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Initial Diagnostics and First Experimental Results of the Pulsed High Density (PHD) FRC Experiment* HIROSHI GOTA, SAMUEL ANDREASON, GEORGE VOTROUBEK, JOHN SLOUGH, Plasma Dynamics Laboratory, University of Washington — The source region for the Pulsed High Density Experiment (PHDX) has been constructed, and Field-Reversed Configuration (FRC) plasmas are being produced. The several diagnostic systems include and axial array of 20 pairs of magnetic probes and flux loops, and a 64 channel array optical measurement system for visible bremstrahlung tomography. The tomographic system will be capable of reconstructing the plasma shape and mode structure, and will incorporate information from end-on imaging for improved resolution. This array consists of collimator, optical fiber, optical filter (λ=520 nm, FWHM= 1 to 10 nm), and Photomultiplier Tube (PMT). The tomographic system and magnetic loop array will be used to investigate the equilibrium and tilt stability of FRCs at high s/E (>3) where s is the ion collisionless skin depth and E is the plasma elongation. The separatrix radius (r_s) of FRC plasma is determined by the excluded flux measurement, and it is found that r_s=0.04-0.05 m (r_s/r_w=0.16-0.2) just after the RMF current drive start-up. The time sequence of separatrix shape relatively agrees with the result of that estimated from the line-integrated radiation intensity at different axial positions. We will present the result of both simulation and experimental results from measured FRC plasmas as well as future plans. *Research funded by the DOE Office of Fusion Energy Sciences

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