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INFLUENCE OF THE ACOUSTIC RESONANCE ON THE COLD PLASMA JET CHARACTERISTICS[1]

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Cold atmospheric pressure plasma jet is a current trend in modern science, technology and medicine. It is widely used in cosmetology, oncology and the food industry [1]. It consists of gas discharge pulses that form a streamer moving through a capillary into an open atmosphere at a pulse repetition rate of typically tens of kilohertz. The energy carried by the streamer is low enough to ensure that a target, such as a biological object, does not experience intense heating, causing the phenomenon to be called "cold". Despite its apparent simplicity, this type of discharge gives rise to a number of technical and scientific problems, so it is a relevant subject for research, both on the specific form of gas discharge and the phenomena associated with it [2,3].

Cold atmospheric pressure plasma jet exists in the open air, so it is possible to influence its characteristics by a large set of methods. One of these methods is to create conditions for acoustic resonance in the volume of the plasma gun and the gas supply fittings. The ignition of any gas discharge generates a shock wave in the environment. If the frequency of power pulses, and accordingly the generation of jets is matched to the length of the standing wave, which is formed in the volume of the installation, it is possible to have a significant influence on the intensity of the cold plasma jet, increasing or decreasing it.

The paper describes a study of the effect of acoustic resonance on the characteristics of a cold plasma jet. The frequency dependence of the current amplitude (fig. 1) carried by the jet is determined, in which the resonance peaks of intensity located at a multiple distance from each other are clearly visible. Experiments were carried out with helium and argon. An experiment was also carried out to tune the resonance to a given frequency by changing the length of the gas supply tube.

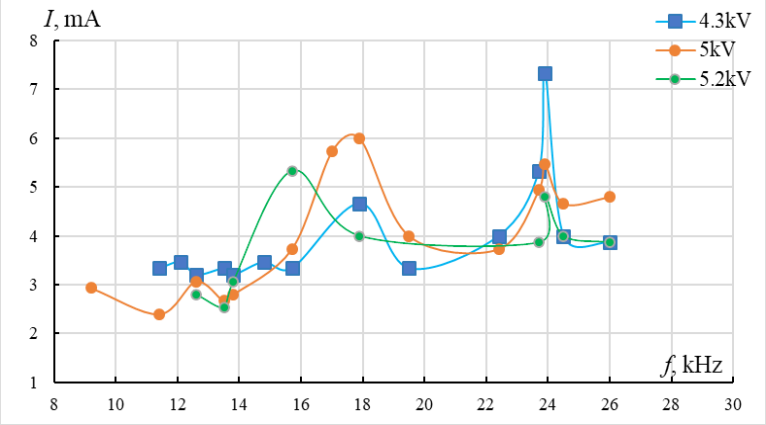

Fig.1. Jet current amplitude versus frequency at different voltages.

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