

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Upper Stages, Space Transfer, Entry and Landing Systems (3)

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LAUNCH VEHICLE UPPER STAGE AMPOULIZATION AS A MEANS OF PAYLOAD CAPABILITY  
IMPROVEMENT

**Abstract**

As known, upper stage basic characteristics substantially influence on launch vehicle efficiency on the whole. Ampoulization application for upper stages propellant systems is proposed and grounded as a means of payload capability improvement and stages reliability increasing. Besides structure of propellant components supply pneumohydraulic system at the engines is considerably simplified owing to various constructively compound elements exclusion for propellant components filling at launch complex as well as high-reliability control units using. Complex methodology has been designed and approved for one of ampoulization upper stage version with consideration for analysis results of rocket production global experience. Features of filling system and operations technology with stage are shown, also calculated method of filling propellant components parameters choice is given. As a result, the given complex methodology allows to increase injected payload mass from 5 to 60