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Poloidal Flows Driven by ITG Turbulence in Tokamaks[1] F.L. HINTON, General Atomics, M.N. ROSENBLUTH, ITER-JCT — We investigate axisymmetric E×B flows driven by ITG turbulence by modeling it as a given noise source in the linearized gyrokinetic equation. We find that these flows should become substantially larger than in gyrofluid simulations, at least in nearly collisionless regimes. Fluctuating radial currents are nonlinearly driven by ITG modes because of finite gyroradius and finite banana width effects. Through the mechanism of a neoclassically enhanced polarization current, the radial electric field fluctuations integrate these radial currents in time. The axisymmetric parts of the driven fields are not damped by collisionless processes, such as transit time damping. Assuming the source currents are random and statistically stationary, the mean square radial electric field increases linearly with time, for times longer than a few ion transit times. It would eventually saturate only because of collisional effects or some nonlinear damping process. Since the resulting sheared E×B flows strongly regulate the turbulence level and the transport, transport rates in reactor sized tokamaks predicted by gyrofluid simulations of ITG turbulence[2] may be much too large.

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[2]J. Glanz, Science 274, 1600 (1996).

F.L. Hinton
hinton@gav.gat.com
General Atomics

- [ ] Prefer Oral Session
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Special instructions: place poster next to M. Rosenbluth

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