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Experiment to Study Alfven Wave Pulses in Plasma Loops MARK KENDALL, PAUL BELLAN, Caltech — Arched plasma-filled twisted magnetic flux tubes are generated at Caltech using pulsed power techniques [1]. The structure and time evolution of these flux tubes exhibit similarities with solar coronal loops, spheromaks, and astrophysical jets. We are now developing a method to excite propagating torsional Alfven wave modes by superposing a ∼10kA, ∼100ns current pulse upon the ∼50kA, 10μs main discharge current that flows along the ∼20cm long, 2cm diameter arched flux tube. To achieve this high power short pulse, a magnetic pulse compression technique based on saturable reactors is employed. A low power prototype has been successfully tested, and design and construction of a full-power device is nearing completion. The final stage of the device utilizes a coaxial water-filled transmission line with ultra-low inductance to attain the final timescale. The water system is additionally de-gassed to reduce bubble formation which otherwise facilitates electrical breakdown between the conductors. The pulse device will be used to investigate interactions between Alfven waves and the larger-scale loop evolution; one goal will be to capture the motion of the propagating wave using high-speed photography capable of resolving the Alfven timescale.

[1] J.F. Hansen, S.K.P. Tripathi, P.M. Bellan, *Phys. Plasmas* **11**, 6 (2004)

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