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Experiments at High I_p/I_{tf} in the Pegasus Toroidal Experiment[1] E.A. UNTERBERG, D.J. BATTAGLIA, M.W. BONGARD, N.W. EIDIETIS, R.J. FONCK, M.J. FROST, G.D. GARSTKA, B.J. SQUIRES, M.B. MCGARRY, University of Wisconsin-Madison — The operating space defined by the external kink mode boundary in a near-unity aspect ratio ST allows access to very high toroidal beta and I_N through operations at high toroidal field utilization factors, $I_p/I_{tf} > 1$. In Pegasus, however, purely inductive-driven plasmas exhibit an operational limit of $I_p/I_{tf} \sim 1$ due to the onset of large-scale tearing modes in a wide volume of low shear near the plasma core region. A new operating regime has been accessed in recent experiments with the addition of electrostatic helicity and edge-current sources. Employing these sources in the lower divertor region as a pre-ionization source, inductive startup at very low field is facilitated and allows $I_p/I_{tf} \approx 1.5$ at low I_p ($\sim$ 50kA). Using these sources for non-inductive startup via helicity injection provides access to $I_p/I_{tf} \approx 2.3$, again at low I_p. In both cases, no large-scale tearing modes are evident. These observations, coupled with magnetic reconstructions, indicating hollow j(R) with possible reverse shear, suggest the sources provide significant modifications to the j(R) profile to allow stable discharge evolution at minimal toroidal field. Experimental studies are focusing on extending these recent discharges to higher I_p.

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