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The development of a 4.6 GHz reflectometer in Alcator C-Mod
S.G. BAEK, A. DOMINGUEZ, PSFC, MIT, S. SHIRAIWA, R. PARKER, P. BONOLI, E. MARMAR, J. WRIGHT, G. WALLACE, PSFC, MIT, G. KRAMER, PPPL — The development of a 4.6 GHz reflectometer system to detect LH waves in Alcator C-Mod plasmas is presented together with preliminary experimental results. Hard X-ray data of the 2008 Alcator C-Mod campaign indicated an anomalous decrease of photon generation in high density plasmas during LHCD experiments, suggesting LH waves did not propagate inside the plasma separatrix. Calculations and simulations show that the nonlinear interaction between a reflectometer probe beam and LH waves in the region where wave matching conditions are satisfied generates back-scattered, frequency shifted signals. To measure these signals, the high frequency stages of existing 60 GHz and 75 GHz O-mode reflectometer channels were modified, and intermediate frequency and power detecting stages have been added. The ray tracing code, GENRAY, and full wave simulations, e.g., TORIC and LHEAF, will be used to optimize plasma conditions for maximum response of frequency shifted signals. Both 1D and 2D transient analysis using the finite element solver, COMSOL, is also presented. Supported by USDoE award DE-FC02-99ER54512.

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