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Turbulence, Turbulence Suppression, and Velocity Shear in the Helimak KENNETH GENTLE, WILLIAM ROWAN, University of Texas at Austin, BO LI, Peking University — The Helimak is an approximation to the infinite cylindrical slab with a size large compared with turbulence transverse scale lengths, but with open field lines of finite length. Radially-segmented isolated end plates allow application of radial electric fields that drive radial currents. Above a threshold in applied voltage (driven current), the fractional turbulent amplitude is greatly reduced. Reductions are observed for both positive and negative bias over a broad range of collisionality and parallel connection length. Concurrent measurements of the ion flow velocity profile are made by Doppler spectroscopy of the argon plasma ion. Turbulence reductions are broadly correlated with reductions in radial correlation length, but not with velocity flow shear. No evidence of zonal flows has been found. The turbulence – density, potential, and temperature fluctuations, is compared with simulations from a two-fluid model for this geometry, which also show reduced turbulence with bias. Work supported by the Department of Energy OFES DE-FG02-04ER54766.

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