SUPERVISOR'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Vertical landing flight envelope definition**
Author's name:	**Jack Charles Hooper**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Control Engineering
Thesis supervisor:	Ing. Tomas Hanis, Ph.D.
Supervisor's department:	Department of Control Engineering

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **challenging**

Evaluation of thesis difficulty of assignment.

The reusability of launch vehicles seems to be new trend in aerospace now. The goal of presented thesis is to investigate descent phase initial states limits for selected vehicle types and landing zone. The descent phase flight simulator tool was created considering dominant physical effects. Finally, the trajectory generation tool was develop based on optimization techniques. The broad expertise needed to fulfill the assignment makes it challenging.

Satisfaction of assignment **fulfilled**

Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.

The assignment was fulfilled in all points.

Activity and independence when creating final thesis **B - very good.**

Assess that student had positive approach, time limits were met, conception was regularly consulted and was well prepared for consultations. Assess student's ability to work independently.

Mr. Hooper was very enthusiastic about the thesis with positive approach. The consultations were regular and well prepared until COVID 19 restriction, where we unfortunately lost any contact.

Technical level **A - excellent.**

Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.

The thesis is on good technical level. Student has proven the capability to deliver solid results based on theoretical knowledge gain during studies and literature survey.

Formal and language level, scope of thesis **C - good.**

Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.

The thesis is well written and organized. The main drawback of the thesis is missing equation numbering making any referencing impossible. Finally, few misspelled or double worlds are present mainly towards the end of the thesis.

Selection of sources, citation correctness **C - good.**

Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.

Student has proven ability to work effectively with literature, however the citation discipline needs to be improved as many of clearly adopted figures were not properly cited.

Additional commentary and evaluation

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Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

The thesis presents study of launch and/or re-entry vehicle trajectories. The important contribution of the thesis is definition of descend phase initial configuration for which preselected landing side is reachable. Student has proven capability to work independently and has mastered principles of flight dynamics. He has implemented re-entry simulation tool considering dominant effects for two types of vehicles. Presented work is limited to 2D – planar trajectories to simplify trajectory generation task and reduce computational effort. Finally, the re-entry trajectories were generated and verified. The readability of thesis is reduced by omitted equation numbering, on top of that several clearly adopted figures and tables are not properly referenced to original source.

I evaluate handed thesis with classification grade **B - very good.**

Date: **1.9.2020** Signature: