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Electron Transport Driven by Short Wavelength Trapped Electron Mode Turbulence ZHIHONG LIN, University of California, Irvine, DOE SCIDAC CENTER FOR GYROKINETIC PARTICLE SIMULATION OF TURBULENT TRANSPORT IN BURNING PLASMAS TEAM — An outstanding issue in tokamak confinement studies is the origin of the anomalous electron thermal transport in internal transport barriers (ITB), where the ion transport is reduced to the neoclassical level. As the density gradient steepens in barrier regions, the electrostatic trapped electron mode (TEM) is often driven unstable. The key issue is whether TEM turbulence is capable of driving a large electron heat flux without driving significant ion heat and particle fluxes. In global gyrokinetic particle simulations using the GTC code, we find that the TEM mode has a wide spectrum with a large linear growth rate for $k_\theta \rho_i$ ranging from ∼0.2 to ∼1. The short wavelength modes drive a large electron heat flux, but a smaller ion heat flux and particle flux. The longer wavelength modes drive a large ion heat flux and particle flux. Since the formation of the ITB is often accompanied by the generation of equilibrium sheared flows, these longer wavelength fluctuations can be easily suppressed or broken up into smaller eddies by the strong flow shear, while the short wavelength fluctuations can survive the shearing effects. Therefore, the small scale TEM turbulence is a viable candidate for driving the electron thermal transport in the ITB regions.

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