Abstract Submitted
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Nonlinear Interactions of Ion Temperature Gradient Microturbulence and Tearing Modes[1] C. HOLLAND, University of California, San Diego, O. IZACARD, Lawrence Livermore National Laboratory, S.D. JAMES, University of Tulsa, D.P. BRENNAN, Princeton University — We report progress on understanding the nonlinear interactions of ion temperature gradient turbulence and tearing modes using both analytic theory and numerical simulations, including some performed with the BOUT++ [1] framework. Using an electromagnetic five-field fluid model, results from two-dimensional simulations with static magnetic islands are first presented. It is found that the island width must exceed a threshold size (comparable to the turbulent correlation length in the no-island limit) to significantly impact the turbulence dynamics, with the primary impact being an increase in turbulent fluctuation and heat flux amplitudes. The turbulent radial heat flux is observed to localize near the island x-point, but does so asymmetrically. To quantify expected back-reaction of the turbulence on the tearing mode, an effective turbulent resistivity is quantified, and shown to be significantly (10x - 1000x) greater than the collisional resistivity used in the simulations. Progress on extending these results to three-dimensional simulations with dynamically evolving tearing mode islands will be presented, and implications of these results for predictive modeling of experiments discussed.

[1] B. Dudson et al., Comput. Phys. Comm. 180, 1467 (2009)

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Christopher Holland
University of California, San Diego

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