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**Dynamic contraction of the positive column of a self-sustained glow discharge in molecular gas flow** MIKHAIL MOKROV, Institute for Problems in Mechanics, RAS, Moscow 119526, Russia, MIKHAIL SHNEIDER, Princeton University, Princeton, New Jersey 08544, USA, GENNADY MILIKH, University of Maryland, College Park, Maryland 20742, USA — We study dynamic contraction of a quasineutral positive column of a self-sustained glow discharge in nitrogen and air in a rectangular duct with the convection cooling. A set of time-dependent two-dimensional equations for the nonequilibrium weakly-ionized plasma is formulated, and then solved numerically. Transition from diffusive state to contracted one is analyzed. It is shown that in nitrogen the contraction occurs in the so-called “hard” or hysteresis mode while in air the character of the transition depends on pressure. Under relatively high pressure, hysteresis does not occur and the transition takes place in so called “soft” mode. When the pressure reduces and thus the role played by electron attachment diminishes, the transition in air occurs in the hysteresis mode. In such a case the inhomogeneous contraction can occur, when a high density plasma channel starting from the initial perturbation near one electrode propagates to the opposite electrode. The discharge evolution of such kind is computed for a case of self-sustained glow discharge in nitrogen. The results are in agreement with experiment.

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