Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Measurement of Mode Converted ICRF Wave Intensity with Phase Contrast Imaging and Comparison with Full-wave Simulations on Alcator C-Mod[1] N. TSUJII, M. PORKOLAB, P.T. BONOLI, Y. LIN, J.C. WRIGHT, S.J. WUKITCH, Massachusetts Institute of Technology, E.F. JAEGER, XCEL Engineering, Inc., D.L. GREEN, Oak Ridge National Laboratory, R.W. HARVEY, CompX — Radio frequency (rf) waves in the ion cyclotron range of frequencies (ICRF) are widely used for heating fusion plasmas. In a multi-ion-species plasma, the launched fast waves convert to ion cyclotron waves and ion Bernstein waves around the two-ion hybrid resonances which exist between the cyclotron resonances. The mode converted waves are of interest as actuators to optimize plasma performance through current drive and flow drive. Numerical simulations are essential to describe these processes accurately in a realistic tokamak geometry, and it is important that these simulation codes be validated against experiment. The phase contrast imaging (PCI) technique has been used on Alcator C-Mod to measure directly the rf waves. The measurements were compared to predictions of full-wave simulations using a synthetic diagnostic method. The measured mode converted wave intensity was found to be a factor of 50 weaker than what was expected from the linear wave theory in a strong mode conversion regime. The agreement improved when the wave intensity was weaker, which is a possible indication of nonlinear wave physics being involved.

[1]Supported by USDoE awards awards DE-FG02-94-ER54235, DE-FC02-99-ER54512 and DE-FC02-01ER54648

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Date submitted: 20 Jul 2012 Electronic form version 1.4