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 $M_t=0.5$), 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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