Abstract Submitted
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Impact of density fluctuations on LHCD power deposition profile on Alcator C-Mod[1] S. G. BAEK, P. T. BONOLI, S. SHIRAIWA, G. M. WALLACE, MIT PSFC, R. T. MUMGAARD, MIT PSFC, CFS — Lower hybrid current drive (LHCD) experiments on Alcator C-Mod have demonstrated efficient current drive at a reactor-relevant density in a divertor configuration for the first time. A detailed experimental study [Mumgaard, MIT PhD Thesis (2016)] indicates that the injected wave power is centrally deposited with a self-similar power deposition profile that is insensitive to the input wave and plasma parameters. This contrasts with standard model analysis that generally predicts an off-axis power deposition in the C-Mod multi-pass damping regime. Since density fluctuations are always present in the tokamak boundary region, an interaction of the LH wave with the density fluctuation may modify wave propagation behavior by rotating the wave perpendicular wave-vector, $k_\perp$ [P. T. Bonoli and E. Ott, Phys. Rev. Lett. **46**, 424 (1981)]. In order to assess such an effect, a phenomenological model that introduces a spread in $k_\perp$ is examined using a GENRAY/CQL3D ray-tracing/Fokker-Planck model in the π-scope workflow. Modeling results indicate that, with a judicious choice of $k_\perp$ rotation, the ray exhibits enhanced first-pass radial penetration, leading to on-axis wave power deposition. A comparison of the model with the experimental result will be presented.

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