

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Biltu Mahato

PhD Program: Mathematics and Mechanics

Title of Thesis: Multifunctional Interleaves for Composite Laminate

Supervisor: Dr. Sergey Abaimov, Skoltech

Co-supervisor: Professor Stepan Lomov, KU Leuven

Name of the Reviewer: Dmitry Kolomenskiy

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

Date: 24-12-2023

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

The thesis explores the possibility to modulate properties of composite laminates by adding carbon nanotubes. It contains five chapters. The first and the last chapters are, respectively, the introduction and the conclusion; original results are contained in chapters 2, 3 and 4. Although chapter 2 is essentially a review of state-of-the-art of electrospun polymeric interleave manufacturing technologies, it contains original results of areal density and conductivity tests obtained by the author of the thesis. Chapter 3 focuses on manufacturing and mechanical characterization of carbon nanotube masterbatch interleaves, chapter 4 concerns with electrical conductivity properties, and these two chapters mainly contain new results obtained by the author. The thesis is well written and well structured.

The topic of the thesis as stated in the title is broad but it embraces the actual contents. The manufacturing methods and the measurement methods are adequately chosen, allowing to produce materials with the desired properties and to quantify those properties. The author has convincingly explained the scientific significance of the results by placing them in the context of the state-of-the-art international research activities. A possible industrial application is proposed in chapter 5, it concerns with monitoring cure status of composite materials that use thermoset polymers. The results are published in peer-reviewed journals.

Minor issues:

- 'Mode I' is mentioned for the first time on page 34 without any explanation. The author should define the two modes, Mode I and Mode II, in the introduction.
- Page 18: 'Initiation' and 'propagation' are not physical quantities per se measured in J/m^2 . Are G_{1i} , G_{1p} , G_{2i} and G_{2p} surface energies?
- Equation (4.3): Specifically, what kind of function is f ? Is it known? Can the author plot it?
- Equation (4.4) should be split in two: one with the '<' and the other with the '>' signs. Same with equation (4.5).

The above issues are not critical. The thesis can be defended.

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