Cyclic Endurance Test of a S1''1'-] 00 Stationary Plasma Thruster

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Russian stationary plasma thrusters (SPT) have now been characterized at several Russian and U.S. facilities; their demonstrated performance capabilities have led to increased interest in these thrusters by Western spacecraft manufacturers for primary and auxiliary propulsion applications. Loral is presently flight-qualifying 1.35-kW, SPT-100 thrusters for north/south station keeping and Earth orbit raising applications and plans to provide these thrusters on their spacecraft, At Design Bureau "Fakel" a steady-state life test is being performed, and performance, plume and EMI/RFI evaluations are being conducted at NASA Lewis Research Center. A key aspect of the S1"1'-100 evaluation program is characterization of the long term operating behavior of the thruster. Typical mission applications of interest require operating times of several thousand hours. Potential use of the thruster for north-south stationkeeping of commercial communication satellites will also require the capability for several thousand on/off cycles. To address these objectives a cyclic endurance test is being performed at JPL under a cooperative program between Space Systems/Loral, JPL (under the JPL Affiliates program) and the BMDO.

The preliminary results of a cyclic endurance test of the Russian 1.35 kW Stationary Plasma Thruster SPT-100" will be described, The endurance test is scheduled for 6,000" on/off cycles and 5,000 hours of operation at an input power to the thruster of 1.35 kW. Cycles are 50 minutes of thruster on-time and 23 minutes of thruster off-time, The endurance test is being performed in a 3.1-m dia by 5.1 -m stainless steel vacuum tank with a pump speed of approximately 50,()()() liters/s on xenon. The beam target and vacuum tank walls are lined in graphite to reduce back-sputtered material to the SPT-100. Data on thruster characteristics such as thrust, plume current densities, discharge voltage, discharge current, mass flow rate and insulator wear will be presented,