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STRUCTURAL ANALYSIS FOR A NANOLAUNCHER'S BODY WITH AN AEROSPIKE NOZZLE

Abstract

Continuing the previous work called "Conceptual design of a nanolauncher based aerospike nozzle to send CubeSats from Mexico" submitted for the IAC 2019, in the present work a structural analysis for the body or fuselage Nanolauncher's is done. This analysis plays a fundamental role for the rocket design and safety.

The structural study is carried out using the numerical and simulation technique known as Finite Element Method (FEM). Due to the advantages to FEM's technique, the modeling allows determine which factors, like wind or mechanical vibrations, could affect the whole nanolauncher (or micro-rocket) and its flight as well as decide how to solve the failures that might happen. Besides, FEM simulation lets spot and visualize any structural vulnerability in the design.

The micro-rocket body's element and the aerospike nozzle are designed using a CAD (Computer Aided Design) drafting software. In the last work presented, an aerodynamic study using FEM was carried out just for the aerospike nozzle. Now, the fuselage will be modeled with the same method. The FEM analysis will give results as the magnitude of the stresses and strains that influence in the entire structure.

In summary, the structural analysis to the Nanolauncher's body assists in estimating of the costs and safety for the rocket final design no needed to build a prototype for testing.

To the next work, based on the results of this paper, one of the outstanding things, it will be determining the moments due to raised thrust. This because of the kind of engine structure that we want to use (an aerospike nozzle).