Abstract Submitted
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The PEGASUS Toroidal Experiment program[1] A.J. REDD, J. BARR, M.W. BONGARD, M.G. BURKE, R.J. FONCK, E.T. HINSON, D.J. SCHLOSSBERG, K.E. THOME, University of Wisconsin - Madison — The PEGASUS program is developing nonsolenoidal startup and growth techniques for tokamaks, and exploring plasma stability at near-unity aspect ratio. Helicity injection from localized current sources (plasma guns) in the plasma periphery have produced $I_p \geq 0.17$MA to date, consistent with helicity balance and Taylor relaxation constraints. Compact passive electrodes can also be used for helicity injection and I_p growth, given a tokamak discharge already formed by the plasma guns. During helicity injection, the plasma edge exhibits bursty low-n MHD activity and ion spectroscopy shows strong ion heating, consistent with turbulent magnetic relaxation processes. After gun shutoff, the plasmas are MHD quiescent, and I_p can be grown and sustained above 0.20 MA, due to formation of sheared magnetic profiles in the core region. Efficient handoff from helicity injection to inductive drive requires relatively slow I_p rampup during helicity injection, to build up significant core current density. Plasma stability is dominated by peeling-like modes at large jedge/B, and large-scale low-m/n=1 core activity. Probe-measured edge profiles constrain equilibrium fits, and allow direct tests of peeling-ballooning theory.

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