

Multiscale turbulence in tokamak plasmas

Based on the considered opinion* of one hour's discussion including M. Barnes, M. Hardman, S. Maeyama, L. Milanese, and J. Parker

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- Turbulence exists at the ion and electron Larmor scales, and both scales can matter for the overall transport level
- Isolated simulations at each scale differ from direct multiscale simulations
- Results of these multiscale simulations:
 - ES turbulence suppressed by IS turbulence
 - IS turbulence (typically) enhanced in presence of ES turbulence

What we would like to know

- When do these interactions matter?
- Are the interactions local or non-local in k -space?
- What's the deal with ETG streamers? Should they be there; do they saturate at electron or ion scales? How does zonal flow saturate in this case?
- In sims where ES suppressed by IS, IS zonal flow also suppressed by ES; hysteresis?
- Related: how does ES turbulence suppress IS-ish zonal flows – via streamers? Tertiary?
- Can IS drive ES or vice-versa?