OPINION

By Assoc. prof. Dr. Eng. Martina Raychinova Tomcheva, University of transport "Todor Kableshkov"

On the dissertation submitted for the award of the educational and scientific degree "DOCTOR"

in the field of higher education 5 *"Technological sciences"*

Professional field 5.2 *"Electrical engineering, electronics and automation"*

Author: m. eng. Petar Ivanov Petrov

Title of dissertation: *"The influence of load on reactive power under asymmetrical and non-sinusoidal regimes"*

1. Brief biographical data and professional profile

The doctoral candidate in this competition, M. eng. Petar Ivanov Petrov, completed his higher education between 1995 and 2000, obtaining both Bachelor's and Master's degrees in *Electronic Engineering* at the "Angel Kanchev" University of Ruse.

By Order №92B/18.10.2024 of the Director of the Institute of Robotics, BAS, M. eng. Petrov was enrolled as a doctoral student (part-time form of study) in the doctoral program *"Elements and Devices of Automation and Computing Technology"*, professional field 5.2 *"Electrical Engineering, Electronics and Automation"*. His scientific supervisor is Assoc. prof. DSn. eng. Iliyan Hristov Iliev.

The doctoral candidate has successfully fulfilled the requirements of his individual study plan, has actively participated in scientific forums, and has met the minimum national criteria for the award of the educational and scientific degree "Doctor."

2. Relevance of the research problem in scientific and applied terms. Scope and significance of the issues and specific tasks addressed in the dissertation

The presented dissertation examines the processes of compensating reactive loads, while also focusing on the application of innovative computational and technological methods for rationalization, optimization, and validation of the obtained results.

The topic of the dissertation is highly relevant, as reactive power compensation is of fundamental importance both for improving the indicators of power quality and for ensuring reliable and efficient electricity supply.

3. Analysis of the structure and content of the dissertation

The dissertation comprises 180 pages and is structured into an introductory section, which provides a concise overview of the work, four chapters, and concluding remarks. At the end of each chapter, the main findings are summarized.

At the conclusion of Chapter One, the aim and principal tasks of the dissertation are formulated. The presented material also includes the author's stated contributions, a record of the dissemination of the dissertation results, and a bibliography containing 129 references in both Cyrillic and Latin script.

4. Degree of familiarity with the state of the problem

M. eng. Petar Ivanov Petrov demonstrates profound knowledge in the field addressed by the dissertation. The author provides an adequate assessment of the current state of

development and the key challenges in this area, and on this basis precisely formulates the aim and objectives of the work.

Following the clear definition of the main goal and the associated tasks, the research has been carried out consistently across all levels of development— theoretical, methodological, and experimental.

5. Consistency of the chosen research methodology with the aim and objectives of the dissertation

The applied research approach confirms that the selected methodology, together with the conducted investigations, provides an adequate response to the main aim and objectives formulated in the dissertation. On this basis, M. eng. Petar Petrov derives the key findings and conclusions of the work.

6. Scientific and/or applied contributions of the dissertation

M. eng. Petar Petrov has formulated two scientific contributions and three applied contributions, with which I fully agree.

The scientific contributions are related to the formulation of innovative theoretical and methodological concepts. The applied contributions encompass practical approaches to the compensation of reactive loads, experimental studies conducted on a real facility, and the optimization of a large industrial installation.

The stated contributions correspond directly to the research performed and the results obtained. I assess the degree of the doctoral candidate's personal involvement in these contributions as representing his own original work.

No evidence of plagiarism or unacknowledged use of other authors' materials has been identified.

7. Evaluation of the Publications Related to the Dissertation

M. eng. Petar Petrov has presented a total of five publications in Bulgarian. The doctoral candidate is the sole author of one publication, while in the remaining papers he is listed as second author. In these publications, the candidate has reflected the most substantial and significant parts of the dissertation research.

8. Evaluation of the Abstract and the Bibliography

The abstract fully and clearly reflects the main aspects of the dissertation, enabling an assessment of the relevance of the problems addressed, the approaches applied for their solution, and the results obtained. The bibliography of the dissertation is up to date and adequately represents the current state of research on the studied scientific problem.

9. Opinions, Recommendations, and Remarks on the Dissertation

My recommendations to the doctoral candidate are as follows:

- To continue working actively on solving tasks related to the compensation of reactive loads;
- To structure and consolidate the content of the dissertation into a teaching aid, so that it may be used in the educational process as well as by specialists in practice.

Conclusion

I consider the dissertation to be a thorough and completed research study that fully meets the criteria and requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZRASRB) with respect to scope, structure, and content.

The dissertation submitted by M. eng. Petar Ivanov Petrov on the topic *"The Influence of Load on Reactive Power under Asymmetrical and Non-Sinusoidal Regimes"* fully satisfies the requirements of ZRASRB and its regulations, and may be admitted to public defense.

I recommend to the esteemed Scientific Jury that M. eng. Petar Ivanov Petrov be awarded the educational and scientific degree "Doctor" in professional field 5.2 *"Electrical Engineering, Electronics and Automation."*

2 September 2025

Reviewer: ....
/Assoc. Prof. Dr. Eng. Martina Tomcheva/