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Kinetic analysis of electromagnetic wave-plasma interaction at oblique and perpendicular incidence[1] SHABBIR A. KHAN, ATSUSHI FUKUYAMA, Department of Nuclear Engineering, Kyoto University — The electromagnetic wave-plasma interaction near the plasma frequency in an inhomogeneous unmagnetized plasma is studied using an integral form of the dielectric tensor which has been derived by following unperturbed particle orbits. With this kinetic dielectric tensor, integro-differential full wave analysis was carried out numerically. For the case of oblique incidence to the density gradient, the wave excites an electrostatic Langmuir wave which is absorbed by Landau damping. The incident angle dependence of the absorption rate is almost the same as that of collisional fluid model, but the power deposition profiles for finite temperature is quite different from the collisional model. In the case of perpendicular incidence, convensional analyses predict no absorption since there is no longitudinal wave electric field to excite the electrostatic wave. Our new analysis based on the integral formulation, however, indicates the absorption in this case due to strong gradient of wave electric field amplitude. This is a result of stochastic heating caused by the random phase of electron oscillating velocity when the electrons goes through the boundary layer. The integral formulation of dielectric tensor enables us self-consistent analysis of wave structure and kinetic absorption.

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