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Scattering of Lower Hybrid Waves in a Magnetized Plasma

In this paper, the Maxwell equations for the electric field in a cold magnetized plasma in the half-space of x≥0 cm are solved. The boundary conditions for the electric field include a pointwise source at the plane x=0 cm, the derivatives of the electric field that are zero stats/cm2 at x=0 cm, and the field with all its derivatives that are zero at infinity. The solution is explored in terms of the Laplace transform in x and the Fourier transform in y-z directions. The expressions of the field components are obtained by the inverse Laplace transform and the inverse Fourier transform. The saddle-point technique and power expansion have been used for evaluating the inverse Fourier transform. The model represents the propagation of a lower hybrid wave generated by a pointwise antenna located at the boundary of the plasma. Here, the antenna is the boundary condition. The validation of the model is performed assuming that the electric field component Ey=0 statV/cm and by comparing it with the model of electromagnetic waves generated by a local small antenna located near the boundary of a tokamak, and an experiment is suggested.

Keywords: dielectric tensor; dispersion relations; electric field.

Biography

Brunello Tirozzi of Mathematical Physics at the University of Rome La Sapienza, Department of Physics. Retired in 2015, since then associate to Enea Research Center of Controlled Fusion at Frascati, Rome. I have published 170 research papers on different fields: elementary particle physics, quantum lattice models, classical dynamics of particle systems, Gibbs random fields for classical spins, central limit theorem for Gibbs random field, Gibbs state for the system with random interaction, neural networks, storage of patterns, Hopfield model. Models of biological neurons. Neural networks description of the immune system. Solutions of hydrodynamical equations, asymptotic expansions. Application to typhoon and tsunami propagation, Maslov operator, run-up. Plasma physics, the study of the solution of photosphere plasma, application to accretion disks of stars, propagation of em waves in a plasma.

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