

IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES (D6)

Enabling safe commercial spaceflight: vehicles and spaceports (3)

Author: Mr. Geovian Stower
Kenya Space Agency (KSA), Kenya

A PRELIMINARY STUDY ON THE TECHNICAL FEASIBILITY OF LAUNCH SITE OPERATIONS
UTILIZING A TWO-STAGE REUSABLE LAUNCH VEHICLE FOR ORBITAL MISSIONS FROM THE
EAST COAST OF KENYA

Abstract

This research paper presents a comprehensive analysis of the technical feasibility of establishing a launch site on the East coast of Kenya, leveraging the geographical advantages afforded by its proximity to the Indian Ocean. Utilizing advanced modeling techniques with AGI STK software, the study evaluates critical factors influencing launch operations, including launch azimuth optimization, airspace restriction considerations, and exclusion zone management. The research highlights the strategic importance of locating the launch site along the East coast, emphasizing its ability to capitalize on the Earth's rotational velocity to enhance launch efficiency and minimize fuel expenditure. By strategically aligning launch azimuths with the Earth's rotation, the study demonstrates the potential for significant savings in fuel budgets, thus optimizing operational costs for space missions. Furthermore, the study delves into the intricacies of airspace restrictions and exclusion zones, crucial for ensuring the safety and security of launch operations. Through meticulous modeling and simulation, the research delineates optimal flight paths and trajectory profiles, minimizing risks associated with overflight over populated areas and maximizing downrange safety. Moreover, the research explores the implications of rocket visibility zones, providing insights into the tracking and telemetry capabilities necessary for monitoring launch vehicles throughout their ascent phases. By integrating rocket visibility zones into launch planning and operations, the study enhances situational awareness and facilitates real-time decision-making. Finally, the paper examines the diverse orbital segments and mission profiles achievable from the East coast launch site, ranging from low Earth orbit (LEO) deployments to geostationary transfers and beyond. By analyzing mission requirements and payload specifications, the study elucidates the versatility and adaptability of the launch site to accommodate a wide range of space exploration endeavors. In summary, this research offers a comprehensive technical assessment of the feasibility of establishing a launch site on the East coast of Kenya, leveraging advanced modeling and simulation techniques. By elucidating the benefits of its strategic location, optimized launch azimuths, airspace management strategies, and fuel-saving potentials, the study underscores the importance of the East coast launch site in advancing space exploration capabilities.

generate titles for this research abstract