A Preliminary Research on Performance Prediction Model of Catapult Launched Take-Off for a Large Wingspan Unmanned Aerial Vehicle

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Abstract The design of Unmanned Aerial Vehicle (UAV) is a typical Systems Engineering (SE) process, which consists of design uncertainties and trade-offs. In predicting the catapult launch of a large wingspan UAV, there are several design drivers and constraints that contribute to the take-off performance. This research investigates the distance estimation methods for UAV take-off in previous research first. The conventional methods, which mostly used are for the distance estimation of the land-based takeoff plane or studying the model of the catapult landing gear only. Thus a gap is found that there are no existing catapult launch performance prediction methods for a large wingspan UAV. It is proposed a fast prediction method based on dynamic and kinematical equations model to deal with this issue. A case study is used to examine the proposed method, and the results show the feasibility in catapult launch performance prediction, especially in the case of short taxing in runway. The new method has the advantage of fast parameter configuration re-build, more reliable performance prediction, and ensures the safety in UAV flight test.

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