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Branching of heated electron energy during plasma current start-up using 2nd harmonics ECCD on QUEST[1] SHINICHIRO KOJIMA, KAZUAKI HANADA, HIROSHI IDEI, TAKUMI ONCHI, RYUYA IKEZO, YOSHIHIKO NAGASHIMA, MAKOTO HASEGAWA, KENGOH KURODA, KAZUO NAKAMURA, HATEM ELSERAFY, MASAHARU FUKUYAMA, Kyushu University, TAIICHI SHIKAMA, NAO YONEDA, SADAYOSHI MURAKAMI, Kyoto University, RYOTA YONEDA, University of California, TSUYOSHI KARIYA, University of Tsukuba, AKIRA EJIRI, YUICHI TAKASE, The University of Tokyo, MASAYUKI ONO, Princeton Plasma Physics Laboratory
— In Q-shu university steady-state spherical tokamak (QUEST), 70 kA of plasma current start-up driven mostly by energetic electrons has been demonstrated by using the 2nd harmonic of 28 GHz electron cyclotron wave (ECW). The existence of energetic electrons will be a crucial issue in devices like ITER. In experiment, the branching of the heated electron energy from the bulk electron heating to the energetic electron heating is observed. Moreover, the increase of energetic electrons is caused by the degradation of fuel particles is found. The power balance between absorbed ECW power and power loss by collision showed that the branching of the heated electron energy such as once energetic electrons having a few keV exist the bulk electron is cooled. In electron confinement time calculation by each particle collision time and modelled connection length, the electron confinement time of a few keV is increased by the degradation of fuel particles.

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