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Understanding Flow Profiles in a Large Scale Helicon Plasma With Electrode Biasing[1] M. GILMORE, T.R. HAYES, S. XIE, L. YAN, C. WATTS, University of New Mexico — Experiments on flow shear/turbulence interactions are being conducted in the linear HelCat device, using both concentric ring and grid electrodes to bias the plasma. Flow profiles exhibit complicated changes with bias in both the azimuthal and parallel directions. Azimuthal flows are dominated by "static" E_rx B_z rotation, but also have a fluctuation-driven (zonal) flow contribution, due to Reynolds stress at the edge. Biasing is found to change the fluctuation dynamics, including fully suppressing fluctuations under some conditions. Strong parallel downstream flow (away from the source) in the plasma center is observed, while a sheared return flow is seen at the edge. Under biasing, the return flow is reduced and eventually reversed. It appears that this return parallel flow may be an inflow driven by increased turbulent radial transport at the plasma edge, rather than a direct effect of biasing currents. As drift wave transport is suppressed, this parallel return inflow reduces. Experimental and initial two-fluid modeling results are presented.

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