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Full wave simulations of microwave interactions with turbulence MATTHEW THOMAS, RODDY VANN, JARROD LEDDY, University of York, ALF KOEHN, IPP Garching, UNIVERSITY OF YORK AND IPP GARCHING COLLABORATION, UNIVERSITY OF YORK AND CULHAM MICROWAVE GROUP TEAM — The interaction between electromagnetic radiation and plasma perturbations in the case that the radiation wavelength is comparable to the size of the perturbations is not a fully-understood problem. Yet the use of microwaves in magnetic confinement fusion plasmas is widespread for heating, current drive and both passive and active diagnostics, including in regimes for which there exist microwave length-scale plasma perturbations. We present simulation results using the full-wave cold plasma finite difference time domain codes EMIT-3D and IPF-FDMC developed independently at York and Stuttgart, respectively. First we present a novel systematic study of the scattering of microwaves through turbulence: we quantified the relationship between the normalised turbulent correlation length and the scattered power. Additionally we found a quadratic relationship between the scattered wave power and the turbulence amplitude. We go on to present results to model the Doppler back-scattering of a broad microwave beam from a moving turbulent slab. This second problem is particularly important for interpreting data from the Synthetic Aperture Microwave Imaging (SAMI) diagnostic currently installed on NSTX-U.

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