Modeling Lattice Fins as Flight Control Surfaces for a Precision Guided Landing of Reusable Rockets

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The frequency of rocket launches has greatly intensified in the recent decade. Reusability is sought after in an effort to reduce the cost of launches and give rise to a new era of space exploration. Landing a rocket booster requires steering the booster at high speeds to a landing pad. Lattice fins are being utilized as a flight control surface due to their flight authority. Three novel designs along with a Control are modeled using Computer-Aided-Design. The fins are tested using Computational Fluid Dynamics (CFD) in an online wind tunnel simulation system to compare the normal force coefficients. Furthermore, data will be collected from a physical wind tunnel at varying angles of attack for each model on the same fuselage. The data collected would be analyzed and compared with the data retrieved from the CFD simulation. From the results, an optimal novel design can be determined. Implementing the novel design will increase efficiency and allow for more development in reusable rockets. My novel design can be implemented in other precision guidance systems. Furthermore, this innovation supports the United Nations Sustainable Development Goal 9 for industry, innovation, and infrastructure.