional heating in both the weakly and strongly collisional limits, and show that, in the latter limit, the neutral fluid couples to the ions and behaves as an MHD fluid.

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