

Abstract Submitted
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Propagation of radio frequency waves through fluctuations in the scrape-off layer modeled by electromagnetic homogenization¹ K. HIZANIDIS, F. BAIRAKTARIS, S.-I. VALVIS, NTUA, Greece, A. K. RAM, PSFC, MIT — In tokamak plasmas, coherent fluctuations, such as blobs and filaments, are observed in the scrape-off layer (SOL). These fluctuations, embedded in background plasma, modify the spatial profile of the plasma permittivity. Radio frequency (RF) waves have to propagate through this spatially varying medium before depositing power in the core plasma. Any changes in the plasma permittivity modify the propagation properties of the waves, such as their polarizations and wave spectra. This, in turn, affects the spatial location and profile of the region where the waves deposit their energy on particles. Studies that have considered the scattering of RF waves by a single blob or filament are limited as they lack a global representation of the SOL. We have developed a special electromagnetic homogenization (EMH) technique to better model the SOL. The standard EMH model is for spherical dielectrics, small filling ratio, and for RF wavelengths longer than the inhomogeneity scale length. Our model is for ellipsoidal blobs of varying permittivity, and assumes that the filling ratio and the RF wavelengths are completely arbitrary. A description of our SOL model and its effect on the propagation of RF waves will be presented.

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Abhay Ram
Massachusetts Inst of Tech-MIT

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