

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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INNOVATION IN WATER ROCKETS DEVELOPMENT BASED ON BIOMIMICRY DESIGN TOOLS
IN COLLABORATION WITH THE AEROSPACE ENGINEERING GROUP OF UNIVERSIDAD DE
COSTA RICA (UCR)

Abstract

At UCR, we are bringing solutions and approaches to aerospace engineering in a more holistic way, considering other factors in addition to the traditionally technical ones. Since Costa Rica is a country with high biodiversity, we have ventured into the use of biomimicry approaches to achieve innovative and different solutions to rocketry problems. As a start in this line of research and development, a study has been proposed on the landing systems of high-power rockets. This design approach from and with nature proposes as adaptations of interest the flying seeds of the South Pacific of Costa Rica. A prototype of a parachute system for a water rocket has been built; its design was based on the seeds of the “Cedro Amargo” (*Cedrela odorata*) tree. The most remarkable characteristics of interest are geometrical configurations and aerodynamic features, which we have identified as compatible with rocket parachute systems. This approach has allowed the development of tools for design analysis, use of materials, and experimentation that go beyond traditional practices. Experimental tests are being carried out in a wind tunnel, to observe aerodynamic aspects of the design proposal, scaling, among others. Subsequently, test launches will be made to verify the correct functioning of the proposed design, considering the safety of the environment as a non-negotiable variable. It has been considered that this biomimicry tool represents a differentiating aspect for development and innovation in our biodiverse country, and mainly in the study we carry out from our university. In this scientific paper, we will describe the process that led to the definition of crucial variables, the selection of the best sources of inspiration from nature, and the impactful aspects that we had to consider in the final design. This research is the result of the project C1461 Mobile Laboratory of Action and Thought in Biomimetic Arts supported by the UCR.