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A 2D Semi-Analytical Electromagnetic Model for Cylindrical ICP Sources with Faraday Shield

Faraday shield(FS) is a metallic shield with slits through which electromagnetic energy is coupled into cylindrical ICP sources. Thus, the effect of FS on the RF power coupling is important to the RF ion sources for fusion[1-2]. Based on the electromagnetic models considering only plasma[3] or FS[4], a 2D model considering both FS and plasma is proposed in this contribution. A long copper FS is approximated to an ideal conductor, and is placed between a uniformly distributed coil and a plasma represented by a uniform lossy dielectric. The magnetic field in free space and plasma is the same as that without FS. Then, the electric field is decomposed into a vortex field and a gradient field. The former is determined by the varying magnetic field only and is obtained analytically. The latter is due to the electric charge accumulated on the surfaces. All points of the gradient field are nearly in phase, so this quasi-static field can be easily obtained by numerically solving a Laplace's equation. By means of this simple model, the electromagnetic mechanism of FS affecting RF coupling is discussed.
[1] Toigo V et al 2021 Fusion Eng. Des. 168 112622
[2] Zielke D P et al 2021 J. Phys. D: Appl. Phys. 54 155202
[3] Chabert P et al 2011 Physics of Radio-Frequency Plasmas
[4] Zhang L G et al 2016 Fusion Eng. Des. 103 74

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