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Edge-core interaction of ITG turbulence in Tokamaks: Is the Tail Wagging the Dog?[1] S. KU, C.S. CHANG[2], Courant Institute of Mathematical Sciences, New York University, G. DIF-PRADALIER, P.H. DIAMOND, CMTFO and CASS, University of California , San Diego, CPES TEAM — A full-f XGC1 gyrokinetic simulation of ITG turbulence, together with the neoclassical dynamics without scale separation, has been performed for the whole-volume plasma in realistic diverted DIII-D geometry. The simulation revealed that the global structure of the turbulence and transport in tokamak plasmas results from a synergy between edge-driven inward propagation of turbulence intensity and the core-driven outward heat transport. The global ion confinement and the ion temperature gradient then self-organize quickly at turbulence propagation time scale. This synergy results in inward-outward pulse scattering leading to spontaneous production of strong internal shear layers in which the turbulent transport is almost suppressed over several radial correlation lengths. Co-existence of the edge turbulence source and the strong internal shear layer leads to radially increasing turbulence intensity and ion thermal transport profiles.

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[2]Also, Korea Advanced Institute of Science and Technology, Daejeon, Korea

Seung-Hoe Ku
Courant Institute of Mathematical Sciences, New York University

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