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High speed images and electrical measurements of drift waves in magnetized microdischarges TSUYOHITO ITO, Osaka University, MARK CAPPELLI, Stanford University — High speed images and electrical measurements from E x B discharges in micro-scale magnetically confined plasmas are presented. The image sequences depict strong and highly-ordered drift waves and underlying smaller-scale turbulence near the plasma edge, with characteristic length scales larger than the electron cyclotron radius. The measured phase velocity of the large scale disturbances is in good agreement with that for classic density-gradient driven isothermal drift waves. Propagating azimuthal waves of mode numbers m = 3 -5 are clearly present in the image sequences, with mode excitation and mode frequency found to be dependent on discharge voltage. The experiments are compared to simple theory for drift-wave dispersion, and are found to be in good quantitative agreement. Dispersion characteristics extracted from the images are also compared to a limited set of measurements taken using Langmiur probes and segmented electrodes. These studies suggest that such magnetically confined microdischarges may provide a useful test-bed for simulations of plasma confinement and turbulence in plasmas of moderate ion temperature.

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