

Application of ECE for electron distribution function analysis under OH and ECH in T-10 tokamak plasma*

V.I. Poznyak, V.V. Pitersky, G.N. Ploskirev, E.G. Ploskirev
Russian Research Centre "Kurchatov Institute," Nuclear Fusion Institute, Moscow, Russia

ECE diagnostics on T-10 allows to measure emission in X- and O-mode into wide range of frequencies (37 – 178 GHz) including the spectra of “upper thermal” electrons with energy up to 300 keV. Comparison of spectra in two polarizations gives information on total, longitudinal and perpendicular velocity of electrons. Radiation of electron flux with total characteristic energy 60 – 100 keV and relatively low transverse energy is registered regular on the outer magnetic surface $q=3$. It is consequence of the non local transport from internal plasma areas. Specific ECE spectra transformation shows to important role of the potential plasma waves in this transport process and in forming of electron distribution function. Similar peculiarities of electron distribution in space were found also on the magnetic surfaces $q=1$ and 2 under condition when optical density of plasma is “gray”. ECE in O-mode under excitation of so called MHD oscillations during central slightly modulated ECH contents regular spikes of high amplitude on the eigen and modulating frequencies of $m/n=1/1$ mode. Pulsing accelerating electric field into $m/n=1/1$ mode area is evaluated as 0.1 – 1 V/cm. Essential difference in dynamics of ordinary and extraordinary ECE from the “black body” central plasma illustrates also strong disturbance in the main part of electron distribution in this regime.

*Work supported by DNST of MinAtom RF.