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Dynamic Formation of FRCs on the PHD Experiment[1] JOHN SLOUGH, SAMUEL ANDREASON, HIROSHI GOTA, CHRIS PIHL, University of Washington — The goal of the Pulsed High Density (PHD) experiment is to reach break-even conditions through the Magneto-Kinetic (MK) compression of the Field Reversed Configuration (FRC). The distributed nature of the MK process provides for highly efficient coupling of bank energy into FRC thermal energy. The FRC is self-compressed to a hot, high density, burning plasmoid. An expansion phase after the burn allows the direct recovery of electrical energy from the heated FRC through induction. The entire process is similar to a reciprocating Brayton engine with no need for flux sustainment. The initial experimental work on PHD has been focused on generating a FRC that has sufficient lifetime, temperature and flux to reach fusion conditions on compression. To achieve this, the largest FRC experiment to date is being constructed. Dynamic formation is employed to produce the FRC during translation resulting in a very high flux, high velocity plasmoid. This process is also thought to generate large sheared axial flows with significant toroidal flux. Experiments with the device operating at half power have achieved initial target parameters with equilibrium temperatures of 300 eV and 15 mWb of flux. Modifications to achieve full power have been completed with the addition of a drift chamber for detailed equilibrium measurements. Results from the first dynamically formed FRCs will be presented.

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