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Experimental Study of a Linear/Non-Linear Flux Rope[1] TIMOTHY DEHAAS, WALTER GEKELMAN, BART VAN COMPERNOLLE, Univ of California - Los Angeles — Flux Ropes are magnetic structures of helical field lines, accompanied by spiraling currents. Commonly observed on the solar surface extending into the solar atmosphere, flux ropes are naturally occurring and have been observed by satellites in the near earth and laboratory environments. In this experiment, a single flux rope (r = 2.5 cm, dz = 1100 cm) was formed in the cylindrical, magnetized plasma of the Large Plasma Device (LaPD, L = 2200 cm, r = 30 cm, $n_o = 10^{12}$ cm^{-3}, $T_e = 4$ eV, He). The flux rope was generated via a DC discharge between a cathode and anode. This fixes the rope at its source while allowing it to freely move about the anode. At large currents ($I > B_o \pi r^2 c/2dz$), the flux rope becomes helical in structure and oscillates about a central axis. Under varying Alfven speeds and injection current, the transition of the flux rope from stable to kink-unstable was examined. As it becomes non-linear, oscillations in the magnetic field shift from sinusoidal to Sawtooth-like. The frequency, mode structure, and MHD quantities such as cross-helicity were examined during this transition from linear to non-linear behavior.

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