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Burning modes of a bipolar pulse discharge in CO_2 and nitrogen V.A. LISOVSKIY, S.V. DUDIN, N.N. VUSYK, A.N. DAKHOV, V.D. YEGORENKOV, Kharkov National University, Kharkov, Ukraine, P.A. OGLOBLINA, Instituto de Plasmas e Fusao Nuclear, Lisboa, Portugal — This paper reports the current and voltage oscilloscope patterns of the bipolar pulsed discharge in the frequency range (from 20 to 300 kHz) with the duty cycle from 0.11 to 0.97 that have been measured in CO_2 and nitrogen within the pressure range from 0.1 to 1 Torr. It has been found that varying the duty cycle may change the discharge axial structure and redistribute the potential drop across the electrodes. At large duty cycle values the discharge has been found to experience a transition from the conventional high-current mode (with cathode sheaths near both electrodes) to a low-current mode characterized by low discharge current values and a feeble glow. In this mode the ionization takes place only in the cathode sheath and the negative glow near the electrode at the time period to which the high voltage is applied. During the remaining part of the period a lower voltage is applied to the second electrode which is insufficient for the cathode sheath formation, therefore during this time one observes a decaying plasma (afterglow). The radiation spectra of the bipolar pulsed discharge in nitrogen have been measured at different duty cycle values using the optical spectrometer. It has been revealed that in a low-current mode the ionization occurs predominantly near one electrode whereas the cathode sheath is not formed near another electrode.

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