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Extended-MHD Studies of Flow-Profile Effects on Edge Harmonic Oscillations in QH-mode Discharges[1] J.R. KING, Tech-X Corp., K.H. BURRELL, A.M. GAROFALO, General Atomics, T.G. JENKINS, S.E. KRUGER, Tech-X Corp., P.B. SNYDER, General Atomics — It is desirable to have an ITER H-mode regime that is quiescent to edge-localized modes (ELMs). ELMs deposit large, localized, impulsive, surface heat loads that can damage the divertor. One such quiescent regime with edge harmonic oscillations (EHO) is observed on DIII-D, JET, JT-60U, and ASDEX-U [1]. The physical mechanisms of EHO are not fully understood, but linear MHD calculations suggest EHO may be a saturated kink-peeling mode partially driven by flow-profile shear [2]. We present preliminary EHO computations using the extended-MHD NIMROD code. The model incorporates first-order FLR effects and parallel heat flows. Using reconstructed DIII-D profiles from discharges with EHO, we scan the $E \times B$ and polodial flow profiles and compute linear stability. The aim is to ascertain the role of the $E \times B$ flow shear, as motivated by experimental results [3], and to compare with theoretical predictions where the growth rate is enhanced at intermediate wavenumbers and cut-off at large wavenumbers by diamagnetic effects [4]. Initial nonlinear computations exploring the EHO saturation mechanism are presented.

[1] Phys. Plasmas, v19, p056117, 2012 (and refs. within).
[2] Nucl. Fusion, v47, p961, 2007.
[3] Nucl. Fusion, v51, p083018, 2011.
[4] Phys. Plasmas v10, p4405, 2003.

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J.R. King
Tech-X Corp.

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