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Author: Dr. Dan Lev
Rafael Advanced Defense Systems Ltd., Israel, dan.r.lev@gmail.com

Mr. Raanan Eytan
Rafael Advanced Defense Systems Ltd., Israel, eytanr@rafael.co.il
Mr. Abraham Warshavsky
Rafael Advanced Defense Systems Ltd., Israel, avrahamw@rafael.co.il
Mr. Leonid Appel
Rafael Advanced Defense Systems Ltd., Israel, leona@rafael.co.il
Dr. Alexander Kapulkin
Asher Space Research Institute, Technion, I.I.T., Israel, kapulkin@techunix.technion.ac.il
Mr. Maxim Rubanovych
Asher Space Research Institute, Technion, I.I.T., Israel, aerrumax@tx.technion.ac.il
Mr. Maxim Rubanovych
Asher Space Research Institute, Technion, I.I.T., Israel, aerrumax@tx.technion.ac.il

CAM200 HALL THRUSTER - DEVELOPMENT OVERVIEW

Abstract

Hall Effect Thrusters (HET), compared with conventional chemical thrusters, hold the premise of significantly lowering the satellite's required propellant mass, making them an attractive propulsion solution. In particular low power HETs are an efficient and reliable solution for small satellite platforms with limited power under 1 kW. This is thanks to the fact that when utilized these low power thrusters are capable of performing orbit raising, orbit correction, low altitude drag compensation and end-of-life de-orbit maneuvers. In the past few years a unique low power HET denoted CAMILA was designed and tested by the Asher Space Research Institute (ASRI) in cooperation with Rafael[1]. During prototype testing stage the thruster exhibited outstanding performance at power range from 150 to 300 W[2-3]. After initial testing the development continued at Rafael with the goal of designing and qualifying a fight model of the thruster. This paper presents the development and qualification process from initial design. Lifetime simulation shows expected thruster lifetime of over 4,000 hours at power level of 250 W and wall thickness of 5 mm. Static, dynamic and random vibration tests, as well as shock tests, were conducted for grade HP BN, grade M26 BN and ZSBN discharge channel materials. The thruster successfully passed all tests thus proving adequate structural integrity. Performance tests were conducted at power levels in the range 100 W - 300 W with two different dielectric channel materials, grade HP BN and grade M26 BN, for two different dielectric channel axial lengths. No significant difference in performance or erosion was observed when comparing the dielectric rings with different materials after 80 hours of operation. Future work will include plume diagnostics and a lifetime test campaign.

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