

Opponent opinion on the doctoral thesis

I. Identification data

Title of dissertation:	Evaluation of DME Network for Ensuring RNAV Capability in the European Region
Author's name:	Tereza Topková
Training workplace:	Department of Air Transport
Opponent of the thesis:	Christophe MACABIAU
Opponent's workplace:	ENAC

II. Evaluation based on individual criteria

Actuality of the dissertation topic	
- Insert comment -	
The thesis with title Evaluation of DME Network for Ensuring RNAV Capability in the European Region is a thesis with an excellently chosen topic. The thesis first develops a model of the relationship between air traffic and DME/TACAN ground stations load in Europe, which is a huge achievement enabling to provide a lot of information. Then this model is used to answer essential questions such as the capability of the current European DME/TACAN network to serve a fleet making more multi-DME interrogations than now (70% of aircraft with FMS interrogating up to five DMEs), the possibility to optimize the European DME/TACAN network to serve the current and the future traffic. It also incidently gives a model of the current and future load of the European DME/TACAN network, which is an information unobservable at this time. All these informations answer many hot questions in European CNS/ATM plans and in standardization, such as current and future RNAV capability of the European DME/TACAN network in particular when GNSS is out of service, European DME/TACAN network load, model of fleet-DME/TACAN interactions.	
evaluation	Excellent

Fulfillment of the goals of the doctoral thesis	
The thesis indicates very clearly several objectives (development of model of air traffic and DME/TACAN ground stations interaction, answer to 3 questions regarding the current and optimized DME/TACAN infrastructure) and according to me all objectives are fulfilled with several assumptions.	
evaluation	Excellent

Methods and procedures of solution

The thesis develops the model of air traffic and DME/TACAN ground stations interaction using a portion of unique real data and using machine learning to compensate for a missing mechanism, which is an excellent choice. Also, this model is validated against the other portion of the real data, and it is very good that validation is kept in mind.

Several comments can be made regarding the underlying assumptions and the choices (DME signal propagation model, use of a larger data set of observed DME replies, more extensive analysis of machine learning results in order to improve the fit, definition of DME stations to be removed).

evaluation	Above Average
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Výsledky disertace – konkrétní přínosy disertanta (Dissertation results - concrete benefits of the dissertation)

- Insert comment -

The thesis provides several outputs (development of model of air traffic and DME/TACAN ground stations interaction, answer to 3 questions regarding the current and optimized Dme/TACAN infrastructure) that come along with assumptions and choices.

evaluation	Excellent
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Significance for practice and for the development of the scientific field

- Insert comment -

The definition of the thesis topic is made in an excellent manner, using excellent information ordered in a fantastic way. This gives a very realistic framework for the analysis which does not focus on fantasies. The results obtained (development of model of air traffic and DME/TACAN ground stations interaction, answer to 3 questions regarding the current and optimized DME/TACAN infrastructure, model of the current and future load of the European DME/TACAN network) are very important foundations to be used in the future.

Regarding the method, as already commented before, a portion of unique real data was used along with machine learning to compensate for a missing mechanism, which is an excellent choice. Also, this model is validated against the other portion of the real data, and it is very good that validation is kept in mind. However, several comments can be made regarding the underlying assumptions and the choices.

evaluation	Excellent
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Formal arrangement of the doctoral thesis and its language level

- Insert comment -

The structure of the thesis is extremely clear, and its motivations are very well explained with good length which is very appreciated.

Some sentences do not have a structure found regularly in English texts, and this problem slightly entails the capacity to understand the thesis sometimes. It would be good to find a way to improve the English.

evaluation	Above Average
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Reminders:
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III. Final evaluation

Final evaluation of the doctoral thesis:
The thesis addresses an excellent topic in a very good manner, and brings outputs that will have an extremely high importance. Some comments can be made about assumptions made, but the thesis is overall excellent.

Ph.D. title award: **I Recommend**

In **2022** day **28 dec**


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Signature of the opponent