Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

MHD turbulence subject to global rotation and a misaligned background magnetic field[1] SANTIAGO BENAVIDES, KEATON BURNS, Massachusetts Institute of Technology, BASILE GALLET, CEA Saclay, JAMES Y-K. CHO, Center for Computational Astrophysics, Flatiron Institute, GLENN FLIERL, Massachusetts Institute of Technology — Astrophysical plasmas are often subject to both rotation and large-scale background magnetic fields. Individually, each is known to two-dimensionalize the flow perpendicular to the direction of interest. In realistic flows, both of these effects are simultaneously present and, importantly, need not be aligned. In this work, we numerically investigate forced MHD turbulence subject to the competing effects of global rotation and a background magnetic field, when the global rotation vector and the magnetic field are perpendicular. We find rich behavior in the parameter space of rotation rate and field strength. In the case of a strong background field, increasing the rotation rate from zero produces significant changes in the structure of the turbulent flow. Starting from a two-dimensional inverse cascade scenario at zero rotation, the flow transitions to a forward cascade of kinetic energy, then a shear-layer dominated regime, and finally a second shear-layer regime where the kinetic energy flux is strongly suppressed and the energy transfer is purely mediated by the induced magnetic field. Furthermore, we find that, when considering the limit of strong rotation and strong magnetic field, the order in which those limits are taken matters.

[1]SJB is grateful for support from the National Science Foundation (OCE-1459702). This research was carried out in part during the 2019 Summer School at the Center for Computational Astrophysics, Flatiron Institute. The Flatiron Institute is supported by the Simons Foundation.

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Date submitted: 03 Aug 2020 Electronic form version 1.4