

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Mohammad Ebadi

PhD Program: Petroleum Engineering

Title of Thesis: Fluid transport in tight rocks: multi-scale AI-driven characterization paradigm

Supervisor: Associate Professor Dmitri Koroteev

Name of the Reviewer: Peyman Mostaghimi

Mr Ebadi was a member of our research group in Sydney as a visiting student from 1/2/2020 to 26/3/2020.	
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	Date: 28-08-2021
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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

I reviewed with interest the Thesis by Mr Ebadi on use of multiscale and machine learning methods in unconventional rock characterization for consideration of a doctoral degree at Skoltech. Digital rock methods and unconventional reservoirs are among areas of my research interest. In the thesis, the candidate demonstrates the ability to carefully formulate an engineering problem related to hydrocarbon reservoir engineering, design methodology using the relevant numerical formulation, collect and analyze data critically and present them in the right form.

Overall, I was impressed with the work and I appreciate that several papers published in high impact journals of the field as a result of the study. Reviewing this thesis was also an opportunity for me to learn more about the exciting works in the research group of Dr Koroteev at Skoltech.

Below, I outline my minor comments to improve quality of the thesis. I believe the thesis is an original contribution to the field and, following these improvements, would meet the requirements for the degree of Doctor of Philosophy.

Chapter 1 reviews the significance of developing unconventional reservoirs to address the energy demand and role of digital rock technologies for reservoir characterization and simulation. I would suggest the candidate add a final section to the chapter where (i) a clear list of objectives of the thesis is outlined and (ii) the interconnection of the following chapters are explained.

The other chapters (2,3,4,5,6) are journal papers that are peer reviewed and published. This is a strong aspect of the work such that the candidate has successfully published his results in peer-reviewed journals.

Finally, the thesis would benefit from a final chapter that contains (i) the main contribution of the thesis to the research field, (ii) explain how the objectives of the thesis are fully met by chapters 2-6, (iii) the vision of the candidate for future research. In specific, the section on future works would provide insights for young researchers who are inspired by the work.

In the end, I would like to congratulate the candidate and the supervisory team for this important research and wish them the best for their future endeavors.



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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