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DESIGN AND SIMULATION OF SMALL SATELLITE MISSIONS USING FREE ACCESS TOOLS

**Abstract**

The development of small satellite missions is an excellent option for a start and the incursion in the space sector for developing countries. Developing countries, in many cases, have economic constraints related to training, infrastructure, and human resources for the development of space technology. In this sense, the road in the envelopment in space becomes longer and with many obstacles. Small satellite missions and the use of commercial electrical, electronic, and electromechanical (EEE) components known as Space COTS can reduce the cost, time, and gap in space incursions for developing countries. For this, a critical stage is the simulation of the mission. In this sense, currently, one has low-cost and/or free access tools, especially for the educational sector, which allow us to carry out simulations of the various aspects to be taken into account in a small satellite mission. Among these tools, one can mention the General Mission Analysis Tool (GMAT), OpenApp, and OpenKit. GMAT allows us to simulate flight dynamics and orbits, while with OpenApp and OpenKit, it is possible to simulate missions of small satellites from 3-unit CubeSats (3U). The present work shows the use of these tools and a 3U small satellite mission simulation with different payloads such as optics, communication, and in-situ demonstration. It is expected that with the use and diffusion of these tools, more and more developing countries will be able to develop their missions and enter into the space sector. Likewise, these tools represent an excellent opportunity to train future professionals with knowledge in aerospace sciences, as in many developing countries, there are still no undergraduate programs in aerospace engineering.