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Propagation of radio frequency waves through density fluctuations[1] S. I. VALVIS, P. PAPAGIANNIS, A. PAPADOPOULOS, K. HIZANIDIS, E. GLYTSIS, F. BAIRAKTARIS, NTUA, Greece, A. ZISIS, I. TIGELIS, NKUA, Greece, A. K. RAM, MIT-PSFC — On their way to the core of a tokamak plasma, radio frequency (RF) waves, excited in the vacuum region, have to propagate through a variety of density fluctuations in the edge region. These fluctuations include coherent structures, like blobs that can be field aligned or not, as well as turbulent and filamentary structures. We have been studying the effect of fluctuations on RF propagation using both theoretical (analytical) and computational models. The theoretical results are being compared with those obtained by two different numerical codes a Finite Difference Frequency Domain code and the commercial COMSOL package. For plasmas with arbitrary distribution of coherent and turbulent fluctuations, we have formulated an effective dielectric permittivity of the edge plasma. This permittivity tensor is then used in numerical simulations to study the effect of multi-scale turbulence on RF waves. We not only consider plane waves but also Gaussian beams in the electron cyclotron and lower hybrid range of frequencies. The analytical theory and results from simulations on the propagation of RF waves will be presented.

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