Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Neoclassical ion heat flux and poloidal flow in a tokamak pedestal[1]

GRIGORY KAGAN, Massachusetts Institute of Technology, PETER J. CATTO, Plasma Science and Fusion Center, MIT — In the core of a tokamak, neoclassical transport normally dominates over classical while itself being dominated by turbulent transport. The situation may be different in a high confinement (or H) mode pedestal, where the latter is effectively suppressed by a strongly sheared equilibrium electric field. On the other hand, this very field makes conventional neoclassical results inapplicable in the pedestal by significantly modifying ion drift orbits. We present the first calculation of the banana regime neoclassical ion heat flux and poloidal flow in the pedestal accounting for the strong *ExB* drift inherent to this tokamak region. Interestingly, the fact that ion heat conductivity depends on the local values of the electric field and its shear allows us to hypothesize about possible shapes of the global electric field and density profiles in the pedestal. We also find that due to the electric field the pedestal poloidal ion flow is likely to change its direction as compared to its core counterpart. This result elucidates the discrepancy between the conventional banana regime predictions and recent experimental measurements of the impurity flow performed at Alcator C-Mod.

[1]Work supported by U.S. DoE

Grigory Kagan
Massachusetts Institute of Technology

Date submitted: 17 Jul 2009 Electronic form version 1.4