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Scattering of radio frequency waves by plasma turbulence[1] A. K. RAM, MIT, K. HIZANIDIS, S. I. VALVIS, A. PAPADOPOULOS, E. GLYTSIS, NTUA, Greece, A. ZISIS, I. G. TIGELIS, NKUA, Greece — In order to optimize the heating of plasmas, or the generation of non-inductive plasma currents, it is necessary to assess the effect of edge turbulence in fusion devices on the propagation of radio frequency (RF) waves. We will present a set of theoretical and computational studies that model the propagation of RF waves through turbulent plasma. The theoretical models are mathematically tractable, and provide physical and intuitive insight into the scattering phenomena. The computational studies provide support for the theoretical models. We use two complementary approaches - geometrical optics and physical optics - for magnetized plasmas with a tensor permittivity. The former, an approximation to the latter full-wave approach, illustrates several important physical aspects of scattering. The physical optics method is the basis for studying scattering from blobs and filaments. Besides refraction and reflection, the spatial uniformity of power flow into the plasma is affected by side-scattering, diffraction, shadowing, and interference. Also, the incident wave can couple power to other plasma waves in the presence of fluctuations.

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