EX-C

Parametric dependencies of low-k turbulence in NSTX H-mode pedestals

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Validating predictive models of pedestal turbulence and dynamics is critical for ITER and next-step devices. Here, we characterize the poloidal correlation length and decorrelation time of low-k pedestal turbulence ($k_\perp \rho_s \leq 1$, $0.8 \leq r/a \leq 0.95$) in NSTX ELM-free, MHD-quiescent H-mode plasmas, plus we identify several parametric dependencies that influence pedestal turbulence quantities. Poloidal correlation lengths (L_p) in the pedestal are typically 10–20 cm and $L_p/\rho_i \approx 8$–18. The parametric dependence with ∇V_T is consistent with enhanced confinement at higher ∇V_T, and parametric dependencies with ∇T_i and ∇n_e are consistent with drift-wave turbulence modes. Parametric dependencies with q and ν_e, however, give mixed evidence for turbulence mediation by the GAM zonal flow. The measurements and analysis presented here broadly characterize pedestal turbulence in high-performance spherical torus plasmas and establish validation benchmarks for pedestal and edge simulations.