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Synthetic Reflectometry Applied to Realistic Plasma Simulation Code[1] LEI SHI, STEPHANE ETHIER, WILLIAM TANG, ERNEST VALEO, WEIXING WANG, Princeton Plasma Physics Laboratory — Reflectometry is widely used in magnetically-confined plasma devices to measure both the density equilibrium profile and fluctuations. In order to better understand and thereby more effectively interpret the output, it is very useful to have a "synthetic diagnostic"/numerical emulator for the reflectometer itself – a synthetic reflectometer. In particular, instead of considering a collection of artificially created equilibrium and fluctuation profiles to test the efficacy of this tool, it is more relevant to apply this against realistic equilibria and fluctuations produced in an actual "numerical experiment." In this work, we apply the synthetic reflectometer to a modern 3D gyrokinetic particle simulation code named GTS which is interfaced against realistic shaped-cross section tokamak equilibria and performs first principle simulations of the evolution of fluctuations. Results will be presented on progress toward our goal of producing – for the first time – the capability to generate synthetic diagnostic results from turbulence simulations that can be compared to those from experimental reflectometry measurements under similar plasma conditions. This could be used in realistically characterizing experimental results, verification, validation and uncertainty quantification.

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