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The Levitated Dipole Experiment: Experiment and Theory[1] J. KESNER, R.M. BERGMANN, J.E. ELLSWORTH, B. KARDON, P.P. WOSKOV, MIT PSFC, M.S. DAVIS, D.T. GARNIER, M.E. MAUEL, Columbia University —
A closed field line confinement system such as a levitated dipole is shear-free and the plasma compressibility provides stability. Theoretical considerations indicate the possibility of both MHD and electrostatic instability that can create turbulent driven transport. Importantly, the resulting transport is expected to create "stationary", inwardly-peaked density and pressure profiles. In LDX, ECH is used to create a low density hot-electron species embedded in a background plasma which, during levitation is seen to contain approximately half of the stored energy. When the floating coil is levitated, competing along-the-field-line losses disappear (all losses become cross-field) and near-stationary density profiles are observed. For edge fueling this inwardly peaked density requires an inward pinch which is also observed. Low frequency kHz range fluctuations appear [Garnier et al., J. Pl. Phys. (2008)] that presumably maintain these profiles. The plasma edge is turbulent and for stationary profiles the edge parameters provide boundary conditions which determine the core parameters.

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