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**Plasma Start-up Experiments Using the Lower Hybrid Wave Excited by a Dielectric Loaded Waveguide Array Antenna on the TST-2 Spherical Tokamak** TAKUMA WAKATSUKI, AKIRA EJIRI, YUICHI TAKASE, HIROKAZU FURUI, TAKAHIRO HASHIMOTO, JUNICHI HIRATSUKA, HIDETOSHI KAKUDA, KUNIHICO KATO, AYAKA NAKANISHI, TAKUYA OOSAKO, TAKAHIRO SHINYA, MASATERU SONEHARA, HIRO TOGASHI, TAKASHI YAMAGUCHI, University of Tokyo, HIROSHI KASAHARA, RYUHEI KUMAZAWA, KENJI SAITO, TETSUO SEKI, FUJIO SHIMPO, NIFS, YOSHIHIKO NAGASHIMA, Kyushu University — Plasma current start-up experiments were performed on the TST-2 spherical tokamak ( $R = 0.38$  m,  $a = 0.25$  m,  $B_t = 0.3$  T,  $I_p = 0.1$  MA) using the lower hybrid wave (LHW) at  $f = 200$  MHz. A waveguide array antenna consisting of four dielectric (alumina,  $\epsilon_r = 10.0$ ) loaded waveguides was used. The coupling characteristics of this antenna were investigated by low power experiments ( $P_{FWD} < 5$  kW). The measured characteristics were qualitatively consistent with those predicted by calculations using a finite element method solver package (COMSOL). The experimentally observed reflection coefficient is large (greater than 36 % averaged over four waveguides), and there are large differences in reflectivities in neighboring waveguides. It was necessary to take into account of the private limiter surrounding the antenna in order to reproduce these features. Non-inductive plasma current start-up to 6 kA has been demonstrated using 20 kW of LHW power. In this experiment, the reflection coefficient was very high because the initial plasma density was much lower than the predicted optimum plasma density.

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