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INTRODUCING A TECHNICAL FEASIBILITY FRAMEWORK FOR A COMMERCIALIZED,
LOW-LATITUDE SPACEPORT IN COSTA RICA

Abstract

Space flight operations have witnessed an industrial boom in recent years due to an increase in launch services from rising actors in the private sector, commonly known as NewSpace companies. As the demand for launch services increases, the expansion for launch facilities and support infrastructure is comparably anticipated. The present study seeks to determine whether the existence of a low-latitude launch point from Costa Rican territory can constitute the basis of a profitable business model, particularly in the domain of insertion into low inclination orbits. The investigation parts from a value proposition hypothesis in which launch services and payload integration is offered from Costa Rica. The assumption is made that reduced launch costs due to geospatial location will generate customer preference for such services, with aspects of the commercial and market analysis left outside the main scope of the technical feasibility investigation. The study addresses the value proposition by first materializing the mechanics of launch to orbit from Costa Rican territory. The range of reachable orbits is determined; a trajectory modeling tool for conventional rocket systems was developed and used to generate the trajectory profiles, given a launch latitude and orbital inclination requirement. With the orbital mechanics parametrizing the remainder of the analysis, human-environment interaction is considered through aspects such as aeronautical navigation and airspace compliance, infrastructural development and environmental compliance, and operational safety. These form a set of criteria used to propose a series of launch sites that are optimally suited for spacecraft launches. With Costa Rica serving as a case-study, this paper establishes a framework that determines a country's geospatial ability of launching to orbit.