

The Plasma Additional Heating Systems by Electron Cyclotron Waves

Authors : Ghoutia Naima Sabri, Tayeb Benouaz

Abstract : The interaction between wave and electron cyclotron movement when the electron passes through a layer of resonance at a fixed frequency results an Electron Cyclotron (EC) absorption in Tokamak plasma and dependent magnetic field. This technique is the principle of additional heating (ECRH) and the generation of non-inductive current drive (ECCD) in modern fusion devices. In this paper we are interested by the problem of EC absorption which used a microscopic description of kinetic theory treatment versus the propagation which used the cold plasma description. The power absorbed depends on the optical depth which in turn depends on coefficient of absorption and the order of the excited harmonic for O-mode or X-mode. There is another possibility of heating by dissipation of Alfvén waves, based on resonance of cold plasma waves, the shear Alfvén wave (SW) and the compressional Alfvén wave (FW). Once the (FW) power is coupled to (SW), it stays on the magnetic surface and dissipates there, which cause the heating of bulk plasmas.

Keywords : electron cyclotron, heating, plasma, tokamak

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