Abstract Submitted
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Experimental study of driven magnetic relaxation in a laboratory plasma S.C. HSU, X.Z. TANG, LANL — The Driven Relaxation Experiment (DRX) has been built at LANL to investigate the possibility of exploiting resonances in the nonlinear force-free equation [1] to optimize magnetic flux amplification and current multiplication for driven-relaxed spheromak-like plasmas, and to explore the application of these ideas to plasma astrophysics problems [2]. It is also our goal to see whether relaxed states with $\lambda > \lambda_1$ can be formed and sustained. The experiment uses a planar magnetized coaxial gun (100–180 kA, 1–7 mWb) to generate driven- relaxed plasmas within a cylindrical flux-conserving boundary (0.9 m diameter). Unique features of DRX include high $\lambda_{\rm gun}$ up to $3\lambda_1$, and a continuously adjustable boundary elongation. The gun is powered by a 3- stage capacitor bank to form (10 kV, 500 μF) and sustain (5 kV, 8 mF) the plasma for up to 500 μs, corresponding to $>$ 10 Sweet-Parker times which allows the plasma to reach a quasi-steady-state. The primary diagnostic is a 48- channel 2D magnetic probe array that will map out a poloidal cross-section of the magnetic field configuration at one toroidal position. The full equilibrium magnetic field will be constructed using a combination of the experimental data and a nonlinear force-free equilibrium solver. We will present details of the experimental setup and the first experimental data. Supported by LANL LDRD. [1] Tang & Boozer, PRL **94**, 225004 (2005); PRL **98**, 175001 (2007) [2] Tang, ApJ **679**, 1000 (2008).

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