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Category Number and Subject:

[**x**] Theory [ ] Experiment

**Ion Cyclotron Heating Induced Fast Ion Transport and Plasma Rotation in Tokamaks,**[*] V.S. Chan, Y.A. Omelchenko, S.C. Chiu, *General Atomics* — Minority ion cyclotron heating can produce energetic ions with banana orbits that are finite compared with the minor radius of a tokamak. The radial transport of the fast ions in the presence of Coulomb collisions results in a radial current and a corresponding J×B torque density on the bulk plasma. Collisions between the minority ions and majority ions provides an additional frictional torque that adds to or opposes the magnetic torque. Our study uses a code which follows the particle drift trajectories in a tokamak geometry under the influence of rf fields and collisions, modeled with an rf-quasilinear operator and a Monte-Carlo operator, respectively. It is shown that when the regions of negative and positive torque density are spatially separated, a finite central rotation velocity can result even when the volume integrated torque density is small. This is consistent with the results of Perkins,[1] that uses a different approach. A physical picture emerges explaining the co- and counter-rotation with low- and high-field resonance respectively as a consequence of finite orbit width. The model also provides details of the rotation profile when ions are continuously being heated and slowed down in steady-state. Qualitative comparison with recent JET results will be discussed.

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[1]F.W. Perkins, "Generation of Plasma Rotation in a Tokamak by Ion-Cyclotron Absorption of Fast Alfvén Waves," Proc. 18th IAEA Fusion Energy Conference, Sorrento, Italy (2000), paper TH/1.

[**x**] Prefer Poster Session
[ ] Prefer Oral Session

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