Abstracts

Excitation of Plasma Waves in an Unbounded Homogeneous Plasma by a Line Source

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The radiation characteristics of a line source of magnetic current embedded in a homogeneous electron plasma of infinite extent are investigated for the case in which a uniform magnetic field is impressed externally throughout the medium in the direction of the source. The single-fluid theory of magnetohydrodynamics is employed. A very simple model is assumed for the plasma. Under this assumption, it is found that there are two modes of propagation of waves of small amplitude. By examining the behavior of these modes in the limiting cases of vanishing external magnetic field or infinite source frequency, they are identifiable as the modified forms of the usual plasma and optical modes which exist in an isotropic electron plasma. The dispersion relations for these two modes are discussed. The power radiated in each of the two modes is also evaluated. It is found that the power radiated in the optical mode is always lower than that due to the line source in free space, whereas the power radiated in the plasma mode is higher than that value for certain ranges of the source frequency.

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