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Core Turbulence and Transport Response to Increasing Toroidal Rotation and Shear in Advanced-Inductive Plasmas[*] G. McKee, Z. Yan, *U. Wisc*; C. Holland, *UCSD;* T. Luce, C. Petty, *GA*; T. Rhodes, L. Schmitz, *UCLA*; W. Solomon, *PPPL* — Multi-scale turbulence properties are altered as core toroidal rotation and *ExB* shearing rates are systematically varied in relatively high-beta, advanced-inductive H-mode plasmas on DIII-D. The energy confinement time increases by 50% as the toroidal rotation is increased by a factor of 2.5 (to M_o=0.5), while core turbulence, measured with BES, DBS and PCI, decreases in dimensionlessly matched plasmas ($\beta \approx 2.7$, q_{95}=5.1). Low-wavenumber ($k_\perp \rho_I < 1$) density fluctuations obtained with BES near mid-radius exhibit significant amplitude reduction along with a slight reduction in radial correlation length at higher rotation, while fluctuations in the outer region of the plasma, $\rho > 0.6$, exhibit, but little change in amplitude. Fluctuation measurements and transport behavior will be quantitatively compared with nonlinear simulations. The resulting reduction in confinement will need to be ascertained for low-rotating plasmas such as ITER and FNSF.

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