SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Systems I (1)

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OVERVIEW OF CURRENT STATE OF ACTIVITIES RELATED TO ROCKET PROPULSION R&D IN RUSSIA

Abstract

This overview is covering current activities of the Russian Federal Space Agency and its subsidiary space researchindustry organizations related to the RD works on propulsion systems, which are essential for the development and, eventually, successful use of new launch vehicles. Current rocket propulsion RD activities in Russia can be divided into three large thematic groups: • Upgrade of existing and development of new rocket engines for use on LVs under development; • Concept studies and verification of concepts for next-gen LV propulsion systems; • High-efficiency propulsion systems for upper stages and exploration systems. In order to upgrade existing and develop new rocket engines for use on LVs under development we are currently performing following activities: - Finalization of test campaign of LOX-kerosene RD-191 rocket engine (downscaled version of RD-170/180 line of engines), which will be used at lower stages of "Angara" LV family; - Upgrade of LOX-kerosene RD-180 rocket engine for use on evolved launch vehicle (ELV); - Upgrade of LOX-kerosene RD-0124 rocket engine for use on "Angara-A5" heavy LV; - Upgrade of LOX-kerosene upper stages engines (suppression of film wall cooling, use of oxygene instead of kerosene as coolant, resulting in higher specific impulse); - Development of LOX-LH RD-0148 rocket engine (expander type, deeply throttable) for ELV and "Angara-A5" LV upper stage; - Studies of high-thrust LOX-LH rocket engines (reconstitution of RD-0120 engine production line or development of new LOX-LH engine). We are also performing concept studies of reusable hydrocarbon-fed rocket engines for next-gen launch vehicles. LOX-kerosene RD-170 family engines have already proven their reusability capabilities (10x use certified). Methane-fed demonstrator based on KVD1 rocket engine has undergone successful testing campaign during 2008-2009. As for upper stages and exploration systems high-efficiency propulsion, we are performing RD works on Hall-type and Ion-type electropropulsion systems enabling cheap orbital transportation, which can be combined with high-power nuclear units (thermonuclear/radiator-cooled and turboelectric/droplet-cooled systems are assessed) enabling shuttle-type interorbital and interplanetary flights.