IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

Author: Prof. Olexandr Petrenko
Flight Control LLC, Ukraine, aleksandr.petrenko@sets.space

Mr. Stanislav Tolok
Flight Control LLC, Ukraine, stas.tolok@sets.space
Mr. Victor Maslov
Flight Control LLC, Ukraine, viktor.maslov@sets.space
Dr. Sergey Kulagin
Flight Control LLC, Ukraine, mvv57@ua.fm
Mr. Viktor Serbin
Flight Control LLC, Ukraine, vs@sets.space
Mr. Alexander Alekseenko
Flight Control LLC, Ukraine, alexandr.alekseenko@sets.space
Mr. Danylo Shcherbak
Flight Control LLC, Ukraine, daniil.scherbak@sets.space

# ELECTRIC PROPULSION SYSTEM SPS-25 WITH HALL THRUSTER

**Abstract**

The company Space Electric Thruster Systems (SETS, Ukraine) is worked out the electric propulsion system - SPS-25. This propulsion system is intended for application on space vehicles in that for the electric propulsion 200-300 W of electric power are setting can be distinguished from the on-board power supply. Electric propulsion system SPS-25 consists of: Hall thruster ST-25; Xenon storage and feed system (XFS); Power Processing Unit (PPU). Hall Thruster ST-25 is designed to work with the power consumption of 150 - 250 W. With the specified power consumption range, the engine develops a thrust of 5 – 11 mN, provides a specific impulse range of 1100 – 1300 s, and the engine efficiency in the range of 24 – 35%. The feature of the ST-25 thruster structure is that in order to reduce the cost of electrical energy for the formation of a radial magnetic field in the accelerator channel of the thruster, a permanent magnet in the central magnetic pole is used. Xenon storage and feed system consists of the tank from polymeric composition materials for storage of working substance, providing storage of xenon at pressure 150 - 190 Barr; high-pressure unit, that provides the decline of pressure in a tank for storage to the level 1.0-1.2 Barr in a tank-receiver and the low pressure unit, that provides the feed of working gas from a tank-receiver to the anode and hollow cathode with the set level of mass flow rate. For the construction of the storage and feed system of working substance the SETS company have designed the valves of high (to 200 Barr) and low pressure (to 5 Barr). For providing of the set mass flow rate of working substance to the anode and hollow cathode by a company SETS corresponding jets were worked out. The Power Processing Unit consists of a few independent sources of power supply: the discharge power supply for the anode unit; the source of current for electromagnets of the thruster; source of current of hollow cathode heater; source of voltage for the storage and feed system of working substance. The Power Processing Unit contains also the control unit of the propulsion system, that gets on-off commands for propulsion system, provides work of the propulsion system and forms the signals of telemetry about current status of subsystems of the propulsion system and transmission of these signals to control system of space vehicle.