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Resolving the Plasma Sheath Layer in Two–Dimensional Magnetized Discharges[1] MARK CARTER, PHILIP RYAN, Oak Ridge National Laboratory, DANIEL HOFFMAN, Applied Materials — The nonlinear physics of sheaths is important to study, not only for the constructive use of sheaths in semi–conductor processing, but also for their destructive tendencies in high power RF fusion applications. The disparity in device–to–sheath scale lengths often allows semi–analytical sheath models to be applied locally in a sheath layer, but whole–system models of realistic devices must be at least two–dimensional (2D) and require a consistent implementation of the sheath models. Whole–system models must also consider sources and transport of plasma outside the sheath layer, electromagnetic coupling throughout the entire RF circuit, and neutral gas flows through the system. In this paper, we present results from joining 2D models of plasma transport and RF power coupling (including static magnetic fields) with locally consistent sheath models using the Modular Oak Ridge RF Integeration Code (MORRFIC). Nonlinear power coupling is accounted for by modifying the local dielectric inside the sheath when resolving the layer. Relatively modest 64–bit computing facilities are used to iterate the RF sheath and nonlinear dielectric properties to be consistent with the RF global solution.

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Mark Carter
Oak Ridge National Laboratory

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