Electron Cyclotron/Bernstein Heating and Current Drive Experiments using Phased-array Antenna in QUEST

H.Idei[1], H. Zushi[1], K. Hanada[1], K. Nakamura[1], A. Fujisawa[1], M. Sakamoto[1], M. Hasegawa[1], H. Igami[2], S. Kubo[2], M. Ishiguro[3], M. Sakaguchi[3], E.I. Kalinnikova[3], S. Tashima[3], S. Kawasaki[1], H. Nakashima[1], A. Higashijima[1], Y. Takase[4], A. Fukuyama[5], T. Maekawa[6], O. Mitarai[7], M. Kikuchi [8], K. Toi [2]

[1]RIAM,Kyushu University Kasuga, Japan, [2]NIFS, Toki, Japan
[3]IGES, Kyushu Univ., Kasuga, Japan
[4]Dep. of Comp. Sci. and Eng., Univ. of Tokyo, Kashiwa, Japan
[5]Dep. of Nuclear Engineering, Kyoto Univ., Kyoto, Japan
[6]Graduate School of Energy Science, Kyoto Univ., Kyoto, Japan
[7]Inst. of Ind. Sci. and Tech. Research, Tokai Univ., Kumamoto, Japan , [8]JAEA, Naka, Japan

The phased-array antenna system for Electron Cyclotron/Bernstein Wave Heating and Current Drive experiments has been developed in the QUEST. The antenna was designed to excite a pure O-mode wave in the oblique injection for the O-X-B mode conversion experiments, and its good performances were confirmed at a low power level. The plasma current (< ~15kA) with an aspect ratio of 1.5 was started up and sustained by only RF injection in the low-density operations. The long pulse discharge of 25 kA was also attained for 17 s. The new density window to sustain the plasma current was observed in the overdense plasmas. The divertor configuration was preliminarily obtained in the RF-sustained plasmas, and the plasma shaping in the divertor configuration has been under optimization.