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Experimental and theoretical study of cold atmospheric plasma jet interaction with metal and dielectric surfaces[1] IRINA SCHWEIGERT, George Washington Univ, SERGEY VAGAPOV, Khristianovich Institute of Theoretical and Applied Mechanics, LI LIN, MICHAEL KEIDAR, George Washington Univ — Recently cold atmospheric plasma jets are widely used in various applications in medicine, material surface treatment and agriculture. In this work, the dynamics of propagation of a cathode-directed streamer and its reflection from surface is studied in numerical simulations (2D fluid model, cylindrical symmetry) and in the experiments. The streamers induced by applying sinusoidal voltage to the powered electrode inside of dielectric tube and propagates to the direction of treated metal or dielectric surfaces. The streamer starts inside of a dielectric tube in pure helium and propagates over a helium jet and a mixture of gases (helium, nitrogen and oxygen). The distribution of molar fractions of gases are calculated with ANSYS Fluent software for helium supply of 13.5 sl/min and the tube radius of 0.23 cm. The experimental data on the speed of a streamer are in a good agreement with calculation results. The reflection of ionization wave from the surface is observed both in the experiment and in simulations. In simulations, it was found that the reflected ionization wave follows a channel produced by a primary streamer. The difference in streamer reflection scenario from dielectric and metal surfaces is analyzed.

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