OVERVIEW OF THE ITER EC H&CD SYSTEM AND ITS CAPABILITIES

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The Electron Cyclotron (EC) system for the ITER Tokamak is designed to inject ≥20 MW RF power into the plasma for Heating and Current Drive (H&CD) applications. The EC system consists of up to 26 gyrotrons (between 1 to 2MW each), the associated power supplies, 24 transmission lines and 5 launching antennas (or launchers). The EC system has a diverse range of applications including central heating and current drive, stabilization of plasma instabilities such as the sawtooth, magneto hydrodynamic instabilities and neoclassical tearing modes (NTMs), and current profile tailoring. This diverse range of applications requires the launchers to be capable of depositing the EC power across nearly the entire plasma cross section. This is achieved by two types of antennas: an equatorial port launcher (capable of injecting up to 20MW from the plasma axis to mid-radius) and four upper port launchers providing access from inside of mid radius to near the plasma edge. The equatorial launcher design is optimized for central heating, current drive and profile tailoring, while the upper launcher should provide a very focused and peaked current density profile for control of the plasma instabilities.

The overall EC system has been modified during the past three years taking into account the issues identified in the ITER design review from 2007 and 2008 as well as integrating new technologies [1]. This paper will review the principal objectives of the EC system, modifications made during the past two years and how the design is compliant with the principal objectives.

[1] C. Darbos et al., Fusion Engineering and Design, 84, 2009, 651-655