Analytic Model of Antenna Sheaths[1] D.A. D'IPPOLITO, J.R.
MYRA, Lodestar Research Corporation — RF sheaths are generated on ICRF antennas whenever the launched fast wave also drives a slow wave, e.g. when the magnetic field is tilted (not perpendicular to the current straps). A new approach to sheath modeling was recently proposed[2] in which the RF waves are computed using a modified boundary condition at the sheath surface to describe the plasma-sheath coupling. Here, we illustrate the use of the sheath BC for antenna sheaths by a model electromagnetic perturbation calculation, treating the B field tilt as a small parameter. Analytic expressions are obtained for the sheath voltage and the rf electric field parallel to B in both sheath and plasma regions, including the Child-Langmuir (self-consistency) constraint. It is shown that the plasma corrections to the sheath voltage (which screen the rf field) can be important. The simple vacuum-field sheath-voltage estimate is obtained as a limiting case. Implications for antenna codes such as TOPICA.[3] will be discussed.

[2]D.A. D'Ippolito and J.R. Myra, Phys. Plasmas **13**, 102508 (2006).
[3]V. Lancellotti et al., Nucl. Fusion **46**, S476 (2006).

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