Fast Ion Induced Shearing of Alfvén Eigenmodes Measured by 2D Electron Cyclotron Emission Imaging

B.J. Tobias, 1 I.G.J. Classen, 2 C.W. Domier, 1 W.W. Heidbrink, 3 N.C. Luhmann, Jr., 1 R. Nazikian, 4 H.K. Park, 5 D.A. Spong, 6 and M.A. Van Zeeland 7

1University of California, Davis, California, USA
2FOM Institute for Plasma Physics Rijnhuizen, Nieuwegein, The Netherlands
3University of California, Irvine, California, USA
4Princeton Plasma Physics Laboratory, Princeton, New Jersey, USA
5Pohang University of Science and Technology, Pohang, Republic of Korea
6Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA
7General Atomics, P.O. Box 85608, San Diego, California, 92186-5608 USA

Abstract. Two-dimensional images of electron temperature perturbations are obtained with Electron Cyclotron Emission Imaging (ECEI) on the DIII-D tokamak and compared to Alfvén eigenmode structures obtained by numerical modeling using both ideal MHD and hybrid MHD-gyrofluid codes. While many features of the observations are found to be in excellent agreement with simulations using an ideal MHD code (NOVA), other characteristics distinctly reveal the influence of fast ions on the mode structures. These features are found to be well described by the non-perturbative hybrid MHD-gyrofluid model TAEFL.

This work supported in part by the U.S. Department of Energy under DE-FG02-99ER54531, SC-G903402, DE-AC02-09CH11466, DE-AC05-00OR22725 and DE-FC02-04ER54698. This work also supported by NWO, POSTECH, and the Association EURATOM-FOM.