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# STRUCTURAL DESIGN OF A CUBESAT TYPE NANOSATELLITE FOR ACADEMIC PURPOSES.

**Abstract**

CubeSat is a standardization of a satellite in the category of nanosatellites whose measurements are 10x10x10 cm and a total weight not exceeding 2 kg. At present, research has been carried out on the structural design of small satellites in order to reduce the size of large satellites to much smaller dimensions, in this way it seeks to reduce the structural costs derived from the launch of these nanosatellites. On that basis, this work proposes the design of a novel structure for a CubeSat 1U nanosatellite, using fewer structural elements with the main objective of reducing or equalizing the structural mass with respect to that of existing commercial structures, being a different alternative to those already designed, so any change made to the structure will change the mechanical response for which it was designed. Therefore, a new structural design of a nanosatellite that complies with the geometric characteristics of weight and size established by the CubeSat standard, will allow validating that the structure can remain intact in its components and deformation tolerances caused by the static loads generated in the critical launch phase. To carry out the design of the structure, it is necessary to apply methodologies that allow adjusting the requirements and restrictions involved, so that the structure meets the required spatial specifications. The structural design was modeled using SolidWorks software.

This work proposes the mechanical design of a CubeSat structure using 10 structural elements, with the aim of reducing or equalizing the total mass, with respect to commercial structures, in addition to manufacturing and launch costs, since, by reducing structural components, The nanosatellite will have less structural weight, which results in sav-ings in manufacturing time, launch costs, and parts manufacturing due to its reduced weight. A static analysis was carried out using the ANSYS Multiphysics platform, from which stresses and deformations were obtained for the proposed CubeSat structure. Based on the results, a maximum deformation of 0.0015123 mm and a maximum stress of 3.4001 MPa were found, both due to the loads generated by the launch vehicle. According to the Von Mises criterion, the safety factor found is 79,409 and assuming that the yield stress of the Al 6061-T6 material of this structure is 270 MPa it can be concluded that the proposed structure is suitable for resist the static loads induced by the launch vehicle.