Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Turbulent Impurity Transport Modeling for C-Mod XIANGRONG FU, WENDELL HORTON, WILLIAM ROWAN, IGOR BESPAMYATNOV, University of Texas at Austin, SADRUDDIN BENKADDA, International Institute for Fusion Science, CATHERINE FIORE, MIT Plasma Science and Fusion Center —
Turbulent particle transport is investigated by analyzing boron impurity transport experiments in the Alcator C-Mod transport experiments with a quasilinear theory. Eigenvalue problems for sets of reduced fluid equations for the multi-component plasmas are solved to get the fluctuating field vector composed of the electric potential ϕ, the main ion density δn_i, the impurity density δn_z and the ion temperature fluctuation δT_i(for ITG). For Alcator C-Mod parameters, we investigate three drift waves models (1) the usual drift waves driven by density gradients, (2)impurity drift waves supported by the impurity density gradients and (3)turbulence driven by ITG mode. With turbulent spectrum obtained from simulations or nonlinear theories, we calculate particle transport coefficients and compare with the experiment and the neoclassical theory. This procedure results in a fast code that could run in real-time on the transport time scale to give the particle fluxes as a function of the state of the plasma. The code may be extended to include multiple modes for a more complete description of plasmas. Examples for the particle fluxes are given for C-Mod in the H modes and newly discovered I modes. Recent experiments reported on LHD are briefly discussed.

Xiangrong Fu
University of Texas at Austin

Date submitted: 09 Jan 2012 Electronic form version 1.4