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Plasma ignition dynamics in atmospheric-pressure pulsed-microwave plasma HIROTAKA TOYODA, TAKUYA MURASE, KAZUKI EGASHIRA, Department of Electrical Eng., Computer Sci., Nagoya University — Atmospheric-pressure pulsed plasmas have been given much attention because of its various possibilities for industrial applications. In this study, temporal variations of both plasma density and microwave electric field in pulsed-microwave atmospheric-pressure plasma of Ar/H₂ and N₂/H₂ are measured using H_β line measurement. From time-resolved measurement of Ar/H₂ plasma from the plasma ignition till the steady state, both increase in plasma density and decrease in electric field are observed up to $\sim 0.7 \mu\text{s}$ from the plasma ignition, and their relation is well explained by the decrease in the plasma resistivity and the current flowing through the plasma. After $\sim 0.7 \mu\text{s}$, plasma density starts to decrease rather slowly at a time scale of a few μs till it reaches the steady state. Time scale of the plasma density decrease is similar to that of the gas temperature increase, suggesting heat expansion of the neutral gas as well as the plasma in the vicinity of the plasma region.

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