Fusion Antenna Analysis Using The Modular Oak Ridge RF Integration Code (MORRFIC) *

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Nonlinear and small scale effects occur in the RF near-field region of fusion antennas, including sheaths, ponderomotive effects, and gas build-up to self-generate plasma. Integrated modules in MORRFIC can estimate the importance of, and interplay between, these various effects. Modules include a linear RF Maxwell solver with plasma variations across and along field lines. Solutions from this module can be used to estimate ponderomotive effects, sheath driving terms, and collisional dissipation. Other modules can be iterated with these solutions to study plasma transport[1]. Transport models include SOLT[1], which models the effect of RF fields on turbulent radial plasma transport, and a weakly-ionized two-dimensional model of collisional transport in RF self-generated plasma. The geometry allows azimuthally symmetric perfectly conducting boundary conditions and complex dielectrics, including a local plasma dielectric tensor. 3-D antenna structures can be modeled using Fourier analysis. A sheath mask is implemented to allow different non-linear sheath models to be included, and diagnostics are available to estimate non-linear effects.

[1] D.A. D'Ippolito, et.al., this conference.

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