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ACTUAL TRENDS ON TECHNOLOGIES AND ARCHITECTURES FOR SMALL LAUNCHERS
IMPROVEMENTS ON COMMERCIAL COMPETITIVENESS

Abstract

Currently, with the exponential demand for responsive means of launching satellites and their constellations, more than two hundred startups have initiated operations of vehicle developments, on all continents, in countries with or without space technology legacy. Even with an unprecedented demand, is believed that less than 80. In addition to the enormous financial challenge of commercializing small launchers services, we have seen the announcement of heavy launch vehicles with reusability characteristics in their configurations, thus causing a drastic change in the pricing of the piggyback market. The entry into operation of several heavy vehicles, with reusable systems, as well as the employment of upper stages designed to operate as space tugs will certainly considerably boost the nano and micro satellite market, with applications and business models that we are still beginning to design today. Even with such heavy vehicles fully operational, it is believed that a considerable part of the nano and micro satellite market will be served by quasi-dedicated launches, with a total payload of less than 1ton. Certainly, the equation of which criteria will impact this choice the most is not yet fully clear, but will certainly involve aspects related to schedule, political motivations, customs, release of certain technologies and subsystems, among many others. In order to create a really competitive option, and not just another sporadic provider, the companies involved in the development of such vehicles really need to approach two objectives that have always been in opposite directions in the studies of tradeoffs of aerospace products, they are performance and cost. In this work, we will analyze which architectures are most suitable for commercial projects of small launchers, considering the cost of development, maturation, time to market and operation of the vehicles. It will also be analyzed which technologies have the greatest impact on the performance and cost of vehicles, and which criteria to consider when choosing subsystems and decisions for in-house manufacturing, market acquisition (when available COTS), development contracts, technology transfer or even acquisition of competent companies. Some vehicles close to commercial operation will be analyzed, and possible variants will be evaluated mainly in terms of manufacturing, development and operation costs.