

Abstract Submitted
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Changes in Ion Orbit Loss, Intrinsic Rotation and Particle Pinch across the L-H Transition in DIII-D Plasmas¹ N.A. PIPER, W.M. STACEY, Georgia Tech, R.J. GROEBNER, General Atomics — Two interesting new L-H phenomena have been observed in a series of DIII-D discharges. 1) The measured C co- ρ toroidal rotation inside of $\rho=0.94$ was observed to increase at the L-H transition, but actually decreased for $\rho>0.94$. A particle-momentum-energy balance shows that the preferential ion orbit loss of ctr- ρ ions causes a co- ρ intrinsic rotation for $\rho>0.94$ which is greater in L-mode than in H-mode, thus causing the drop in total measured rotation for $\rho>0.94$ at the L-H transition. 2) In two of the three shots the electromagnetic pinch velocity went from weakly inward in L-mode to strongly inward in H-mode for $\rho>0.96$, consistent with improved particle confinement in H-mode associated with inward electromagnetic forces on the ions. The calculated edge neutral density, which is proportional to the radial particle flux, drag frequency, and therefore pinch velocity, is greater in H-mode than in L-mode for the two shots with a strongly inward pinch in H-mode of $\rho>0.96$, but not for the third shot in which the inward pinch in H-mode was weaker than in L-mode.

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