Stability and Edge-Localized Mode Characterization in I-Mode Pedestals

JR Walk,* JW Hughes, AE Hubbard, B LaBombard,
DF Brunner, JL Terry, DG Whyte, and AE White
MIT Plasma Science and Fusion Center

PB Snyder
General Atomics

E Edlund
Princeton Plasma Physics Laboratory

(Dated: November 21, 2014)

I-mode is a novel high-confinement tokamak regime characterized by H-mode-like enhanced energy confinement and the formation of a strong temperature pedestal, without the accompanying density pedestal or enhanced particle confinement, maintaining an L-mode-like density profile. I-mode exhibits a number of desirable properties for a reactor regime, including a lack of strong degradation of energy confinement with heating power and apparent naturally-occurring suppression of large ELMs, avoiding the need for externally-applied ELM suppression. However, under certain conditions (particularly, reduced toroidal field) small, intermittent ELM-like events are seen, although these cases are modeled to be stable to the peeling-ballooning MHD instability associated with the ELM trigger, as is typical of I-mode pedestals.

PACS numbers: 52.55.Fa, 52.55.Tn, 52.35.Py, 52.25.Fi, 52.40.Hf

* jrwalk@psfc.mit.edu

I. INTRODUCTION

ACKNOWLEDGMENTS

Experimental work on Alcator C-Mod is supported by US DOE agreement DE-FC02-99ER54512. Theory work at General Atomics is supported by US DOE agreement DE-FG02-99ER54309. The authors also wish to acknowledge the efforts of the Alcator C-Mod group for supporting the experiments reported here.