Paper ID: 42689
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IAF SPACE SYSTEMS SYMPOSIUM (D1)
Technologies to Enable Space Systems (3)

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THERMOELECTRIC SYSTEM OF THERMOSTATING FOR SPACE STATIONS, MOON AND MARTIAN BASES

Abstract

For the uninterrupted functioning of most on-board systems on the space stations, and for life support of crew it is needed to maintain temperature of internal space at a constant level, which is associated with high energy consumption. Yuzhnoye State Design Office researches innovative thermoelectric thermostating system, basic components of which are thermoelectric modules of Peltier. These modules are widely used in space system engineering. In this direction, a patent of Ukraine was obtained UA105764 11.04.16. Thermoelectric modules are used for cooling, heating, and generation of electric energy. The thermoelectric module is the set of electrically connected thermocouples, placed between two flat plates. At transmission of direct current through the thermoelectric module, the temperature gradient appears between sides of the module, one side is cooled and other is heated. At the same time, on a hot side, additionally to heat energy, being emitted according to the law of Joule-Lenz, additional heat energy according to the thermoelectric Thomson effect will be emitted, without increasing the power consumption for power supply. Tests of a laboratory sample of block of thermoelectric modules for the surface thermostating system showed the decline of energy consumption by 40The single unit of the thermoelectric system of thermostating will reduce energy consumption, provide effective heating and cooling, and also can be used for generation of electric power in generator mode without use of additional equipment. Due to small dimensions, the system will provide additional free space. These and other advantages make the thermoelectric system of thermostating perspective for the use on the space stations, and also on future Moon and Martian bases.