

Jury Member Report – Doctor of Philosophy thesis.


Name of Candidate: Ilias Giannakopoulos

PhD Program: Computational and Data Science and Engineering

Title of Thesis: Memory compression of the Galerkin volume integral equations and coil modeling for the electrical property mapping of biological tissue

Supervisor: Professor Maxim Fedorov

Name of the Reviewer: Ivan Oseledets, Full Professor, Skoltech.

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p>Signature:</p>  <p>Date: 30-08-2020</p>
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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 presented thesis presents a strong body of work. It combines the best of several research areas. First of all, it focuses on a challenging practical problem from biomedicine. Second, it rigorously formulates the mathematical problem and computational challenges. The next-generation MRI scanners requires on-line processing, and that is the core of the computational algorithms developed in this thesis. The computational tools are built around integral equation formalism, developed in the close collaboration with the group of Prof. J. White in MIT, combined with low-rank approximation methods developed in different research groups, but mostly in Russia and US. These tools, both for matrices and tensors, allow to significantly reduce the computational complexity, making the whole process close to real time.

The thesis is well-written. I have been following this research for a long time, and I can only congratulate the applicant for such a high-quality thesis. For the first time writing a thesis review I have no desire to write any specific comments on how it can be possibly improved. I think, it can be accepted "as-it-is" with the highest possible recognition!

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