

Review of Master's Thesis

Student: Kardoš Juraj, Ing.
Title: Auto Taxi System Design for Aircraft (id 17237)
Reviewer: Vlk Jan, Ing., UPGM FIT VUT

- 1. Assignment complexity** **more demanding assignment**

The complexity of the topic is above average thanks to the multidisciplinary nature of the task. I would like to compliment the student on finding the courage to choose a topic, which involved a lot of effort and studies beyond his ordinary duties.
- 2. Completeness of assignment requirements** **assignment fulfilled with enhancements**

All assigned tasks of the thesis were successfully fulfilled. In Chapter 2 the student described the reference frames, which are necessary for the aircraft motion modeling and then added a highly detailed ground motion model that takes into the account the various situations, which the aircraft might experience while taxiing. The following chapter investigates the aircraft model implementation. Here the student also compares different available ODE solvers. Chapter 4 deals with a control system design composed around a classical PID controller, which was taken as the baseline controller. The student designed an interesting structure of individually tuned controllers that ensure precise automatic navigation of the aircraft on the ground. In my opinion, this section could be improved with investigation and comparison of different control algorithms, where more than one control structure could be utilized. Student also included very detailed description of the evaluation process, which can be found in Chapter 6.
- 3. Length of technical report** **in usual extent**

The theses is written on 65 pages. All Chapters are informatively rich and cover the discussed topic.
- 4. Presentation level of technical report** **90 p. (A)**

The thesis is well structured and the chapters follow the predefined outline. The amount of text in all chapters is well balanced. The information is presented to the reader in a compact and coherent way. Only the rich description of the numerical methods and Simulink solvers (7 pages) in Chapter 3 could be reduced, as in my opinion it is not overly useful for the result of the theses.
- 5. Formal aspects of technical report** **85 p. (B)**

The technical report is written in English language and it is understandable for the reader. The formal part of the report is at a very high level and it is created with a sense for aesthetics.
- 6. Literature usage** **90 p. (A)**

The student cites variety books and articles, which are related to the topic in lieu with contemporary standards.
- 7. Implementation results** **95 p. (A)**

The simulation models of the aircraft ground motion and the controller are designed with the function block diagram technique that is understandable and well-arranged. Functionality and correctness of the whole model was demonstrated in Chapter 5.
- 8. Utilizability of results**

Utilization of the results is possible in further research of the AutoTaxi systems e.g. in tuning of the control system of the aircraft ground maneuvers.
- 9. Questions for defence**
 - How would you approach a problem of noisy input measurements in your controller? How would you modify the actual control system?
 - Are there any other possibilities how to automatically navigate the aircraft on the ground without using the waypoints?
- 10. Total assessment** **93 p. excellent (A)**

The student proved considerable effort and expertise in modeling the aircraft ground motion, which was necessary for a successful controller design. The actual control system was designed with a clear objective of a providing a deterministic and clean controller structure. More sophisticated control algorithms should be considered when implementing the AutoTaxi system into a real aircraft and subjecting it to real conditions. The text part of the thesis was delivered in high standard, as well as its formal layout which contributes to an overall good readability. Suggested grade - **excellent (A)**

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