

Abstract Submitted
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Sheath boundary in 3-D time-domain edge plasma simulation¹

D.N. SMITHE, A. HAKIM, Tech-X Corporation, D.A. D'IPPOLITO, J.R. MYRA, Lodestar Research Corporation, E.F. JAEGER, L.A. BERRY, Oak Ridge National Laboratory, SCIDAC CENTER FOR SIMULATION OF WAVE-PLASMA INTERACTIONS TEAM — A general purpose time-domain plasma simulation algorithm has been constructed and implemented in the VORPAL software framework.[1] It is able to represent the complex physical boundaries of the ICRF antenna structure, and complex magnetic topology of the edge region. This time-domain algorithm is now being supplemented with a sub-grid boundary sheath model based upon the work of D'Ippolito et al.[2] We verify the model against known behavior from frequency-domain sheath calculations in 1-dimension. We also test the model in 3-D simulation including RF launcher geometry, and compare results with related models being implemented in 1, 2, and 3-D full wave solvers. This new model will provide realistic estimates of power loss due to short range sheaths. We will also present possible strategies for treating mid and long range sheaths within the model.

[1] D. N. Smithe, Physics of Plasmas, Vol. 14 056104 (2007).

[2] D. A. D'Ippolito and J. R. Myra, Phys. Plasmas 13, 102508 (2006).

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David Smithe
Tech-X Corporation

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