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Two-dimensional Measurement of N_2 Rotational Temperature Distribution in Atmospheric Positive DC Glow Discharge using Spectroscopic Imaging TAKAO MATSUMOTO, RYO SASAMOTO, HIDEAKI ORII, YASUJI IZAWA, KIYOTO NISHIJIMA, Fukuoka University — An experimental method of determining a two-dimensional image of the N_2 rotational temperature in stationary atmospheric non-thermal plasma by spectroscopic imaging was presented. In the experiment, a steady-state glow corona discharge was generated by applying a positive DC voltage to a rod-plane electrode in synthetic air. Spectral images of a DC glow discharge were taken using a gated ICCD camera with ultra narrow band-pass filters, corresponding to the head and tail of a N_2 second positive system band (0-2). The qualitative N_2 rotational temperature was obtained from the emission intensity ratio between the head and tail of the N_2 second positive system band (0-2). The directions of observation were toward the lateral side and hemisphere sides of the rod electrode. The change in the distribution of rotational temperature in a positive DC glow discharge due to the amplitude of applied voltage was investigated. As a result, it was confirmed the rotational temperature and its distribution in a positive DC glow corona respectively increased and spread diffusely with increasing applied voltage. In particular, a distinctly high temperature region was formed in positive DC glow corona near the tip of the rod electrode just below the sparkover voltage.

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