Including RF Antenna Effects in Scrape-Off-Layer-Turbulence Simulations*

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We discuss progress on including RF effects in tokamak edge/Scrape-Off-Layer (SOL)-relevant turbulence simulations. A capability for studying effects of boundary conditions representing RF launching structures on turbulent solutions such as those from the SOLT3D code is being developed. SOLT3D is a 3D BOUT++-based extension of the SOLT model [1] currently under development at LLNL. Simple model RF-sheath boundary conditions, involving regions on the outer flux surface biased at an effective potential relative to other parts of the surface and other boundary surfaces, are being implemented and tested in SOLT3D. A steady axisymmetric version of the SOLT3D model has also been implemented in the COMSOL Finite-EleMent (FEM) package. This can be used to benchmark SOLT3D solutions and is also capable of handling more complicated domains and boundary shapes, such as indentations representing antenna and shielding structures, than is currently possible under BOUT++. The values of fields on a flux surface in the FEM solutions can be used as boundary conditions in BOUT++-based (e.g., SOLT3D turbulence) simulations. Progress on developing such a simulation workflow will be discussed, and results from verification studies and initial simulations will be presented. The inclusion of ponderomotive effects in the SOLT3D model will also be discussed.

[1] J. R. Myra, D. A. Russell, D. A. D'Ippolito, Phys. Plasmas 15, 032304 (2008)

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