Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Physical interpretation of the nonlocal transport and dynamic equilibrium computation with coupling to the transport[1] LINJIN ZHENG, University of Texas at Austin, Institute for Fusion Studies — The so-called non-local transport was observed in various tokamaks. A sudden cooling at plasma edge is found to lead to the temperature rise at plasma center. It has been shown that the Ohmic heating power redistribution is insufficient to explain the center temperature increase and the typical local transport models are unable to explain this phenomenon. We point out that the Ohmic current redistribution can also cause the center plasma compression. The compression can provide an additional heating mechanism for center plasma. To demonstrate this mechanism we develop the dynamic transport-equilium code (DynTEQ) to compute the dynamic evolution process. In difference from the existing coupled transport-equilibrium codes which couple directly the transport and the MHD equilibrium packages through iterations, the numerical scheme in DynTEQ code includes the convective effects into the transport process with MHD force balance constraint imposed consistently. Both physics mechanism and numerical scheme will be explained, with cylinder results detailed. It is also pointed out that the plasma compression can also lead to the formation of the steep pressure gradient region (i.e., the so-called transport barrier) as typically observed during the off-axis heating process.

[1]Supported by U. S. Department of Energy, Office of Fusion Energy Science.

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Date submitted: 12 Jul 2013 Electronic form version 1.4