

Abstract Submitted  
for the DPP14 Meeting of  
The American Physical Society

**An improved bootstrap current formula for edge pedestal plasma**

ROBERT HAGER, C.-S. CHANG, PPPL — An improved version of a bootstrap current formula based on the results of the neoclassical guiding-center particle-in-cell code XGC0 [Koh et al., *Phys. Plasmas* **19**, 072505 (2012)] is presented. The original formula improved the accuracy of the predicted bootstrap current in the edge pedestal, where the ion orbit width can be comparable to the pressure gradient scale length, the passing particle region is narrow, and the ions experience orbit loss. We improved two aspects of this formula. We corrected the asymptotic behavior of the bootstrap current coefficients at higher collisionality from what was inherited from the Sauter formula [O. Sauter et al., *Phys. Plasmas* **6**, 2834 (1999)]. We also improved the jumpy aspect-ratio dependence of the transition between an enhanced (NSTX) and reduced (DIII-D) bootstrap current regime found by Koh et al. In addition, we elucidate the physical origins of the improvement and of the difference from a local analysis that includes the importance of finite ion orbit excursion effects on the electron current in the edge pedestal.

Robert Hager  
PPPL

Date submitted: 11 Jul 2014

Electronic form version 1.4