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Two-Dimensional Electron Density Measurement of Positive Streamer Discharge in Atmospheric-Pressure Air[1] YUKI INADA, Saitama University, RYO ONO, AKIKO KUMADA, KUNIHIKO HIDAKA, The University of Tokyo, MITSUAKI MAEYAMA, Saitama University — The electron density of streamer discharges propagating in atmospheric-pressure air is crucially important for systematic understanding of the production mechanisms of reactive species utilized in wide ranging applications such as medical treatment, plasma-assisted ignition and combustion, ozone production and environmental pollutant processing. However, electron density measurement during the propagation of the atmospheric-pressure streamers is extremely difficult by using the conventional localized type measurement systems due to the streamer initiation jitters and the irreproducibility in the discharge paths. In order to overcome the difficulties, single-shot two-dimensional electron density measurement was conducted by using a Shack-Hartmann type laser wavefront sensor. The Shack-Hartmann sensor with a temporal resolution of 2 ns was applied to pulsed positive streamer discharges generated in an air gap between pin-to-plate electrodes. The electron density a few ns after the streamer initiation was $7*10^{21}\mathrm{m}^{-3}$ and uniformly distributed along the streamer channel. The electron density and its distribution profile were compared with a previous study simulating similar streamers, demonstrating good agreement.

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Yuki Inada
Saitama University

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