

Measurement of lower-hybrid waves with microwave back-scattering on TST-2

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Non-inductive plasma start-up with lower-hybrid (LH) waves is being investigated on the TST-2 spherical tokamak at the University of Tokyo. Plasma current ramp-up up to 20 kA has been achieved so far with a capacitively-coupled comblin (CCC) antenna. The current drive efficiency dropped sharply around the mode conversion density limit that increases with the magnetic field. Full-wave modeling is underway to describe quantitatively the LH current drive on TST-2. Direct wave measurement in the plasma core is important for quantitatively accurate analysis. A new microwave back-scattering diagnostic is fabricated for this purpose. A microwave probe beam in the range of 10-40 GHz are launched into the plasma and scattered by the density fluctuations of the LH waves. The scattered light is detected by mixing it with the swept microwave source (swept frequency homodyne detection). Since the signal amplitude at the microwave frequency is proportional to the density fluctuation amplitude at the microwave wavenumber, the radial wavenumber spectrum of the LH waves can be measured. The actual wave measurements will be presented if available.

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