Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Instrumentation development and theoretical analysis for the Driven Relaxation Experiment (DRX)[1] ERIC HEISLER[2], University of Utah, SCOTT HSU, LANL — Magnetic relaxation in plasmas could potentially provide efficient fusion energy configurations, and help explain cosmological magnetic structures. Magnetic relaxation is thought to be constrained by energy barriers, limiting plasmas to fall below the first eigenstate of the linear force-free equation. The Driven Relaxation Experiment (DRX) will attempt to create a driven steady-state above the first energy barrier using a coaxial plasma gun at higher gun current/flux ratio than conventional experiments. This project has involved instrumentation development and theoretical analysis for DRX. Instrumentation development includes: (1) design/construction/calibration of gun current, voltage, and magnetic field diagnostics, and (2) assembly and testing of a hydrogen injection system including gas puff valves, and capacitor bank power supply. Theoretical analysis has focused on analytic and numerical solutions of the nonlinear (partially relaxed) force-free equation relevant for the DRX setup. The analytic solutions are compared to the linear (fully relaxed) solution and to numerical solutions of the partially relaxed problem.

[1]Supported by LANL LDRD Program.
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Date submitted: 17 Jul 2006 Electronic form version 1.4