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Numerical analysis of inductive and capacitive coupling in radio-frequency micro discharges YOSHINORI TAKAO, Department of Aeronautics and Astronautics, Kyoto University, Japan, KOJI ERIGUCHI, KOUICHI ONO — A numerical study of radio-frequency Ar micro discharges has been performed including both inductive and capacitive coupling of the source coil to the plasma. We employ a two-dimensional axisymmetric particle-in-cell with Monte Carlo collisions (PIC-MCC) method. The plasma chamber is 2.5 mm in radius and 4 mm in height with a flat spiral coil on top of the source or a helical coil on the cylindrical wall. The particle simulation was conducted at the Ar pressure of 500 mTorr, rf frequency of 450 MHz, and total power deposition in the plasma of 5 mW. The peak electron density and temperature obtained in the discharge were 7.5×10^{10} cm^{-3} and 3.4 eV, respectively, under the condition where only inductive coupling was taken into account. Including capacitive coupling in the model resulted in different spatial distributions, where the peak density was a little away from the coil, although almost the same values of the peak electron density and temperature were obtained.

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