Edge Transport Bifurcation in Plasma Resistive Interchange Turbulence

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Transport bifurcation and mean shear flow generation in resistive interchange turbulence are explored with self-consistent fluid simulations in a flux-driven system with both closed and open field line regions. The nonlinear evolution of resistive interchange modes shows the presence of two confinement regimes characterized by low and high mean flow shear. By increasing the power flow above a threshold, large-amplitude oscillations in the turbulent and mean flow energy are induced. The fluctuation energy is decisively transferred to the mean flows by large-amplitude Reynolds power as turbulence intensity increases. Consequently, a transition to a state of reduced transport occurs, in which strong mean shear flows are generated at the plasma edge. The flux-gradient relationship is also examined to show the bifurcation in plasma edge transport.