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Modelling Reflectometry Diagnostics: Finite-Difference Time-Domain Simulation of Reflectometry in Fusion Plasmas

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Reflectometry simulations are particularly important since they permit to assess the measuring capabilities of existing experimental systems and to predict the performance of future ones. We present a brief overview of reflectometry together with a short introduction to the Finite Difference Time Domain (FDTD) method for the simulation of reflectometry. The goal is to prepare the listener for the presentation of the family of REF MUL* codes, which incorporate new numerical solutions such as new kernels and source techniques. Their use allows to set up synthetic diagnostics that not only consider the wave propagation in a given plasma but also take into account the system's location within the vacuum vessel, together with a characterization of its access to the plasma (waveguides and antennas). The synthetic diagnostic is complemented with the signal processing techniques necessary to process the measured reflectometry data. We illustrate the use of synthetic diagnostics in the assessment of the Plasma Position Reflectometers of ITER and DEMO.

Summary

Synthetic reflectometry diagnostics implemented using the FDTD method permit to assess the measuring capabilities of existing experimental systems and to predict the performance of future ones such as the Plasma Position Reflectometers of ITER and DEMO.

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