

IAF SPACE PROPULSION SYMPOSIUM (C4)
Virtual Presentations - IAF SPACE PROPULSION SYMPOSIUM (VP)

Author: Mr. Baptiste Laulan–Souilhac
ISAE - Institut Supérieur de l’Aéronautique et de l’Espace, France,
Baptiste.LAULAN-SOUILHAC@student.isae-superaero.fr

A WAY TO INCREASE ROCKET EFFICIENCY: THE AEROSPIKE ENGINE

Abstract

The past few years, a new space race has begun with the development of private companies willing to build cheaper rockets. Currently, the rocket sector is more and more competitive with the emergence of reusable launchers and the New Space: companies want to reduce launch prices and, at the same time, increase payload mass delivered into space. However, all current solutions use a bell-shaped engine which is not optimized for atmospheric phases, eventually being more expensive. A solution to reduce the launch cost would be to optimize the engine for the atmospheric phase and thus increase the overall efficiency of the launcher. Motivated by these facts, we propose a design of an aerospike engine. This engine could be a solution to reduce launchers costs and therefore take the lead on the current space race. This article has three main objectives. First, it proposes an efficient cooling system for the nozzle walls, as heat dissipation is the main drawback of the aerospike engine. Second, it suggests an architecture for the aerospike engine with a turbopump system, combustion injector and combustion head. Third, this article makes the case for a closed loop aerospace engine with enriched hydrogen and oxygen. Eventually, we propose a detailed design of an aerospike engine.