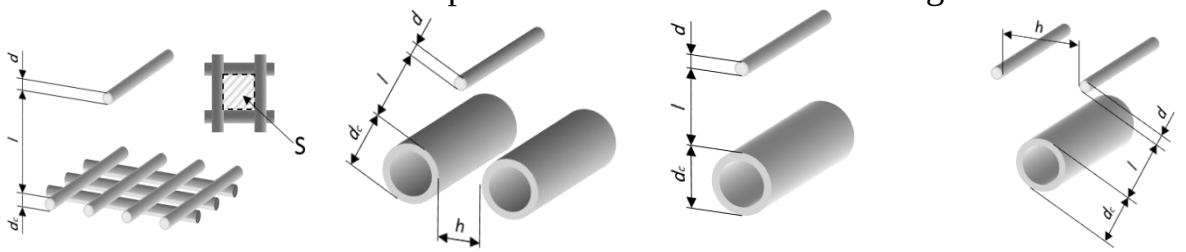
COMPARISON OF DIFFERENT IONOCRAFT ELECTRODE SYSTEM MODELS

Dremin D.V., Khomich Yu.V., Rebrov I.E.

Institute for Electrophysics and Electric Power RAS, Russia, Saint- Petersburg, Dvorzovaya Naberezhnaya 18, 191186, Rbrv.igor@gmail.com

Abstract: The influence on thrust parameter and efficiency from geometric parameters and design features of the ionocraft electrode systems (IES) in air at atmospheric pressure and natural humidity is considered. Collector in form of a grid or two parallel tubes gives a significant increase of thrust and thrust-to-power ratio of EHD propulsion system compared with the single tube collector.

Geometric parameters and design features of the IES include the diameter of the corona electrode, the distance between it and the collector, the number of plasma emitters (PE) in usage and the framework of the collector [1-4]. Designs of five IES models shown in Fig 1. Thrust parameter is represented by magnitude of a generated thrust *F*, g and the efficiency is evaluated by magnitude of thrust-to-power ratio *F/P*, g/W [5-7]. In all five models nichrome emitter wire with diameter d = 0.02 mm is under negative potential. The aluminum tube collector has diameter d_c = 10 mm. Results of the experiment show that *F/P* of system with the grid collector and system with double tube collector are comparable, although for the last one a greater thrust value is observed at the same discharge current. Compared to the single tube collector such configurations give an increase of value of *F/P* to 1.5–2 times. Using of double PE leads to a drop of output parameters due to the mutual shielding of PE, when the ratio *h/l* is lower value of 1.15. The IES with a grid collector has reached the maximum for this series of experiments of thrust to about 2.8 g.



1 *2* *3* *4 and 5*

Fig 1. *1* – steel grid collector with mesh size of S = 2x2 mm^2 and diameter d_c = 0.42 mm; *2* – double tube collector with distance h = 10 mm; *3* – single tube collector; *4,5* – double wire emitter with h equal 10 and 30 mm, single tube collector.

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