OPINION

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Concerning scientific works submitted for participation in competition for awarding the academic position of "Associate Professor" in professional field 5.1 "Mechanical Engineering"; scientific specialty "Industrial Heat Engineering"

The competition was officially announced in State gazette, issue 58 from 23.07. 2019 and on the website of TU-Gaborovo to meet the needs of Department of Power Engineering at Faculty of Mechanical and Precision Engineering, with one applicant: Chief Assistant Professor Valentin Metodiev Petkov, PhD at Department of Power Engineering, TU-Gaborovo

1. An overview of the content and results of the works submitted

The submitted materials for participation in the competition include a total of 25 peer-reviewed publications, 1 abstract of a doctoral thesis, 1 monograph and 3 handbooks. Of these, 3 have been published in journals referenced in Web of Science and 11 in journals referenced and indexed in other well-known web search databases. In accordance with the numbering of articles and abstracts, the scientific papers can be divided into two main thematic areas, which are directly related to the announced competition for associate professor.

1) Thermodynamic analysis and intensification of heat exchange in metal recuperative heat exchangers under different geometric configurations of the pipes:

• 3 publications (№ 2.1.1, 2.1.2 and 2.1.3) in Impact Factor Magazines;

• 11 publications (№ 2.2.1 - 2.2.11) in a journal referenced in CSA / CIG, EBSCO Information Services, Google Scholar and ProQuest;

• 5 publications ((№ 3.1.1, 3.1,1, 3.1.6 - 3.1.8) in national journals;

• 3 publications ((№ 3.2.1 - 3.2.3) in proceedings of national conferences with international participation;

• a monographic work **Performance Evaluation of Ducts with Non-Circular Shapes and Laminar Fully Developed Flow**, integrating studies published in 5 of the above publications;

• an abstract of a dissertation on the topic "Intensification of heat exchange in circular tubes with rolled turbulators and spiral strips".

2) Analysis and improvement of the efficiency of solar collectors for heating of domestic water: 3 publications ((No 3.1.3 to 3.1.5) in national magazines.

4 in number publications of students on the above topics in proceedings of Student Scientific Sessions of TU-Gabrovo, developed under the guidance of Chief Assistant Valentin Petkov were

presented in addition. He has also co-authored 7 publications in national issues outside the competition (in the field of mechanical engineering).

The published handbooks are used in the training of students at TU-Gabrovo and are useful for engineering practice in the field of heat engineering:

• Handbook of laboratory exercises in Thermodynamics and Heat Transfer;

• A collection of exercises in Thermodynamics;

• Thermodynamic tables for water, water vapor and refrigerants.

Chief Assistant Petkov is a single author on the collections of exercises and thermodynamic tables.

According to the enclosed copy of the competition material, the applicant has a total of 28 citations, 10 of which are in Impact / Rank journals, 15 in other foreign journals, 1 in international conference proceedings, 1 in a dissertation and one in a national journal.

The structures and contents of the materials, submitted by the applicant, are in the area of the competition and cover the national criteria and criteria of TU - Gabrovo for the occupying an academic position "Associate Professor".

2. General characteristics of the candidate's activities

2.1. Educational activity (work with students and doctoral students)

Chief Assistant V. Petkov has submitted documents for teaching activity at the Department of Power Engineering at the Technical University of Gabrovo with the required horarium. He has over 31 years of experience as a lecturer at the institution of higher education and has consistently held the academic positions of Assistant, Senior Assistant and Chief Assistant. During this period, he taught 4 Bachelor's Degree courses and 5 Master's Degree courses, all in the field of competition.

For the last 5 years he has been the head of 42 diploma works and the reviewer of 83 diploma theses of students graduating Bachelor and Master's degrees. All these are in the field of heat engineering. He additionally consulted PhD students, which is evident from his publishing activity.

The competences in the design and engineering in the field of thermal techniques contribute to the successful teaching and pedagogical activity of the applicant. They are used to conduct extracurricular classes and to create a broader interest in engineering students.

2.2. Scientific and applied-scientific activity

The scientometric indicators for the research and applied activities of Chief Assistant Petkov are presented in a separate report and exceed the minimum requirements for the occupying the academic position of “Associate Professor”.

The candidate's research is reflected in the published monograph and his scientific publications, most of which are referenced and indexed in world-renowned databases. They are known in the scientific community, as can be seen from the number of citations noted (28 in

number). The articles that formed the basis of the developed monograph were not taken into account at the calculating of the scientometric indicators.

The applicant has participated and participates in the teams of 14 research projects funded by the national budget. He is a manager of 4 of them. The projects are on the topics of the publications submitted for the competition.

2.3. Implementation activities

The applicant participates in a team that has established a research laboratory "Intensification of Heat Exchange" with laboratory stands for the study of heat exchange in pipes with different geometric configurations in heat exchangers and solar collectors. The stands can be used for research and teaching.

Results of the research of Chief Assistant Professor Petkov have been successfully implemented in practice: pipe configurations of the type examined have been used to increase the efficiency of heat exchangers in heating and industrial installations. This is evidenced by references from the engineering firm.

The topics of the research projects in which the applicant participates are also with implementing nature.

3. Contributions (scientific, applied-scientific, applied). The importance of contributions to science and practice

The author's reference for the applicant's contributions includes 2 scientific, 12 applied-scientific and 2 applied contributions. I accept their formulating. They generally include:

• new guidelines for the intensification and improvement of heat transfer efficiency in pipes for heat exchangers and solar collectors aiming to reduce exergy losses due to irreversible processes of heat exchange and mechanical energy dissipation due to hydraulic resistance;

• extended methods and criteria for evaluating the efficiency of heat transfer at laminar flows in different pipe geometries for heat exchangers;

• new information on hydraulic resistance and heat transfer coefficients for the modes and piping configurations under the above study.

The scientific researches were carried out by means of adapted mathematical analyzes of the thermal and hydrodynamic processes in the studied objects and experimental researches through laboratory stands, equipped with modern measuring equipment. The results are useful for evaluating the efficiency and constructive refinement of heat exchangers and solar collectors, widely used in thermal engineering.

4. Assessment of the applicant's personal contribution

The scientific summaries obtained with modern theoretical and experimental research methodologies reflect the upgrade of the applicant's competences in the field of thermal engineering over the years and are evidence of his personal participation in the scientific and applied contributions reflected in the publication activity. This is also obvious from the articles (5 in number), the monograph and the two handbooks, of which Chief Assistant Petkov is the single author.

5. Critical notes and recommendations

I do not have critical notes on the applicant's research and teaching work. I recommend patenting of successful solutions to the tubular configurations for heat exchangers and solar collectors, studied by him.

6. Personal impressions

I have recently known Chief Assistant Valentin Petkov, but I would like to express my positive impression of his out-of-class and individual work with students, as seen in the publications presented, the participation of students in projects, the large number of graduates he has managed and peer-reviewed theses. These activities contribute to the improvements of the rating of TU-Gabrovo and the quality of the teaching process, and demonstrate the applicant's responsibility as a university lecturer.

7. Conclusion

The applicant's scientific and educational performance indicators fully meet the requirements for occupying the academic position of "Associate Professor" according to the Law for the Development of Academic Staff in the Republic of Bulgaria and the Regulations for its implementation. **I confidently propose Chief Assistant Professor Valentin Metodiev Petkov, PhD to be elected as an "Associate Professor" in the area of higher education 5. Technical Sciences, professional field 5.1. Mechanical Engineering, specialty Industrial Heat Engineering**.

07.11. 2019 /signature/

Jury member: /Assoc. Prof. PhD Nina Penkova/