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Time-Domain modeling of tokamak RF edge physics with the VORPAL code[1] DAVID SMITHE, JOHN R. CARY[2], CHET NIETER, JOHAN CARLSSON, Tech-X Corporation, CYNTHIA PHILLIPS, Princeton Plasma Physics Laboratory, DAN D'IPPOLITO, Lodestar Research Corporation — We present progress in the development of time-domain tokamak RF edge physics modeling. The target application for this modeling effort has transitioned to Tech-X's VORPAL simulation tool. This new tool provides significant advantages for speeding up the development process. Recent progress on this tool (see paper by Nieter et al., this conference) provides curved surfaces modeling. An existing fluid model can provide an algorithmic foundation for the semi-implicit linear magnetized plasma dielectric model. Demonstrated large scale parallel operation of VORPAL is also an important advantage. Additional theoretical development includes the introduction of a time-domain RF sheath model. A concern for RF heating of tokamaks is parasitic power loss that can occur in the plasma sheaths at the metallic and dielectric surfaces within the vessel. However, these effects can be very dependent on geometry specifics, necessitating a 3D modeling tool, such as VORPAL. We present a time-domain equivalent algorithm of the frequency-domain model in the reference, LRD-05-104, D. A. D'Ippolito et al., which estimates RF power loss to sheaths.

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