Title	Electromagnetic waves in magneto-plasma medium
Sub Title	
Author	近藤, 倫正(Kondo, Michimasa)
Publisher	慶応義塾大学藤原記念工学部
Publication year	1965
Jtitle	Proceedings of the Fujihara Memorial Faculty of Engineering Keio University (慶応義塾大学藤原記念工学部研究報告). Vol.18, No.71 (1965.) ,p.100(36)- 100(36)
JaLC DOI	
Abstract	
Notes	Summaries of Doctor and Master Theses Master of Engineering, 1965 Electrical Engineering
Genre	Departmental Bulletin Paper
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00180071-0036

Electromagnetic Waves in Magneto-Plasma Medium

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The classical Appleton-Hartree equation is given for the calculation of the propagation constants of an electromagnetic wave in magneto-plasma medium. Since the Appleton-Hartree equation has four parameters, i.e. the density of charged particles, mean collision frequency, outer DC magnetic field and the frequency of an electromagnetic wave, the calculation of the propagation constants is extremely complicated.

This paper consists of two chapters. In the first chapter it is described how the propagation constants vary with the intensity of the earth magnetic field in general atmospheric zone. From the result of theoretical calculation, it has become clear that the phase terms of the propagation constants vary about 10^{-24} rad/m with the variation of 1 gauss of magnetic flux density.

In the second chapter, the complex specific dielectric constants of magneto-plasma medium are evaluated graphically. Four parameters mentioned above are normalized and transformed variables, so that the specific dielectric constants for the various parameter values might be given with the graph. By means of above mentioned graph, the author got relevant boundary values for the parameters to detect variations of magnetic fields.

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