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Effects of a strong magnetic field on turbulence subjected to axisymmetric contraction[1] X.M. ZHAI, M.P. CLAY, P.K YEUNG, Georgia Tech — Many engineering applications and laboratory experiments involve the flow of fluids subjected to axisymmetric mean strain associated with the effects of varying cross-sectional area. If the fluid is conducting and a magnetic field is present then the Lorentz force leads to further complexities. In this work we apply a uniform magnetic field to homogeneous turbulence after a time-dependent axisymmetric contraction (Clay & Yeung, *J. Fluid Mech.* **805**, 460-493 (2016)) designed to mimic experiments. A magnetic field along the extensional direction is observed to initially weaken the anisotropy that developed from the contraction, but at later times the flow shows a high degree of anisotropy resembling that seen in simulations with isotropic initial conditions. The small scales no longer return to isotropy although they remain statistically axisymmetric. The anisotropy development is analyzed by computing various terms (including the Joule dissipation tensor) in the Reynolds stress budget equation, and studying directional properties of energy transfer in wavenumber space. We also compare results at different Reynolds numbers and magnetic interaction parameters.

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