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RF Wave Propagation and Scattering in Tokamaks WENDELL HORTON, University of Texas at Austin, MARC GONICHE, CEA, IRFM, France, ALEX AREFIEV, University of Texas at Austin, YVES PEYSSON, ANNIKA EKEDAHL, CEA, IRFM, France, INSTITUTE FOR FUSION STUDIES COLLABORATION, IRFM CEA COLLABORATION — The propagation, scattering and absorption of the lower hybrid and electron cyclotron RF waves used to control fusion plasmas is reviewed. Drift wave turbulence driven by the steep ion and electron temperature gradients in H-mode divertor tokamaks produces strong scattering of the RF waves used for heating and plasma currents drive Both the 3-5GHz lower-hybrid (LH) and the 170GHZ electron cyclotron (EC) waves experience scattering and diffraction as propagating through the statistically complex density of the plasma. Ray equations are used to calculate the spread of the rays and the associated change in the parallel phase, polarization and group velocity of the RF waves in the propagation through the fusion plasma. A Fokker Planck equation for the phase space of the RF plasmons is one method to describe the spread of the RF wave power in the complex geometry of a divertor tokamak using the ray tracing codes. The evolution of the electron distribution function from the resonant electron-wave interactions is summarized for several scenarios. The resulting X-ray spectrum is broaden giving better agreement with the measured X-ray spectrum than that calculated in the absence of the turbulent scattering of the RF waves. M. Goniche, et al. and Tore Supra Team, Phys. Plasmas 21, 2014.

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