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Scattering of Oblique Electromagnetic Waves by a Thin Conducting Wire Parallel to the Ambient Magnetic Field in a Non-Gyrotropic Plasma in the Resonance Frequency Range

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A problem of scattering of oblique plane electromagnetic waves propagating in a cold non-gyrotropic plasma in the resonance frequency range by a thin finite-length conducting wire parallel to the ambient magnetic field is considered. The solution to the scattering theory integral equation for the current induced on the wire surface as well as the scattering field and cross section are found and analyzed. The approach is based on the perturbation theory that takes into account the thin wire approximation generalized to the case of the anisotropic plasma. Special attention is paid to the case of highly oblique quasi-electrostatic waves which scattering characteristics are quite unique. The results are important for analysis of (a) reception of electromagnetic waves in the space plasma using antennas onboard spacecraft and (b) diffraction of electromagnetic waves by long field-aligned plasma density irregularities in planetary magnetospheres under certain conditions.

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