![Skoltech logo](Skoltech - Skolkovo Institute of Science and Technology)

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Oleg Khamisov

PhD Program: Engineering systems

Title of Thesis: Optimization of Frequency Control in Power Systems

Supervisor: Assistant prof. Anatoly Dymarsky

Co-advisor: Prof. Janusz Bialek

Date of Thesis Defense:

Name of the Reviewer: Prof. Artem Abakumov

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Signature:** **Date: 26-02-2020**

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

The thesis addresses two important control aspects of power systems: frequency control and congestion management. The thesis is well structured providing the comprehensive literature review regarding the importance of the problem, explaining in layman terms how the problems arise in course of everyday routine grid operation and in emergency, the factors affecting the control performance of the grids. This introduction follows with a more professional and detailed overview of the frequency control and congestion management in the aspects having closer relation to the subject of the thesis. The stated problems and suggested solutions are arranged according to the control properties, namely distributed communication, congestion management and inter-area flows control. Each topic is completed with conclusions and the whole set of results is summarized in suggestions for the further work.

The topic of the thesis and the selected methods are highly relevant for the subject of the thesis as it can help preventing equipment wear and destruction, power deficit and cascade blackout. The novelty of the performed research stems from developing frequency control and congestion management algorithm for the power system model with second order turbine governor dynamics (in contrast to lower order models used before) and from proving global asymptotic stability for this power system model. The results of the PhD thesis are published in 6 proceedings in renowned international conferences with at least 3 indexed in WoS/Scopus thus satisfying the PhD requirements and presented in 5 talks at the conferences and at a number of seminars. Thus the quality of the publications is sufficient for PhD defense. High level of publications and presentations ensure the competitiveness of the results obtained at international level.

Provisional Recommendation

☒ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*