

## ABSTRACT

### STUDY OF FREE FLIGHT TRAJECTORY OF RXX-450 UNDER SINGLE STUCK FIN

by

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Lapan's RXX-450 rocket will be the rocket model for this thesis. The objective of the thesis is to analyze the effect caused by single stuck fin to RXX-450 free flight. The rocket is remodeled using Onshape, a 3D drawing application to confirm the value of inertia as well as the center of gravity of the rocket. Missile DATCOM is used to generate rocket aerodynamic derivatives data. Numerical calculation and simulation are done in MATLAB and Simulink. Then, simulation results are visualized using MATLAB to be analyzed. Analysis is carried out by comparing the trajectory obtained from the simulation of the ideal rocket which we call here the Nominal Trajectory, with the trajectory of the rocket rocket that failed. The failure in question is in the form of canard deflection. The results show that stuck-deflected fin in a rocket causing the rocket to flight off-track. There is a tendency for the relative motion of the rocket in the X axis to point toward the negative, when the fin stuck angle increases. on the X axis, the largest deviation value against the nominal trajectory can be seen in the case of canard deflection of 10 degrees, which is -200 m deviation. As for the Z axis, the largest deviation value can be seen at the canard deflection time of 5 degrees, which reaches 45 m deviation. Further, negative stuck angle -1 deg fin brings out a different result that the positive stuck angle +1 deg fin.

Keyword: *Rocketry, Natural Motion, Stuck Fin, Simulation*