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**New dynamics of magnetically driven plasma jets in response to changes in applied current** A.L. MOSER, P.M. BELLAN, Caltech — The Caltech spheromak formation experiment produces a T$\sim$5 eV, n$\sim 10^{21}$ m$^{-3}$ plasma using one of three possible power supply configurations: a capacitor bank with a FWHM $\sim$10 $\mu$s current, a recently incorporated pulse forming network (PFN) with a FWHM $\sim$55 $\mu$s current, or the two supplies in concert. Past experiments using only the capacitor bank showed that the current-carrying plasma jet kinks consistent with the ideal MHD kink limit[1]. In recent experiments, plasmas produced using only the PFN or using both power supplies follow this trend, with the varying shape and increased time of the current giving rise to additional new behavior. The radius of unkinked jets expands and contracts in time following the changing current. Now not only can kink-unstable plasmas exhibit two visible twists but they can also evolve in two distinct ways post kink onset, with kink amplitude growing either slowly or quickly. In the latter case there is often a distinct fine-scale structure in the kinked jet as well as signs of plasma twists piling up and of the plasma jet detaching and reconnecting.

[1] Hsu and Bellan, Phys. Plasmas 12, 032103 (2005)

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