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**Study on Microwave Plasma Source with TM-wave Cavity, of
which Bottom Plate Replaced with High-Density Plasma** SUMIO KO-
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— It is well known that a microwave plasma source with a resonant cavity for TM modes may efficiently sustain high density plasma. The aim of this paper is to present the formula to calculate the length of a resonant cavity, of which the end plate is replaced with high density plasma. The resonant cavity consists of air gap and a dielectric window because a plasma chamber must be sealed with the latter one. The formula derived analytically, which considers the reflection of microwave from the surface of the dielectric window, can predict a resonant cavity length for TM modes, at which a local density peak would appear. The prediction of local density peaks from the formula agrees with experimental results. Finite-difference time-domain (FDTD) simulations for electromagnetic fields inside the cavity support that a resonant cavity is formed when the local density peak appears. This formula will be useful to design a microwave plasma source with a resonant cavity for TM modes.

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