Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Visualizing Gyrokinetic Turbulence in a Tokamak GEORGE STANTCHEV, WILLIAM DORLAND, University of Maryland — Multi-dimensional data output from gyrokinetic microturbulence codes are often difficult to visualize, in part due to the non-trivial geometry of the underlying grids, in part due to high irregularity of the relevant scalar field structures in turbulent regions. For instance, traditional isosurface extraction methods are likely to fail for the electrostatic potential field whose level sets may exhibit various geometric pathologies. To address these issues we develop an advanced interactive 3D gyrokinetic turbulence visualization framework which we apply in the study of microtearing instabilities calculated with GS2 in the MAST and NSTX geometries. In these simulations GS2 uses field-line-following coordinates such that the computational domain maps in physical space to a long, twisting flux tube with strong cross-sectional shear. Using statistical wavelet analysis we create a sparse multiple-scale volumetric representation of the relevant scalar fields, which we visualize via a variation of the so called splatting technique. To handle the problem of highly anisotropic flux tube configurations we adapt a geometry-driven surface illumination algorithm that places local light sources for effective feature-enhanced visualization.

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Date submitted: 22 Jul 2005 Electronic form version 1.4