

## **REVIEW**

**by Professor Dipl. Eng. Stefka Ivanova Nedelcheva, PhD at TU-Sofia, FEP-Sliven,**

on the materials, submitted for participation in the competition for taking the academic position of ‘Associate Professor’ at Burgas Free University, in the higher education area ‘Technical Sciences’, professional field 5.2 Electric Power Engineering, Electronics and Automation (Electronization)

### **1. General presentation of the submitted materials**

By order of the Rector of Burgas Free University (BFU) I was appointed a member of the Scientific Jury of the competition for taking the academic position ‘Associate Professor’ at BFU in the higher education area ‘Technical Sciences’, professional field 5.2 ‘Electric Power Engineering, Electronics and Automation’, announced for the needs of the Faculty of Computer Science and Engineering (FCSE).

The only candidate, who has submitted documents for participation in the competition, announced in State Gazette, issue 56 of 6<sup>th</sup> July 2021 and on the website of BFU, is Head Assistant Dipl. Eng. Daniela Zhekova Mareva, PhD, from BFU, FCSE.

The materials, submitted by Head Assistant Dipl. Eng. Daniela Zhekova Mareva, PhD, are in compliance with the Regulations for Development of the Academic Staff of BFU. The candidate participates in the competition with a monograph, 22 scientific publications, 6 teaching aids, and a list of 5 projects with her participation. The listed scientific papers are not part of the doctoral thesis of the participant in the competition.

### **2. Brief biographical data about the candidate**

Head Assistant Daniela Mareva, PhD, graduated from the Technical University of Varna in 1999, obtaining the educational and qualification degree Master of Science in Electronic Engineering and Microelectronics. In 2016 she defended her doctoral thesis and obtained the scientific degree Doctor of Philosophy (PhD) in the professional field 5.2 Electric Power Engineering, Electronics and Automation, doctoral program ‘Electronization’, which corresponds to the scientific specialty for which the competition for the position of ‘Associate Professor’ was announced.

Head Assistant Daniela Mareva, PhD, has over 20 years of teaching and research experience. Her professional experience is completely sufficient in terms of the announced competition.

### **3. General characteristics of the candidate's activity**

#### **3.1. Assessment of the educational and pedagogical activity of the candidate**

The pedagogical training of Head Assistant Dipl. Eng. Mareva, PhD, is at a high level with in-depth theoretical and practical knowledge. She has published 6 textbooks and teaching aids to ensure the learning process.

#### **3.2. Assessment of the scientific activity of the candidate**

##### **3.2.1. Contributions in the scientific papers outside the monograph**

The submitted scientific works for participation in the competition are 24. Of these, 9 are referenced and indexed in world-famous databases with scientific information (Scopus), and 13 - cited.

The major **scientific contributions** in them are the following:

**Scientific contributions:**

- development of a methodology for designing an inductor for an induction heating device [II13];
- proving new facts about the use of combined pulse-width modulation (PWM) which achieves less current ripple and improves the power factor [II7];
- obtaining confirmatory facts about the possibilities for control of the parameters of the welding process with superimposed pulses through an additional current source for a welding inverter with improved parameters [II10].
- demonstration of the change in both the mode of operation of an inverter and respectively in the load of the semiconductor elements in different emergency situations [II12].
- comparative analysis of the different types of modulation for control of transformer non-dimmable converters in nominal mode of operation, designed for LED luminaires [II7].
- a new technical solution for the implementation of an independent welding inverter with two resonant frequencies [II16], as well as for an autonomous inverter-type current source with pulse-arc welding [II17].

**Scientific and applied contributions:**

- simulation of the inductor operation for an induction heating device, using the FEM analysis [II 13];
- design methodology for sizing of an inductor for induction heating with application of numerical and FEM modeling [II 13];
- simulations (PSpice) of the operation and characteristics of a welding machine at different modes and loads [II 10];
- mathematical modeling of the current through the transistors of the inverter for heating fluids with a combined structure [II 12];

**Applied contributions:**

- structural improvements with the use of nanocrystalline materials to reduce losses in a power converter [II.7];
- development of new converter type power-supply devices with intermediate conversion [II.2];
- innovative research in the field of autonomous inverter power supply for various applications [II.3], trends in pulse electric arc welding control [II.6];
- improvement in the power parameters of welding sources [II.4], [II.5].

- evaluation of the energy efficiency of an inverter source for induction heating of fluids [II.12];

Teaching and methodological contribution in publications [II12] and [II18].

### **3.2.2. Contributions in the monograph**

#### **Scientific contributions:**

- innovative solutions, related to improving the quality of welding with inverter welding machines;
- innovations, aiming at technical and technological improvement of some of the schemes of welding devices;
- obtaining expressions for calculation of individual elements, on which the characteristics of the circuit solutions of some welding machines depend.

#### **Scientific and applied contributions:**

- development of Pspice-models of the power part of circuits;
- generalization and analysis of the tendencies for increase of the working frequency, reduction of the dimensions of the welding devices and increase in the quality of welding.

#### **Applied contributions:**

- classification of welding methods and types of welding units, their characteristics and features;
- comparative analysis of the advantages and disadvantages of welding source diagrams;
- overview of the methods and schemes for improving the switching characteristics of converters.
- obtaining analytical dependences for sizing of welding units.

The contributions in the candidate's scientific works are significant. The quantitative parameters of the criteria for holding the academic position 'Associate Professor' are met.

### **4. Assessment of the candidate's personal contribution**

The contributions achieved by Head Assistant Daniela Mareva, PhD, are due to her in-depth work in the research field and are useful for practice. The contributions of the candidate in the respective publications are her personal merit.

### **5. Critical remarks and recommendations**

I have no significant remarks on the presented scientific papers.

Abbreviations, not explained in the text, are noticed in some publications.

My only formal note on the monograph is that on page 106 it is written: "the purpose of this *article* is ..." – a mistake, obviously coming from the direct use of texts from the article when writing the monograph and not noticed when editing.

## 6. Personal impressions

I do not know in person Head Assistant Dipl. Eng. Daniela Mareva, PhD. My impressions of her are entirely from the materials, presented for the competition. I believe that her very good professional training and over 20 years of teaching experience make her an honored lecturer. From the published scientific works and textbooks it can be established that she can work successfully both independently and in a team. The large number of scientific papers with a reference to Scopus makes a good impression.

## CONSLUSION

The documents and materials, submitted by Head Assistant Daniela Mareva, PhD, **meet all the requirements** of the Law for the Development of Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation and the respective Regulations of BSU.

The candidate in the competition has presented a significant number of scientific papers published after the materials used in the defense of the educational and qualification degree Doctor pf Philosophy (PhD). The candidate's works contain original scientific and applied contributions. Her theoretical developments have practical applicability.

The results achieved by Head Assistant Daniela Mareva, PhD in teaching and research activities fully comply with the specific requirements of BSU.

The acquaintance with the presented for the competition materials, the scientific works, the achieved contributions of the candidate, and the analysis of their significance, allow me to give my **positive** assessment and **recommend** to the Scientific Jury to choose Head Assistant. Dipl. Eng. Daniela Zhekova Mareva PhD to hold the academic position of ‘Associate Professor’ at BSU in the professional field 5.2 Electrical Engineering, Electronics and Automation (Electronization).

6<sup>th</sup> October, 2021

**Reviewer:** .....

(Prof. Dipl. Eng. Stefka Nedelcheva, PhD)