# Computer simulation for an array based on capillary discharge

V.V. Kuzenov [1,2,3], S.V. Ryzhkov[1]

[1] *Bauman Moscow State Technical University, Moscow, Russia*

[2] *A.Yu. Ishlinsky Institute for Problems in Mechanics RAS, Moscow, Russia*

[3] *N.L. Dukhov All-Russian Research Institute of Automatics («ROSATOM»)*

Pulsed plasma jets are often used in various technical and scientific applications and can be formed by using a capillary discharge with an evaporating wall (CDEW) [1-10]. The CDEW is a powerful pulsed plasma-dynamic discharge whose plasma is created in a dielectric cylindrical channel filled to facilitate electrical breakdown by a metallized powder. In this case, the pulsed electric current flows through the cylindrical channel and forms a dense hot plasma in it, which flows through the output section of the CDEW, having a high emissivity. We modelled a two dimensional plasma array based on series connected capillary discharge. Each capillary device is composed a CDEW. Numerical simulation is performed and spatial distributions of pressure, temperature, velocity and Mach number in a pulsed capillary discharge jet and a system of pulsed jets at different instants of time are obtained. The structure of an underexpanded supersonic jet that expires from the working channel of the CDEW is investigated.

This research is supported by the Russian Minobrnauki (Project No. 13.5240.2017/8.9).

References

[1]. Pashchina, A.S., Efimov, A.V., Chinnov, V.F. and Ageev, A.G., "Specific features of the radial distributions of plasma parameters in the initial segment of a supersonic jet generated by a pulsed capillary discharge," *Plasma Phys. Rep.* **43**, 796-800 (2017)

[2]. Varaksin A.Yu., *High Temperature* **56**, 275–295 (2018)

[3]. V.V. Kuzenov and S.V. Ryzhkov, *Bull. Russ. Acad. Sci.: Phys.* **80**, 598 (2016)

[4]. V. V. Kuzenov, T.N. Polozova and S. V. Ryzhkov, Problems of Atomic Science and Technology No. **4 (98)**, 12 (2015)

[5]. V.V. Kuzenov, S.V. Ryzhkov, A.Yu. Gavrilova and E.P. Skorokhod, "Computer simulation of plasmadynamic processes in capillary discharges", High Temperature Material Processes **18**, 119 (2014)

[6]. V.V. Kuzenov and S.V. Ryzhkov, *Problems of Atomic Science and Technology* **1**, 12 (2013)

[7]. V.V. Kuzenov and S.V. Ryzhkov, *Problems of Atomic Science and Technology* **4** (86), 103 (2013)

[8]. S.V. Ryzhkov, *Proc. 35th EPS Conf. on Plasma Physics and Contr. Fusion*, ECA Vol. 32D, P1.114 (2008)

[9]. V.V. Kuzenov and S.V. Ryzhkov, *Journal of Physics: Conference Series* **830**, 012124 (2017)

[10]. Varaksin A.Yu., *High Temperature* **54**, 409–427 (2016)