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Impulsive excitation of high frequency electrostatic waves by a point charge in a cold magnetized and unbounded plasma

O. C. Randriamboarison

Université d'Orléans and Laboratoire de Physique et Chimie de l'Environnement, UMR 6115, Centre National de la Recherche Scientifique (LPCE/CNRS), 45071, Orléans, France (randriam@cnrs-orleans.fr)

A quite classical problem of impulsive excitation of longitudinal waves at the upper-hybrid branches of the resonance cone is considered. We describe the new formalism which allows an analytical treatment of the propagation equation. Considering the evolution equation in its equivalent Volterra integral equation, a method based on Picard's successive approximation is employed in order to derive the resolvent kernel. A simple convolution, with respect to time variable, of this resolvent kernel with the suitable source term leads to the time evolution of the impulsive response of the magnetoplasma. At this stage however, the problem solution takes the form of a mathematical expression exhibiting derivatives with respect to spatial variables. By the aid of Heaviside direct operational formalism, we then proceed to an analytical inversion of this intermediate formulation. As a result, the explicit expression of the excited longitudinal wave potential is inferred. Discussions of various conditions and physical situations of the magnetized plasma then complete the contribution.