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Modulation method as a tool to measure three dimensional magnetic field structures in toroidal plasmas KATSUMI IDA, TATSUYA KOBAYASHI, National Institute for Fusion Science, Toki, 509 5292, Japan, WONHA KO, HYUNGHO LEE, YONGKYOON IN, HYUNSEOK KIM, National Fusion Research Institute, Daejeon 34133, Korea — Three dimension (3D) magnetic field applied by external coils is modified by the 3D current produced by plasma (plasma response). For example, the magnetic island produced by the external field and resonant or non-resonant magnetic perturbation (NRMP or RMP) field applied usually differ from the vacuum magnetic field due to the plasma response. Therefore, it is important to determine the 3D magnetic field experimentally, not based on the magnetic field calculation. Two modulation techniques applied to various toroidal plasmas to measure 3D magnetic field structure are discussed. One is the modulation electron cyclotron heating (MECH) to measure the size of magnetic island by taking advantage of bi-directional (inward and outward) heat pulse propagation excited by MECH inside magnetic island. Recently, the modulation of NRMP or RMP field is applied to measure the penetration length of the 3D perturbation magnetic field using the modulation amplitude profile of the toroidal rotation gradient. In this talk, 1) bifurcation phenomena of magnetic island in LHD [1] and DIII-D [2] plasmas and 2) non-linearity of the penetration of 3D magnetic field in KSTAR H-mode plasma will be presented. Ref [1] K.Ida et. al., New J. Phys. 15 (2013) 013061, [2] K.Ida et. al., Sci. Rep. 5 (2015) 16165.

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