

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Models for fast ion tails and ion orbit loss in the moments formulation of neoclassical theory¹ WAYNE HOULBERG, STEVEN HIRSHMAN, ORNL, KERCHUNG SHAING, U. Wis-Madison — We present models for the inclusion of strongly anisotropic fast ion tails and orbit losses in the moments formulation of neoclassical theory [1], and implemented in the NCLASS code [2]. Anisotropic fast ion tails (e.g. from NBCD or RFCN) provide a torque, which induces poloidal as well as toroidal flows in the thermal species. Ion orbit losses at the plasma edge also provide a torque, and may drive the L-H transition [3,4]. One of the most challenging computational aspects of this work has been the extension of the friction and viscosity tensors to arbitrary order in order obtain converged solutions to the resonant perturbation to the electron distribution when the fast ion velocity is finite relative to the electron thermal velocity. The velocity moments then yield a converged solution for the flows (which can be measured directly for non-hydrogenic ions), as well as particle and heat fluxes and currents. [1] S.P. Hirshman, D.J. Sigmar, Nucl. Fusion 21 (1981) 1079 [2] W.A. Houlberg et al, Phys. Plasmas 4 (1997) 3230 [3] K.C. Shaing et al, Phys. Fluids B 2 (1990) 1492 [4] R. Hiwatari et al, Plasma Phys. Control. Fusion 44 (2002) A445

¹Research supported in part by USDOE Contract DE-AC05-00OR22725.

Wayne Houlberg
ORNL

Date submitted: 23 Jul 2006

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