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Comparison of power transfer efficiency and plasma parameters of series and parallel antennas in inductively coupled plasmas TAE-WOO KIM, HYUN-JU KANG, CHIN-WOOK CHUNG, Department of Electrical Engineering, Hanyang University — When the capacitive coupling between the antenna and plasma is large, it is hard to make the high density plasma due to the large ion energy losses inductively coupled plasma. Therefore, the parallel antenna structure is commonly used in plasma processing chamber to reduce the capacitive coupling. However, when a parallel antenna is used, the power transfer efficiency from the antenna to the plasma is low because the primary inductance (antenna inductance) is lower than that of the series antenna and the mutual inductance is also lower in the transformer model. In this study, the power transfer efficiency and the plasma parameters were measured to investigate the effects of the series and parallel antennas on the plasma. To compare the series and parallel antennas, both antennas were made of copper tubes of the same length and thickness. The experiment shows that the parallel antenna has good ionization efficiency and the series antenna has good power transfer efficiency as expected from the model.

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