Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Design of an ICRF plasma thruster antenna by TOPICA
GIUSEPPE VECCHI, VITO LANCELLOTTI, RICCARDO MAGGIORA, Politecnico di Torino, Italy — A typical RF plasma thruster is comprised of an RF plasma source, an open-ended magnetic confinement device, an RF acceleration unit and a magnetic nozzle. The usual choice for the acceleration is to employ the Ion-Cyclotron resonance frequency (ICRF), a well established technology in fusion experiments for transferring large RF powers to magnetized plasmas. To help design RF thruster ICRF antennas, TOPICA (Torino Polytechnic Ion Cyclotron Antenna) code [1] has been recently extended to handle cylindrically symmetric plasmas. The latter entailed developing a wholly new module of TOPICA charged with the task of solving Maxwell's equations in cylindrical magnetized warm plasmas and yielding the Green's function $\underline{\underline{\tilde{Y}}}(m, k_z)$, i.e. the relationship at the air-plasma interface between the transverse magnetic and electric fields in the spectral (wavenumber) domain. The approach to the problem of determining the antenna input impedance relies on an integral-equation formulation for the self-consistent evaluation of the current distribution on the conductors. This work reports on TOPICA evolution and presents the design of an RF thruster ICRF antenna.

1. V. Lancellotti et al., Nucl. Fusion, **46** (2006) S476-S499

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Date submitted: 22 Jul 2006 Electronic form version 1.4