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Simulation of Nanosecond Pulsed Discharge in Atmospheric Pressure Neon - Comparison between Metal Electrode and Liquid Electrode
- KAZUKI MOTOJIMA, NAOKI SHIRAI, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — We carried out numerical simulation of nanosecond pulsed discharge in atmospheric pressure neon by two dimensional fluid model. The nanosecond pulsed discharge is generated using two types of electrode configuration; metal needle to metal plane electrodes and metal needle to liquid electrodes. The gap length between electrodes is 1 mm. In case of liquid cathode a liquid layer of 0.6 mm width is added. We confirmed the time evolution leading to bridging the gas gap from streamer propagation. Streamer has thick diameter. It is considered that streamer shape depends on a high ionization rate of neon, electrode shape, and higher applied voltage of nanosecond pulsed discharge than the breakdown voltage. We show the spatial profile of the electric field strength penetration in the liquid from the streamer. The Electric field in the liquid up to 100 kV/cm, which might induce the conductive current. Since the dielectric relaxation time is longer than the pulse width of the applied voltage, the liquid electrode almost behaves as dielectric. The influence of liquid conductivity on the discharge propagation was investigated from the viewpoint of time constant dominant for determining discharge properties.

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