Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

A systematic study of tokamak pedestal instability trends using gyrokinetic simulations WEIGANG WAN, University of Colorado, Boulder, ALEXEI PANKIN, Tech-X Corporation, SCOTT PARKER, YANG CHEN, University of Colorado, Boulder — Global gyrokinetic simulations of DIII-D H-mode edge pedestal show two types of instabilities: an intermediate-n, high frequency mode that propagates in the electron diamagnetic direction which we identify as the "kinetic peeling ballooning mode (KPBM)," and a high-n, low frequency mode that propagates in the ion direction which we identify as the "ion mode." When the q profile is flattened by the bootstrap current, the ion mode transits to kinetic ballooning mode and becomes the dominant instability. Properties of these two instabilities are studied by varying the density and temperature profiles of equilibria. It is found that the KPBM is destabilized by density and ion temperature gradient, and the ion mode is mostly destabilized by electron temperature gradient. In a more self-consistent study, a sequence of DIII-D like equilibria has been generated using the TOQ equilibrium solver. The H-mode pedestal parameters have been modified in a systematic way in order to produce equilibria with distinguishably different stability properties that have been audited with ideal MHD stability codes including BALOO, DCON, and ELITE. The MHD stability analysis of these equilibria are then compared with gyrokinetic simulations using the code GEM.

Weigang Wan
University of Colorado, Boulder

Date submitted: 13 Jul 2012 Electronic form version 1.4