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Electromagnetic Waves in Magneto-Plasma Medium

Michimasa KONDO*

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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