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Allowing for Slow Evolution of Background Plasma in the 3D FDTD Plasma, Sheath, and Antenna Model[1] DAVID SMITHE, THOMAS JENKINS, JAKE KING, Tech-X Corporation — We are working to include a slow-time evolution capability for what has previously been the static background plasma parameters, in the 3D finite-difference time-domain (FDTD) plasma and sheath model used to model ICRF antennas in fusion plasmas [1]. A key aspect of this is SOL-density time-evolution driven by ponderomotive rarefaction from the strong fields in the vicinity of the antenna. We demonstrate and benchmark a Scalar Ponderomotive Potential method [2], based on local field amplitudes, which is included in the 3D simulation. And present a more advanced Tensor Ponderomotive Potential approach [3], which we hope to employ in the future, which should improve the physical fidelity in the highly anisotropic environment of the SOL. Finally, we demonstrate and benchmark slow time (non-linear) evolution of the RF sheath, and include realistic collisional effects from the neutral gas. [1] "Benchmarking sheath sub-grid boundary conditions for macroscopic-scale simulations," T. G. Jenkins and D. N. Smithe, Plasma Sources Science and Technology 24 (2015). [2] "Nonlinear ICRF-plasma interactions," J. R. Myra, et. al., Nucl. Fusion 46, S455 (2006). [3] "Improvements to the ICRH Antenna Time-Domain 3D Plasma Simulation Model," D. N. Smithe, T. G. Jenkins, J.R. King, 21st Topical Conf. on RF Power in Plasmas (2015).

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