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Rotational Shear Effects on Edge Harmonic Oscillations in DIII-D Quiescent H-mode Discharges[1] XI CHEN, K.H. BURRELL, N.M. FERRARO, T.H. OSBORNE, M.E. AUSTIN, A.M. GAROFALO, R.J. GROEBNER, G.J. KRAMER, N.C. LUHMANN JR., G.R. MCKEE, C.M. MUSCATELLO, R. NAZIKIAN, X. REN, P.B. SNYDER, General Atomics, W.M. SOLOMON, B.J. TOBIAS, Z. YAN, General Atomics — In quiescent H-mode (QH) regime, the edge harmonic oscillations (EHO) play an important role in avoiding the transient ELM power fluxes by providing benign and continuous edge particle transport. A detailed theoretical, experimental and modeling comparison has been made of low-n (n=5) EHO in DIII-D QH-mode plasmas. The calculated linear eigenmode structure from the extended MHD code M3D-C1 matches closely the coherent EHO properties from external magnetics data and internal measurements using the ECE, BES, ECE-I and MIR diagnostics, as well as the kink/peeling mode properties of the ideal MHD code ELITE. The numerical investigations indicate that the low-n EHO-like solutions from M3D-C1 are destabilized by the toroidal rotational shear while high-n modes are stabilized. This effect is independent of the rotation direction, suggesting that the low-n EHO can be destabilized in principle with rotation in both directions. These modeling results are consistent with experimental observations of the EHO and support the proposed theory of the EHO as a rotational shear driven kink/peeling mode [1][2].

[1][1] P.B. Snyder, et al., Nucl. Fusion 47, 961 (2007). [2] K.H. Burrell, et al., Nucl. Fusion 49, 085024 (2009).

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