

Abstract Submitted
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Toroidal plasma start-up, refluxing and sustainment by repetitive plasma injection¹ SIMON WOODRUFF, ANGUS MACNAB, JENNIFER BAERNY, COSMO SMITH, TIM ZIEMBA, Woodruff Scientific Inc — A critical problem for most toroidal plasma configurations is to demonstrate solenoid-free start-up and sustainment: one solution might be to repetitively inject helicity-bearing plasmoids. We are exploring this concept in the Pulsed Build-up Experiment (PBX) [1] and with 3D MHD simulations [2]. PBX is designed to produce three spheromaks by energizing magnetized planar coaxial electrodes, and inject each subsequent spheromak into a copper flux-conserving. Three 32 μ F, 8kV banks produce 100kA currents in 10 μ s pulses to form the plasmas, and six 16 μ F banks are used to energize compression coils. Magnetic energy in the flux conserver is monitored by use of magnetic field coils. We report first results from the experiment and summarize theoretical and computational understanding that points to favorable start-up, refluxing and sustainment scenarios that are not deleterious to confinement. Applications to other closely related toroidal plasma configurations is discussed. [1] S. Woodruff et al J. Fusion Energy v28, p229-234 (2009) [2] A. I. D. Macnab et al J. Fusion Energy v28, p183-186 (2009).

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