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**Self-consistent modeling of the tokamak RF antennas, edge plasma, and sheath voltages** DAVID SMITHE, TOM JENKINS, TRAVIS AUSTIN, JOHN LOVERICH, PETER STOLTZ, Tech-X Corporation — We model the 24-strap ITER RF antenna with a time-domain electromagnetic simulation package [1] that faithfully represents the 3D complexity of the launcher geometry. The simulations include a cold-plasma fluid model of the edge plasma [2], with an RF sheath sub-grid model which allows for realistic behavior of plasma in contact with metallic structures, such as Faraday shields [3]. Interestingly, localized short wavelength modes, likely slow waves, have been observed in the vicinity of the launcher, and are very sensitive to density. We investigate the effect on these waves for varying density, density profile, and magnetic shear. We further investigate the contribution to high sheath potentials such waves might have. We also present status and additional highlights of the continuing evolution of the overall model. This includes studies to benchmark the nonlinear sheath width and loss parameters, and more diagnostics aimed towards better characterizing energy balance. It also includes application of the analysis on larger problem domain size, with scaling-study results. Finally, we review recent work to improve the model for warm plasma, and nonlinear effects. Work supported by US. DOE Grants DE-FG02-09ER55006 and DE-FC02-08ER54953.

[1] Nieter, C. and Cary, J. R., JCP 196 (2004) 448-473.
[2] Smithe, D., Physics of Plasmas 14, 056104 (2007).
[3] Myra and D'Ippolito, PRL 101, 195004 (2008).

David Smithe
Tech-X Corporation

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