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RESISTOJET FOR MICRO AND NANO SATELLITES

Abstract

Nowadays micro and nano satellites become more and more useful. But the scarce of suitable propulsion systems makes the usage of small satellites less effective. One type of the engines which used for micro and nano satellites is resistojet. Existing restitojets has a vapor chamber with none suitable dimensions for nano satellites. Also its need high power supply (about 200...600 W)and tank pressure (1...1,5 MPa) which makes them heavy and dangerous. The designed resistojet allows to solve this problems and could be used in nano and micro satellite structure. The propulsion system includes pressurised fuel tank with liquid ethyl spirit or distilled water and the valve which controls the flow rate. The main difference from the traditional resistojet is the vapour chamber. After the valve liquid gets in a capillary copper tube. The tube heated by electroheater (isolated NiCr cord). Liqud evaporates and accelerates in the tube and in the end of the tube vapour's speed reaches the sound velocity. The supersonic nozzle mounted on the end of the tube. This scheme allows to save more place and provides on the specific impulse about 900...980 m/s, thrust 3...10 grams with power supply 30..90 W.The experimental model of this propulsion system was developed and successfully passed the tests in the vacuum chamber. Another benefits are low cost and high manufacturability. This facts makes possible to use this engine in students or university projects include launches from ISS. So this system could be of the essence for many nano-satellite missions.