plasma densities. For the case of an anisotropic Maxwellian velocity distribution, (1) simply becomes

\[ \omega^2 > \frac{1}{2} \frac{\alpha^2}{c^2} \omega_p^2, \]  

where \( \alpha \) is the thermal velocity along \( B_0 \).

Now, we consider an anisotropic Maxwellian velocity distribution with loss cones given by

\[ f_0 = \frac{1}{N \pi^3 \alpha_1 \alpha_2} \exp \left[ -\frac{\left( \frac{v_1}{\alpha_1} \right)^2 + \left( \frac{v_2}{\alpha_2} \right)^2}{2} \right], \]

\[ v_\perp > \frac{|v_\perp|}{(R - 1)^4}, \]

\[ v_\parallel = 0, \quad v_\parallel < \frac{|v_\parallel|}{(R - 1)^4}, \]  

where \( \alpha_\perp \) denotes the thermal velocity perpendicular to \( B_0 \), \( R \) is the mirror ratio, and \( \int f_0 dv = 1 \) so that \( N = [(R - 1)\theta/(R - 1) + 1]^2 \) where \( \theta = (\alpha_\perp/\alpha_\parallel)^2 \). We find that for this distribution the condition for stability of the electromagnetic wave propagating perpendicular to \( B_0 \) becomes

\[ \omega^2 > \frac{1}{2} \frac{(R - 1) \theta}{(R - 1) + 1} \frac{\alpha^2}{c^2} \omega_p^2. \]  

This differs from (2) by the factor \( (R - 1)\theta/(R - 1) \cdot \theta + 1 \) which is less than one for all finite values of \( R \) and \( \theta \). For \( R = 1 \), there is no instability since the dispersion relation is reduced to the cold plasma case where \( \omega^2 = c^2 k^2 + \omega_p^2 \) (\( R = 1 \) means that particles with any motion along \( B_0 \) will escape from the mirror configuration and the results of Hamasaki show that the instability is due to thermal motion along \( B_0 \)). For \( R = \infty \), we simply regain (2) as this value of \( R \) means that all particles are confined in the mirror configuration.

Consequently, we have shown, from (4), that the loss cones of an anisotropic Maxwellian velocity distribution have a stabilizing influence on electromagnetic waves propagating perpendicular to an applied uniform magnetic field \( B_0 \), when compared with an anisotropic Maxwellian without loss cones.

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**Comments**

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**Comment on “Oblique Incidence of an Electromagnetic Wave on a Plasma Layer”**

VAUGHAN H. WESTON

Radiation Laboratory, Department of Electrical Engineering, The University of Michigan, Ann Arbor, Michigan
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In the nonrelativistic analysis of a plane wave incident upon a warm plasma slab\(^1\) and half-space,\(^2\) a coupling term \( \beta \) defined as follows from Eq. (24)\(^3\):

\[ \int v_0 f_0(v) \nu v \, dv = -i \pi \omega^2 \lambda \rho n \beta \]

occurs, which was nonzero for the Maxwellian distribution function. It can be shown that this expression can be written in the reduced form

\[ \beta (\omega^2 \lambda \rho ; n) = -2 \int_{-\infty}^{\infty} \nu v f_0(v) \, dv, \]

where

\[ v^2 = v_0^2 + v^2, \]

for an isotropic unperturbed distribution function. For a cutoff distribution function \( f_0(v) \) which vanishes for \( |v| < v_0 \), it follows that \( \beta \) vanishes if \( v_0 > c/\sin \alpha \). Since nonrelativistic theory was employed,\(^1,\(^2\) it is more appropriate to use the cutoff distribution function where \( v_0 = c \). In this case, \( \beta \) will vanish for \( |\sin \alpha| < 1 \), and should be neglected in the final results.\(^1,\(^2\) However, for the case \( |\sin \alpha| > 1 \), which would arise in the plane wave decomposition of the incident field produced by a source in the vicinity of the slab or interface, the term \( \beta \) may not necessarily vanish for the cutoff distribution function.

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