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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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FUTURE-ORIENTED PARTIALLY RE-USABLE TRANSPORTATION SYSTEM FOR SPACECRAFT LAUNCH. MAIN PRINCIPLES TO DEVELOP MAIN PROPULSION SYSTEM.

Abstract

The report presents basic requirements to the layout, configuration and main specifications of the future-oriented space transportation launch system featuring fly-back 1st stage boosters returned to the launch point. The report provides basic results of engineering work for the early stage of the system development. It also shows the role of the fly-back booster propulsion system to achieve required performance factors of the system. The report covers basic principles on how to develop and use a propulsion system featuring re-usable liquid-propellant rocket engines (multi-engine configuration of a propulsion system, presence of the onboard malfunction monitoring and shutdown system, utilization of new efficient liquid propellants, possibility to accomplish the task in case of a one-engine failure, maintainability and serviceability in-between flights with minimal resources etc.). The report provides experimental data obtained during fire tests of a liquid-propellant rocket engine – a prototype of the fly-back booster engine using the compressed natural gas/liquid oxygen propellant components. It formulates the direction of subsequent efforts to develop a re-usable transportation system.