

Determination of Rational Surface Position and Magnetic Island Width in TCABR

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Magnetic islands inside the plasma are one of the most important subjects in stability and transport properties in tokamaks. Typically, measurement of the electron temperature with high radial and temporal resolutions shows peculiarities which can be associated with the presence of magnetic islands [1]. For better characterization of the magnetohydrodynamic (MHD) activity, we have combined external magnetic measurements (twenty-four Mirnov coils in a poloidal cross-section) with soft X-rays (twenty chords views the plasma column laterally, from low field side) and bolometer array (twenty-four chords views the plasma column from top to the bottom). Since the MHD instabilities cause oscillations in the radiated power profile measured by the bolometric and soft X-rays that could also provide a possibility to determine the width and radial position of magnetic islands. The spectral analysis of the bolometric signals are compared with the spectral analysis of a simulated signal. A Matlab® program was specially developed to simulate the integral characteristic of the MHD-induced oscillations in the radiated power measured by the bolometric system and these signals were then adjusted to fit the experimental spectrum results. These results were then compared with the rational surface position and magnetic island width that were determined directly from the ECE measurements [2].

[1] A.M.M. Fonseca, V.S. Tsypin, R.M.O. Galvão, Y.K. Kuznetsov, I.C. Nascimento, R.P. da Silva, E.A. Seatone and A. Vanucci, *Physics of Plasmas* **12**, 052501-1 (2005)

[2] Antonio M.M. Fonseca, Vladimir S. Tsypin, Ricardo M.O. Galvão, Ivan C. Nascimento and Yurii K. Kuznetsov, *IEEE Transactions on Plasma Science* **33**, 2046 (2005)