

## STATEMENT

on dissertation thesis for fulfillment of educational and scientific degree "Doctor" (PhD) in higher education field of study: 5. „Technical sciences”, professional field: 5.2. „Electrical, electronics and automation engineering” for PhD program „Elements and devices in automation and computational technic“.

Author: **Assist. Eng. Petar Petrov MsC**

Thesis Theme: „**Electrical load influence over reactive power for non-symmetrical and non-sinusoidal regimes**”

Scientific Jury Member: **Assoc. Prof. Eng. Petko Nedyalkov PhD, IR-BAS**, in appointment № 78/16.07.2025 from IR-BAS Director.

### **1. Main information for PhD candidate**

Eng. Petar Petrov MsC developed his PhD thesis in section “Robotics in Electrical Power Systems /REPS/” (PE) of Institute of Robotics – Bulgarian Academy of Sciences in manner of “Free doctorate program” and he is an assistant in the same section since year 2024.

Public PhD thesis defense is stated in “REPS” /PE/ section seminar proposal to the Scientific Council of IR-BAS. There is presented a document for fulfillment of 130pts according to IR-BAS assessment methodology, which is over the 100 pts minimum.

### **2. Thesis Actuality.**

Thesis is considering with conventional and hi-tech reactive power compensation methods. There is proposed a new reactive power compensation approach in compensating power according “Reactive Power Direction and Magnitude” criteria, application of anti-resonance protective devices, implementation of chain active filters and SCADA monitoring and control system. The proposed methodology offers high level of combined technical and economical effectiveness.

### **3. Level of Research.**

Thesis citation references are 129 bibliographic sources, 45 of them from Romanic languages. The PhD candidate analyses in details referenced problems and form correct definition of the thesis tasks.

### **4. Methodic conformity with thesis tasks and aim.**

In conformity of the thesis tasks there are presented results from schematically - technical analysis and industrial optimization for reactive power loads in power supply system. The characteristic coefficients about four main grid sections are took from analysis conducted in daily and monthly cycles. Also there are analyzed working regimes and facility parameters with quantity assessment for generated reactive power and active power losses for reactive power transfer. There are defined optimization problem for “Annual Reduced Expenses Minimum” criteria and therefore synthesis methodic is adapted to the facility particular schematic.

### **5. Thesis Characteristics.**

The thesis is structured in 171 pages containing 104 figures and 38 tables, including: introduction, symbol list, four main chapters with their separated conclusions, general thesis conclusions, general thesis contributions, bibliography and publication chain list.

#### **6. Scientific and scientific-applied contributions.**

The thesis author formulated 2 scientific and 3 scientific-applied contributions, which can be summarized as: new methods and technologies development, new and previously confirmed facts verification. The contributions are accepted as they are formulated.

#### **7. Publication chain assessment**

The publication chain for the presented PhD thesis are list of 5 articles in proceedings of International Energy Forum, Varna, 2025. One of the papers is PhD candidate self-developed, and the others are in development with PhD candidate's supervisor. The scientific metrics is of the publication chain is 56.7pts in accordance with NACID/НАЦИД/ assessment methodology, which is over the 30pts minimum.

#### **8. Assessment of PhD candidate personal contribution.**

The personal contribution of the PhD candidate over the general contributions, publications and thesis are well presented in the documentation materials.

It can be reported no presence for revealed plagiarism.

#### **9. Assessment dissertation abstract.**

Dissertation abstract expresses basics and contents of the thesis in clear manner and sufficient fulfillment level. It can be reported for the presented volume of the abstract is quite big in comparison with the regular volume of 32 pages.

#### **10. Opinion, recommendations and notes.**

The presented thesis is vast and well-structured scientific research for the aimed problematics.

It can be reported no presence of any essential censures.

Also it can be reported some technical remarks, which are announced to the PhD candidate – table and figure captions with missing description and markings (fig. 1.18-35, 2.3 etc.); equations with missing dimension units (eq. 2.72, etc.); inappropriate scale of figures (fig. 4.2, etc.).

In personal, it is recommended for the PhD candidate to continue his research and to present and publish self-developed studies in that very same scientific field.

## 11. Conclusion

Dissertation thesis presented by Assist. Eng. **Petar Petrov** MsC contains results expressing the methodological solution of thesis aim and tasks.

It can be reported that the summary assessment is positive.

Also, it can be reported sufficient fulfillment for the scientific and scientific-applied contributions for academic staff growth law ZRASB /3PACPБ/, its regulations, and IR-BAS academic staff regulations, in their particular sections about PhD defense procedures.

In accordance with those statements it can be submit in the Scientific Jury Council to confer **Assist. Eng. Petar Ivanov Petrov MsC** on educational and scientific degree "Doctor" (PhD) in higher education field of study: 5. „Technical sciences“, professional field: 5 2. „Electrical, electronics and automation engineering“ for PhD program „Elements and devices in automation and computational technic“.

17.09.2025r.

Scientific Jury Member: ... ..  
/Assoc. Prof. Eng. Petko Nedyalkov PhD/