Experimental Tests of the EPED Model for ELMy H-Mode Pedestals on Alcator C-Mod

John Walk, Jerry Hughes, *MIT PSFC*
Phil Snyder, *General Atomics*

H-mode discharges on Alcator C-Mod with Edge Localized Modes (ELMs) are used to test the EPED class of models, which predicts the width and height of the plasma pedestal. The model utilizes a calculation of the intermediate-*n* "peeling-ballooning" mode stability limit with the additional constraint on the onset of the approximately-localized strong electromagnetic kinetic-ballooning mode to uniquely constrain the pedestal width and height for a given set of bulk plasma parameters [1]. The original version of the model, EPED1, depended on MHD stability calculations using the ELITE code on model equilibria for the peeling-ballooning limit, and utilized the dominant scaling with pedestal poloidal beta for the kinetic-ballooning limit. This model has previously been extensively tested on both C-Mod and DIII-D. The current version, EPED1.6, directly evaluates the diamagnetic stabilization of the peeling-ballooning mode, as well as a first-principles kinetic-ballooning criterion [2]. We present results of EPED1.6 analysis on a wide range of C-Mod ELMing H-mode discharges compared to observed pedestal width and height. In particular, we present plasma current scans over 700kA-1MA, as well as shaping variation both in elongation (1.45-1.6) and upper/lower triangularity (0.15-0.3 and 0.7-0.8), in continuation of previous ELMing pedestal studies on C-Mod. EPED validation is also extended into the high-field (B_T~8T) and low-field (~3.5T) regimes in the high lower-triangularityequilibrium typically used for ELM studies on C-Mod. Additionally, several unusual ELMing discharges at typical C-Mod shape and lower density are characterized.

* Work supported by USDOE award: DE-FC02-99ER54512
[1] P.B. Snyder *et. al.*, *Physics of Plasmas,* **16**, 056118 (2009)
[2] P.B. Snyder *et. al.,* "A First Principles Predictive Model of the Pedestal Height and Width: Development, Testing, and ITER Optimization with the EPED Model", IAEA FEC, Daejeon, Korea, October 2010. THS/1-1. Submitted to *Nuclear Fusion.*