Abstract Submitted
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Blobs, momentum transport and tokamak rotation[1] J.R. MYRA, D.A. D'IPPOLITO, D.A. RUSSELL, Lodestar Research Corp., S.I. KRASHENINNIKOV, UCSD, B. COPPI, MIT — This paper examines how instabilities in the vicinity of the last closed surface (LCS) can provide a mechanism for tokamak rotation. Our hypothesis is: (i) that edge instabilities saturate by the generation of filamentary coherent structures (blobs) which convect radially outward towards the wall; and (ii) when the underlying unstable waves have a preferred phase velocity, momentum can be transferred to the blobs and lost from the core plasma, providing a recoil force that rotates the core. To test these ideas, a simple two field (2D PDE) model similar to the Wakatani-Hasegawa and blob models is proposed which embodies the essential features of electrostatic drift wave instability and curvature-driven blob transport in a layer near the LCS. The resulting equations are solved numerically in the strong (order unity fluctuation) limit. Then, employing an exact momentum conservation law, we derive a diagnostic to account for momentum flow across the LCS, and use it to obtain the net edge momentum source for tokamak rotation due to turbulence-generated ExB flows.

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