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P1.1071 From a reflectrometry code to a standard EC code to investigate the impact of the edge density fluctuations on the EC waves propagation

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Recent modelling and experimental studies [1-4] show that the edge density fluctuations can affect the electron cyclotron (EC) wave propagation in a tokamak plasma. In particular, the presence of density fluctuations in the scrape-off layer (SOL) can modify the EC beam propagation causing a power deposition broadening at the EC resonance location. This aspect could play a major role in the efficiency of the EC waves in stabilizing/suppressing the neoclassical tearing modes (NTMs). In this work, we show a new numerical tool originally developed for reflectometer simulations [5, 6] to address the points described above. This code was commonly used for reflectometer antenna-plasma coupling calculations that include density fluctuations [7]. The main capabilities of the codes are: (i) it solves the Maxwell equations in both 2D and 3D geometries; (ii) the numerical domain can be divided in three regions: a vacuum region, a paraxial region, and a full-wave region, each with the appropriate wave solving strategy for high computation efficiency. A description of the code will be presented together with a comparison between the paraxial and the full-wave solutions with and without edge density fluctuations in both 2D and 3D geometries. A scan in the amplitude of edge density fluctuations will be presented together with the evaluation of the 3D electric field pattern at the location of the EC resonance. Moreover, the impact of a time variation of the SOL density fluctuations to the EC beam will be explored. Finally, future applications with realistic fluctuations from experiment measurements and/or from turbulence codes will be discussed.

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