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Designing an RF thruster booster unit with TOPICA[1] VITO LANCELLOTTI, GIUSEPPE VECCHI, RICCARDO MAGGIORA, Politecnico di Torino — Electromagnetic (RF) plasma-based propulsion systems have gained increasing interest, as able to yield continuous thrust and controllable and wide-ranging exhaust velocities. An RF plasma thruster essentially features a plasma source, a booster unit and a magnetic nozzle. The usual choice for the booster is the ion-cyclotron resonance heating (ICRH), a well-established technology in fusion experiments to convey RF powers to magnetized plasmas. To help design the booster unit, TOPICA was extended to deal with magnetized cylindrical inhomogeneous plasmas [1]. The latter required a new module in charge of solving Maxwell's equations within the plasma to obtain the pertinent Green's function in the Fourier domain, i.e. the relation between the transverse magnetic and electric fields at the air-plasma interface. Calculating the antenna impedance—and hence the plasma loading—relies on an integral-equation formulation and subsequent finite-element weighted-residual scheme to evaluate the current density distribution on the conducting bodies and at the air-plasma interface. In this work the design of an ICRH stage with TOPICA is discussed.
[1] V. Lancellotti *et al.* (2007) *Proc. Joint Propulsion Conf.* AIAA-2007-5129

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