

Abstract Submitted
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Comparison of lower-hybrid frequency spectra at the high-field and low-field side in Alcator C-Mod¹ S.G. BAEK, R.R. PARKER, S. SHIRAIWA, G. WALLACE, D. BRUNNER, I. FAUST, A. HUBBARD, B. LABOMBARD, M. PORKOLAB, J. TERRY, C. LAU, PSFC, MIT, Y. TAKASE, University of Tokyo — On Alcator C-Mod, the precipitous decrease of lower-hybrid (LH) current drive efficiency has been observed above the line averaged density of $1 \times 10^{20} \text{ m}^{-3}$ in relatively low temperature target plasmas ($T_{e0} \sim 2 \text{ keV}$). A set of 6 spectral recorders with high repetition rate have been developed to examine the non-linear interactions between LH waves and plasmas. LH wave frequency spectra are measured using existing probes on Alcator C-Mod: one on the LH launcher, two on the inner wall, and three on the outer divertor. Interestingly, when the density is raised over $1 \times 10^{20} \text{ m}^{-3}$, the LH spectra measured at the inner wall show strong sidebands with spectral power that is comparable to that of the pump wave. The frequency spacing of the sidebands corresponds to the ion cyclotron frequency high field side, indicating that parametric decay instabilities occur near the inner scrape-off layers. These sidebands are observed to be much weaker when measured at the low field side. The LH spectra are generally broadened when measured away from the LH launcher, indicating LH waves may undergo scattering processes. These observations suggest that nonlinear processes can be also responsible for the observed degradation of the current drive efficiency in high density plasmas, in addition to collisional absorptions, ionizations, and full-wave effects.

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