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Temporal variation of plasma density in atmospheric-pressure pulsed-microwave plasma[1] HIROTAKA TOYODA, HAIPENG YANG, TATSUO ISHIJIMA, Nagoya University — Atmospheric pressure plasma is often produced by pulsed mode at a power duration less than a few tens μs so as to suppress transition from non-equilibrium to equilibrium plasma. Taking account for the time scale of plasma density increase (a few to 10 μs) after the plasma ignition, the plasma density is considered to be strongly time-dependent during the pulsed atmospheric pressure plasma. In this study, temporal variation of H_β spectra in atmospheric-pressure pulsed-microwave plasma is investigated by a gated optical multichannel analyzer (OMA) to give insight into the temporal variation of plasma density as well as the electric field. From the H_β line-width measurements for different polarizations, i.e., polarization parallel and perpendicular with respect to the applied electric field, contribution of Stark splitting due to external electric field is discriminated from the measured H_β line width. Line broadening due to the Stark splitting is clearly observed immediately after the plasma ignition, suggesting that the externally applied field penetrates into the plasma at this stage and that such influence must be subtracted for the precise plasma density measurement by Stark broadening.

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