

# REVIEW

on a competition announced by the Technical University of Gabrovo, for academic position "Associate Professor" in area of higher education 5. Technical Sciences, professional field 5.1 Mechanical Engineering, scientific speciality „Industrial Heat Engineering”, published in the State Gazette, vol. 58/23.07.2019, with candidate senior lecturer Valentin Metodiev Petkov, PhD

Reviewer: Professor Jordan Todorov Maximov, DSc

Only one candidate participates in the competition: Valentin Metodiev Petkov, PhD, born on 04.06.1961. He works at the Technical University of Gabrovo, Department of Power Engineering, and holds the academic position of "Senior Lecturer".

## 1. General characteristics of the candidate's research and applied activities

Senior lecturer Valentin Petkov participates in the competition with the following asset:

*a. Scientific articles in international journals with impact factor*

three articles, having numbers\* 2.1.1, 2.1.2 and 2.1.3;

*b. Scientific articles in international journals without impact factor*

11 articles, having numbers 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10 and 2.2.11;

*c. Scientific articles in journals in Bulgaria†*

eight articles with numbers 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7 and 3.1.8;

*z. Scientific papers in editions of the International Scientific Conference, organized by Technical University of Gabrovo*

three papers with numbers 3.2.1, 3.2.2 and 3.2.3;

*ð. Monograph in English, edition of Ex-press, Gabrovo*

one monograph;

*e. Thesis of a dissertation for obtaining educational and scientific degree "doctor"*

20 of the 27 scientific papers are in English. Seven of the publications are standalone. Of the other 20 works: 11 have one co-author and 9 have two co-authors. These facts show the candidate's leading role in his research and publication activities. It should be noted that four articles are co-authored with the American scientist A. Bergles. Six of the publications are co-authored with doctoral students.

The candidate has provided a list of citations to his works as follows:

- In journals with impact factor (with self-citations included - see for example 1.1 and 1.2) – 10 citations;
- In foreign journals – 15 citations;
- In proceedings of international conferences – 1 citation;
- Dissertation outside Bulgaria – 1 citation;
- In Bulgaria – 1 citation.

The Scopus reference shows that the h - index of the candidate is equal to 3.

Senior lecturer Valentin Petkov, PhD, is the head of four students who presented scientific reports at the Student Scientific Session of TU - Gabrovo.

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\* According to the list of publications provided by the candidate

† Journal of Technical University of Gabrovo is applying for indexing and is being monitored by Web of Science

The candidate has submitted a list of seven publications with his participation, which publications are outside the scientific specialty of the competition: four are in tribology, one is in material science, one is in 3D geometric modeling, one is in design.

Dr. Valentin Petkov has presented a list (as a executor and as a leader) in 14 research projects, which are specifically funded by Section 3 of the State Budget. The last four projects have been managed by the applicant.

The Heat Transfer Intensification Research Laboratory has been created, developed and expanded with additional stands thanks to the applicant's leading role.

The publications in scientific specialty of the competition are in the field of energy efficiency and can be classified in two directions:

1) Intensification of the heat transfer in heat exchangers (most publications);

2) Efficiency of solar collectors (3 publications).

*In conclusion, it can be said that the predominated part of the candidate's works are focused in the field of heat exchange intensification. The main research method used by the applicant is the experimental one. The foregoing determines the appearance of the candidate Dr. Valentin Metodiev Petkov as a researcher.*

## **2. Assessment of the applicant's study activity and qualification**

Senior lecturer Dr Valentin Metodiev Petkov participates in the competition with a total of 3 textbooks – User guide for laboratory exercises in thermodynamics and heat transfer (co-authored); Thermodynamic tables for water, water vapor and refrigerants (standalone); Collection of Problems in Thermodynamics (standalone). The candidate works at the Technical University of Gabrovo consecutively as: Assistant (1987 - 1990), Senior Assistant (1990 - 2003) and Senior Lecturer (since 2003 to present). The subjects taught are: Applied geometry and engineering graphics, Technical documentation, Thermodynamics, Thermodynamics II, Building heat engineering, Fundamentals of ventilation and air conditioning, Architectural, construction and thermal characteristics of buildings (masters), Heat and mass transfer equipment (masters), Secondary energy resources (masters), Intensification of heat exchange (masters), Thermodynamic bases of ventilation and air conditioning (masters).

In the last 5 years, senior lecturer Dr V. Petkov has been scientific leader of a total of 42 graduate students in Department of Power Engineering, of which 17 masters. For the same period the candidate has been a reviewer of 83 graduation projects, 24 of which are masters.

The applicant has attached a certificate of proficiency in English as well as a certificate of full design competency.

Based on the above facts, I believe that the applicant Assistant Professor Dr Valentin Metodiev Petkov has the necessary pedagogical preparation and qualification for occupying the academic position "Associate Professor", for which he is applying.

## **3. Basic scientific and applied contributions**

The contributions that I've admitted I edited and classified as scientific-applied and applied. I have not recognized any scientific contributions.

### *A. Scientific contributions*

There are no scientific contributions

### *B. Scientific – applied contributions*

B.1. Creating new classifications, methods, constructions, technologies and more.

♦ Optimization of single-phase, fully developed channels with constant density in channels using the entropy minimization method (monograph);

♦ Criteria for evaluating the energy performance of single-phase fully developed flows in channels of different geometric shapes (monograph, 2.1.2, 2.2.4, 2.2.5, 2.2.7);

- ◆ Thermo-hydrodynamic characteristics of transient and single-phase flows (2.1.1, 2.2.8, 2.2.9, 3.1.6, 3.1.7, 3.2.1);
- ◆ Evaluation of the effect of using different techniques for intensification of single-phase heat transfer (2.1.3, 3.1.6, 3.1.8);
- ◆ Criteria for a preliminary assessment of the benefits of applying heat transfer intensification techniques for laminar flows in pipes and ducts (3.2.2);
- ◆ Application of the constructive theory for determining the energy characteristics of channels with a tree structure (2.2.10, 2.2.11).

#### B.2. Obtaining and proving new facts

- ◆ Minimum entropy generate: laminar flow in a circular tube; turbulent flow in an elliptical tube (monograph);
- ◆ Cases have been identified where, for a given boundary condition (T and H1), pipes with specific non-circular cross-sections are competitive with pipes with a standard circular cross-section (monograph, 2.1.2, 2.2.4, 2.2.5, 2.2.7);
- ◆ Hydraulic resistance and heat transfer coefficients (2.1.1, 2.2.8, 2.2.9, 3.1.7, 3.2.1).

#### C. Applied contributions

- Increasing the efficiency of solar collectors (3.1.3, 3.1.4, 3.1.5);
- An apparatus for studying the intensification of heat exchange in pipes and channels at single-phase, laminar, transient and turbulent flow (3.2.3).

### 4. Importance of the contributions to the science and practice

The results of the research and teaching activities of senior lecturer Valentin Petkov has an applied orientation and ultimately serves the engineering practice and training of students.

#### Tables 1

Minimum number of scientific results for the occupation of the academic position "Associate Professor", in accordance with the rules adopted by the TU - Gabrovo

Scientific results	min. number	Dr V. Petkov
Holder of disciplines	1	4 (bach.); 5 (masters)
Textbooks published	2	3
Articles and papers published		
- total	20	27
- standalone	4	7
- with impact factor	(1)	3
Number of known citations from other authors	5	28
Participation in projects and contracts	2	14
Note: The number in brackets is optional		

The applicant has provided a certificate showing that he has fulfilled the minimum national requirements for occupying the academic position of Associate Professor.

The minimum quantitative requirements applied to the candidates for occupying the academic position of "Associate Professor" according to the rules adopted by the TU - Gabrovo are also satisfied by the candidate Dr. Valentin Petkov (Table 1).

## 5. Notes and recommendations

- In the author's contribution report, the applicant claims another scientific contribution: „Vector analysis of ... [2.2.1]”. The wording, in my opinion, needs serious revision for the following reason: the vector analysis taken alone is a research method; as an instrument it cannot be a contribution as it is known (precisely as an instrument); a contribution is the results from the analysis. Ibidem, p. C – A, with the wording "Study of ..." is claimed as a contribution. Exploring anything by itself cannot be a contribution. A contribution is the result of the study. In addition, the applied contribution needs to be substantiated.
- I would recommend to senior lecturer Dr Valentin Petkov to continue his research work in the field of heat exchange intensification and to publish the scientific results obtained in journals with impact factor.

## 6. Personal impressions

I have known engineer Valentin Petkov for many years as a quiet, humble, very hardworking colleague and an excellent specialist in the field of heat exchange intensification. I am convinced by the immediate impressions of his significant personal contribution to the building of the Department of Power Engineering.

## 7. Conclusion

Based on my familiarity with the submitted scientific papers and textbooks as number and quality, presented by the candidate Dr. V. Petkov, the contributions they contain, as well as on the basis of other assets presented in the study activity, the comparison made in Table 1 and my personal impressions, I find it is reasonable to suggest:

**senior lecturer Valentin Metodiev Petkov to take up the academic position of „Associate Professor” at Technical University of Gabrovo, in area of higher education 5. Technical Sciences, professional field 5.1 Mechanical Engineering and scientific specialty „Industrial Heat Engineering”.**

/signature/

Reviewer: Professor Jordan Maximov, DSc

October, 2019  
Gabrovo