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Modeling studies of transport bifurcation phenomena in a collisional drift wave turbulence. RIMA HAJJAR, PATRICK DIAMOND, GEORGES TYNAN, ARASH ASHOURVAN, University of California San Diego — Self-organization of drift wave turbulence via particle transport and Reynolds stresses is a mechanism for turbulence suppression and reduction of cross field transport. This energy transfer mechanism between microscale drift waves and mesoscale zonal flows can create a transport bifurcation and trigger the formation of an internal transport barrier. We report here on studies investigating transport bifurcation dynamics in the CSDX linear device using a 1D reduced turbulence and mean field evolution model. This two-mixing scale Hasegawa-Wakatani based model evolves spatio-temporal variations of three plasma fields: the mean density n, the mean vorticity u and the turbulent potential enstrophy e. The model adopts inhomogeneous potential vorticity mixing on a mixing length the expression of which is related to the Rhines' scale and to the mode scale (i.e. is ∇n and ∇u dependent). The model is based on expressions for turbulent fluxes of n, u and e derived from mixing length concepts. Turbulent particle and enstrophy transport are written as diffusive, but a residual stress part is included in the expression for the vorticity flux. Mixed boundary conditions are used at both ends of the domain and an external boundary fueling source is added. Simulation results show a steepening in the particle density profiles with $\mathbf{B}$ along with the formation of a net flow shear layer resulting from the vorticity mixing. These results suggest that the system dynamic is capable of sustaining the plasma core by means of a purely diffusive particle flux, without any explicit inward particle pinch.

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