

Abstract Submitted
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Direct Comparison of Gyrokinetic Turbulence Simulations with Phase Contrast Imaging Fluctuation Measurements¹ DARIN ERNST, Mass. Inst. of Technology, A. LONG, Cornell Univ., N. BASSE, L. LIN, M. PORKO-LAB, Mass. Inst. of Technology, W. DORLAND, Univ. Maryland — We have developed a synthetic diagnostic¹ for the GS2 gyrokinetic code for direct comparisons with phase contrast imaging (PCI) measurements of density fluctuations in Alcator C-Mod. The gyrokinetic simulation is carried out in a local, field line following flux-tube, while PCI measures density fluctuations along 32 chords passing vertically through the plasma cross-section.² Transforming from Clebsch to cartesian coordinates, and integrating appropriately over portions of the flux tube viewed by the diagnostic, yields a density fluctuation spectrum versus wavenumber k_R in the major radius direction. To achieve vertical localization, we examine an ITB case in which the spectrum is dominated by a strong trapped electron mode, localized near the half-radius. The wavelength spectrum from the simulations, using the synthetic diagnostic, closely reproduces the PCI spectrum. Contributions from k_ψ , where $\mathbf{B} = \nabla\alpha \times \nabla\psi$, downshift the GS2 k_α spectrum to improve upon our previous raw comparison with the PCI k_R spectrum.³

¹A. Long, D. R. Ernst *et al.*, Bull. Am. Phys. Soc. **50**(8) p. 153, GP1.48, also p. 235, LP1.37. ²N. P. Basse *et al.*, Phys. Plasmas **12**, 052512 (2005). ³D. R. Ernst *et al.*, 2004 IAEA Fusion Energy Conference, IAEA-CN116/TH/4-1, see also Phys. Plasmas **11** (2004) 2637.

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