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MHD During Relaxation and Growth of DC Helicity Injection Plasmas on Pegasus[1] J.L. BARR, M.W. BONGARD, R.J. FONCK, A.J. REDD, S.M. REISS, University of Wisconsin-Madison — Non-solenoidal plasma startup via DC helicity injection in Pegasus uses injected current streams that become unstable and relax to a tokamak-like configuration consistent with Taylor relaxation. Previous work had suggested that the current streams perturb the vacuum poloidal magnetic field to create a field null prior to relaxation. Local magnetic measurements using an insertable Hall Probe array diagnostic confirm the creation of this field null less than 1 ms prior to relaxation. Helicity injection plasmas are often accompanied by bursty n = 1 magnetic activity that presumably transports driven current into the plasma core, but the precise mechanism for the current drive is still under investigation. The MHD bursts quickly diminish after helicity injection drive is stopped. This MHD quiescence continues after the introduction of Ohmic induction, and the plasma continues without the tearing modes that usually limit Pegasus Ohmic operation. This is consistent with equilibrium reconstructions that show helicity injection drives J(r) profiles that are modestly frozen-in for the following Ohmic phase. The Hall Probe has been re-deployed to a midplane location to ease analysis for local current density and magnetic measurements to investigate the relationship between the n = 1 MHD activity and current drive associated with DC helicity injection.

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