

SPACE PROPULSION SYMPOSIUM (C4)

Propulsion System (1) (1)

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PROSPECTS FOR USE OF POWERFUL LOX-KEROSENE RD175 AND RD176 LPRE FOR FIRST STAGE OF "PHOENIX" LV OF MIDDLE CLASS AND ADVANCED LV OF SUPERHEAVY CLASS.

Abstract

At JSC "NPO Energomash" there are unified line of powerful LOX-kerosene RD170, R171, RD171M liquid propellant rocket engines with thrust of 800 t for first stages of "Energia" LV, "Zenit" LV and newly developed advanced "Phoenix" LV of middle class, as well advanced projects of RD175 LPRE with thrust of 1000 t and RD176 LPRE (forced modifications of RD171 engine) for first (in some cases - second) stages of projected LV of medium and super-heavy classes, including possibility of installation without a substantial redesign of LV and engine in "Phoenix" LV. RD170, RD171, RD171M engines are the world's most powerful rocket engines ever in operation. This LPRE line has highest level of parameters and characteristics for engines of such class. In development of RD170 engine family in JSC "NPO Energomash" a number of new advanced projects of engines is developed: - RD175 engine with two series-connected TPU for considerable reduction of dynamic stress of each TPU, splitting the required power between two turbines under condition of providing the required pressures of propellant components; - RD176 engine which different from RD171M engine by combustion chamber design (increasing throat diameter of chamber). The use of uniform chambers in entire line of RD170 rocket engine family (from four-chamber engines to single-chamber ones) will allow to force all engines in case of demand from LV developers. The maximum use of design and schematic decisions, used at development of RD170, RD171, RD171 engines, has planned to reduce development time, complexity and cost of RD175 and RD176 engines. Achieved long-term experience of JSC "NPO Energomash" will allow in the shortest time to create a new modifications of LOX-kerosene rocket engines with a maximum level of quality and reliability for any advanced Russian and foreign LV.