

## Temporal fluctuation of electron density measured by means of Wave-Cutoff method in Radio Frequency Capacitive Coupled Plasma

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Wave-cutoff method, one of the plasma diagnostic methods, has many advantages. This method hardly perturbs plasma, and is useful even in processing plasma. This method uses network analyzer(300 kHz ~ 6 GHz) and a cutoff probe composed of two coaxial cables with their tips exposed which are electrically connected to the network analyzer. Network analyzer is used as an electromagnetic wave source and as a spectrum analyzer. One of the tips of the probe is used as a radiating antenna, and the electromagnetic wave propagates in the plasma. The other tip of the probe receives the transmitted wave. The network analyzer gets transmission spectrum of electromagnetic wave. Since the sweep time of the network analyzer is about hundreds of milliseconds, it cannot measure fast varying plasma. To improve time resolution of measurement, an oscilloscope with high bandwidth and fast sampling rates was introduced. Network analyzer is still used as an electromagnetic wave source, and the oscilloscope gets source signals and transmitted signals. With the oscilloscope, the time resolution is about a few nanoseconds. In radio frequency capacitive coupled plasma, electron density would vary with time even in a bulk plasma, since the radio frequency potential and spatial charge distribution is varying with time. With the wave-cutoff method whose time resolution is improved, the time variation of electron density was measured in a period of radio frequency.