Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Reduced predictive models for Micro-tearing modes in the pedestal[1] MAX CURIE, JOEL LARAKERS, MICHAEL HALFMOON, DAVID HATCH, University of Texas at Austin, EHAB HASSAN, University of Texas at Austin/Oak Ridge National Laboratory, M. KOTSCHENREUTHE, R. HAZELTINE, S. MAHAJAN, University of Texas at Austin, J. CHEN, D. BROWER, University of California, Los Angeles, R. GROEBNER, General Atomics — The experimental discovery that magnetic fluctuations observed in the tokamak pedestal seem to show a remarkable sensitivity to the toroidal mode numbers n poses a very interesting and challenging problem. The theoretical challenge becomes even more acute when gyrokinetic simulations of the microtearing modes (MTM) seem to reproduce exactly the same effect. We have developed a pedestal specific model that shows that the n sensitivity is likely to be a consequence of a deeper interaction between magnetic shear (that determines the mode rational surface) and the sharply varying profile of ω_{*e}; it is this combination that determines the conditions for the existence and stability of the MTM. It is found that the MTMs tend to localize at the peak in the ω_{*e} profile, and are unstable only when a given rational surface aligns with this peak. This idea will be explored and tested using data from DIII-D as well as other experiments. Investigations based on this idea have provided insight into the magnetic spectrograms across several machines for several discharges and; in particular, we were able to, effectively, predict the gaps between frequency bands and toroidal mode numbers.

[1]Work supported by US DOE grants DE-FG02-04ER54742, DE-AC02-09CH11466 and DE-FC02-04ER54698 and IFS in University of Texas.

Max Curie
University of Texas at Austin

Date submitted: 07 Oct 2020 Electronic form version 1.4