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Scattering of radio frequency waves by density fluctuations A.K. RAM, PSFC-MIT, K. HIZANIDIS, NTUA, Greece, Z. IOANNIDIS, I. TIGELIS, NKUA, Greece — The scattering of radio frequency waves by density fluctuations in magnetized fusion plasmas is studied theoretically and computationally. For coherent fluctuations, such as filaments in the edge region, we use a full-wave model for which the theory is similar to that for Mie scattering of electromagnetic waves by dielectric objects [1]. The filaments are considered to be cylindrical with their axes aligned along the magnetic field. The results from the theoretical model are compared with numerical simulations using COMSOL. The simulations are extended to plasma conditions that are beyond the scope of the theoretical model, e.g., multiple filaments and filaments with density gradients. For incoherent planar fluctuations, which can be either in the core of the plasma or in the edge region, our theory is based on the Kirchhoff approach in tandem with Huygen's principle. The coherent and incoherent fluctuations scatter the incident plane wave, as well as couple some of the power to different plasma waves. The scattered spectrum is affected by the size of the fluctuations, the frequency, and the direction of propagation of the incident wave.

[1] A. K. Ram, K. Hizanidis, and Y. Kominis, *Phys. Plasmas* **20**, 056110 (2013).

Abhay Ram
Massachusetts Inst of Tech-MIT

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