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**Electron temperature gradient undulations and transport induced by modulated NBI in DIII-D.**[1] BINGZHE ZHAO, MAX AUSTIN, DAVID HATCH, University of Texas at Austin — Significant intermittent electron temperature gradient fluctuations, which may be of a size to affect global transport, have been observed in DIII-D hybrid discharges, correlated with modulated neutral beam heating and deeply penetrating ELMs. The beam modulation is controlled by a $\beta_N$ feedback system and hence is not at any constant frequency. When the beam is heavily modulated, ECE and TS diagnostics can show localized changes in $T_e$ gradients, with stationary periods up to 50 ms, with $a/L_{Te}$ varied around a factor of 4 near the edge of the confinement region. These random gradient undulations are of a sufficient magnitude to affect growth rates of turbulent modes. Linear gyrokinetic simulations from GENE show that during the high gradient phase the growth rate of both electrostatic and electromagnetic modes rise in this region; especially, the growth rate of KBM rises to a similar level of ITG during the high gradient phase and is negligible otherwise. Regimes with intermittent gradient fluctuations have increased transport over regimes without fluctuating gradients, as for example in DIII-D QH-mode discharges. The higher transport is being investigated using non-linear gyrokinetic simulations.

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