Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Understanding electron transport mechanism in collisionless trapped electron mode turbulence[1] YONG XIAO, UC Irvine — A prominent candidate for the electron heat transport in tokamaks is collisionless trapped electron mode (CTEM) turbulence. Our large scale simulations using gyrokinetic toroidal code (GTC) finds that electron heat transport can be non-diffusive in CTEM turbulence. Radial correlation analysis shows the existence of mesoscale eddy although the turbulence eddies are predominantly microscopic due to the zonal flow shearing. The radial profile of the electron heat conductivity is found to roughly follow the global profile of fluctuation intensity, while the ion transport tracks local fluctuation intensity. This suggests a non-diffusive component in the electron heat transport, which arises from the ballistic radial drift of trapped electrons due to a combination of the presence of the mesoscale eddies and the weak detuning of the toroidal precessional resonance. However, the ion radial excursion is not affected by the mesoscale eddies due to the parallel decorrelation. A careful study of the radial transport of the trapped electrons confirms the non-diffusive feature, which can be quantitatively modeled by a quasilinear theory.

[1]Work supported by DOE GPS, GSEP and CPES centers.

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Date submitted: 20 Jul 2010 Electronic form version 1.4