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Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Aleksandr Vedernikov

PhD Program: Mathematics and Mechanics

Title of Thesis: Effects of technological regimes on structural performance of pultruded profiles

Supervisor: Assistant Professor Alexander Safonov

Name of the Reviewer: Ivan Sergeichev

I confirm the absence of any conflict of interest	**Date: 31-09-2022**

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

Ph.D. thesis of Alexander Vedernikov aims to investigate the effects of technological regimes on the structural performance of pultruded profiles. Ph.D. thesis is well-structured and easy to follow. It contains 12 Chapters. In the first chapter, Alexander introduces the motivation of his project, analyses previous studies, and outlines the research gaps. The second chapter formulates the mathematical model of the pultrusion process by describing the thermomechanical initial-boundary value problem (IBVP) predicting the response of a body to applied temperature loads. In the third chapter, Alexander briefly presents the results obtained during his Ph.D. project. This thesis is based on eight articles, published by Alexander, which are presented in chapters 4-11. Finally, chapter 12 concludes this thesis and proposes future research directions.

The topic of the Ph.D. thesis is fully aligned with its actual content. The research objectives are clearly stated. It is then followed not only by pultrusion experiments but also by the development of the appropriate numerical models. Thus, I believe, that the stated problem was studied from different standpoints, which makes this Ph.D. thesis coherent and logical.

Mechanical testing experiments were done following international standards. The methodological part follows state-of-the-art approaches and practices widely applied by the composite scientific community these days.

The results of the presented Ph.D. thesis are significant from the scientific standpoint, which is supported by the number of publications and their top-level journals. In my opinion, the most significant result is the development of a numerical model predicting the spring-in of L-shaped profiles pultruded at different pulling speeds as well as accounting for different spring-in formation mechanisms (i.e. chemical shrinkage, thermal contraction). It is not only a significant achievement in the pultrusion scientific domain but also promises future application in the engineering practice for more efficient die design and technological parameters choice.

No doubt, that the results of Alexander's work are relevant not only for scholars but also for composite practitioners. It has full potential to be applied in the civil engineering practice for both increase in the profitability of the pultrusion process and further promotion of pultruded structural profiles.

As of today, Alexander is an author/co-author of 14 articles (as per Scopus) published in highly ranked Q1/Q2 journals such as "Composite Structures", "Composites - Part A: Applied Science and Manufacturing", "Composites Communications", "Journal of Composite Materials". He developed his scientific profile from scratch to an h-index of 8 and nearly 200 citations in 4 years that is quite an impressive result in my opinion.

Regardless the total positive impression, some minor points should be addressed:

1. This is a suggestion rather than a strict recommendation. It would be nice to include an "Acknowledgment" section in the Ph.D. thesis, thereby appreciating the contribution of Alexander's scientific peers, colleagues, and professors related to the development of the Ph.D. project.
2. Although the novelty of the thesis is obvious, I would recommend developing a section where these main points might be clearly stated.
3. Generally speaking, this thesis is well-written, however additional proofreading would improve the quality of English and eliminate minor typos and grammatical errors.

Overall, I believe, that Alexander made a significant contribution to the composite materials domain. The results of his Ph.D. project are novel, top quality, and scientifically sound, thus, fulfilling all the formal requirements of the Ph.D. project. I wish Alexander all the best in his future scientific endeavors. Having said that, I would like to recommend proceeding to a formal thesis defense.

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*