

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Rahim Samanbakhsh

PhD Program: Engineering Systems

Title of Thesis: Design of power converters for renewable energy sources

Supervisor: Assistant Professor Federico Martin Ibanez, Skoltech

Name of the Reviewer:

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p>Date: 08-11-2022</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

This thesis focuses on improving features of power converters, particularly in multilevel inverters and Z-source converters. In the first goal of the thesis, the proposed 15-levels inverter is designed. The second goal of the thesis is intended to build a Z-source converter with improved features. The proposed Z-source structure has a very high voltage boost gain at a low shoot-through duty ratio and high modulation index to reduce the semiconductor stress.

The described research is performed at high international level and is consistent with current state-of-the-art in the area of power systems control. The results are published in several conference proceeding including one journal paper.

The structure of the thesis seems excessive. The Thesis has very long introduction. The content of the first 4 chapters could be collected to at most 2 chapters. The main contributions are described in Chapters 5 and 6, conclusions are summarized in Chapter 7.

Other questions:

- p. 130 Description of the Algorithms is not strict enough. Algorithm usually has the set of inputs (and initials values for input variables, if necessary), outputs and the set of steps through which needed to obtain the values for output variables.
- In the Thesis you emphasize the applicability of the proposed inverter for **industrial** loads. What do you mean by that and what's the difference between industrial and non-industrial (I assume, residential?) load?

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