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SAFETY AND PERFORMANCE ASPECTS OF THE NEW RUSIAN RLV PROJECT WITH  
REUSABLE BOOSTERS

**Abstract**

Reduction of dimensions and number of alienation areas for separated parts (SP) falling is one of main requirements for prospective aerospace systems. In many concepts of reusable launch vehicles with winged 1st stage boosters (RLV) this problem is solved by return of 1st stage boosters to the launch site. However, the price of such requirement is unreasonable. First, the relative payload mass is reduced due to increasing an "inefficient" mass of the 1st stage (due to additional engines and its fuel). Second, the aerodynamic maneuver of an almost 180 degrees turn of the booster is accompanied by high aerothermodynamic loads, raising flight performance risks and requiring additional protection measures, that increase the dry booster mass.

In the paper we discuss improving RLV safety and efficiency by changing the concept of the booster rescue. It is suggested to refuse from the requirement to bring 1st stage boosters to the launch site necessarily and expand an airdrome network for boosters landing. In relation to this RLV type fail-safety problem solutions are proposed.

The comparative analysis of various RLV concepts is based on rigorous calculations of optimal RLV injection trajectories from new Russian launch site.