OPINION

by Assoc. Prof. Valentin Metodiev Petkov PhD, Technical University - Gabrovo

on the materials submitted for participation in the contest
for occupying the academic position "Associate Professor"
in field of higher education - 5. Technical Sciences,
by professional field - 5.4. Energetics,
specialty - "Industrial Heat Engineering"

In the competition for Associate Professor, announced in the State Gazette, issue 54/25.06.2024 and on the TU-Gabrovo website for the needs of the Power Engineering Department at Faculty of Mechanical and Precision Engineering, with the only applicant: Senior Assistant Plamen Yordanov Penchev PhD, - Technical University - Gabrovo.

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

Out of the scientific papers on the PhD thesis, the candidate Senior Assistant Plamen Yordanov Penchev participates in the competition with a total of 21 works, of which – 19 scientific publications and 2 university teaching aids. All 21 scientific works are in the field of the scientific specialty and are therefore in the field of competition and can be grouped into 3 directions:

1. Heat transfer enhancement in heat exchangers - 10 scientific publications (1 monograph, 4 articles and 5 reports);

2. Drying equipment and technologies – 4 articles and 1 report;

3. Combined heating and hot water systems - 4 articles.

According to the minimum national requirements, the classification is as follows:

a) 1 monograph in English, published by University Publishing House „V. Aprilov“ - Gabrovo;

b) 1 article with an IF in “Thermal Science” (IF:1,1) which is a core element in the monograph;

c) 17 scientific publications in non-refereed peer-reviewed journals or in edited collective volumes, of which:

- 2 articles in international journals abroad – “Thermal Science” and “International Journal of Emerging Technologies in Computational and Applied Sciences”;

- 9 articles in magazines in the country - "Mechanics of Machines", "Journal of the Technical University of Gabrovo", "Science & Technologies" and "Textiles and Clothing";

- 2 reports at international conferences abroad - Zambia and South Africa;

- 4 reports at international conferences in the country - UNITECH by Technical University - Gabrovo and Scientific Conference with International Participation - Stara Zagora;

d) 2 university textbooks in electronic format, respectively - "Gas supply" - textbook and "Heat exchange devices" - course lectures, published by University Publishing House "V. Aprilov" - Gabrovo.

Of all 19 scientific publications Senior Assistant P. Penchev is an independent author in 7, of which 1 is in English. As first co-author is listed in 3, as second co-author is listed in 8, of which 7 are in English, of which 1 is with IF. The candidate is respectively the sole author and co-author of the two teaching aids.

Summarizing the results of the presented works, it is evident that they cover the minimum national requirements in the sense of the „Law on Development of the Academic Staff in Republic of Bulgaria“, for occupying the academic position "Associate Professor", as well as the minimum requirements of the Technical University - Gabrovo.

2. General description of the applicant's activities

2.1. Educational and pedagogical activity (work with students and PhD students)

Senior Assistant Plamen Penchev PhD is a leading teacher with lecture courses of 4 academic disciplines in bachelor's degree (Heat exchange devices, Heat and gas supply, Refrigeration equipment, Drying equipment) and 3 academic disciplines in master's degree (Refrigerating Installations,

Refrigeration and freezing, Gas supply systems). For the last 3 years, the candidate has been academic supervisor of 20 graduates, of which 7 are in the master's degree.

In the companies he worked with, he organized practical training for students from the specialty, and in this way they carried out their production practice.

He organized visits to sites with installed specific devices and installations related to the profile of the specialty and presentations of leading companies in the field of HVAC systems.

His rich practical experience contributes to the training of students for their practical training in the disciplines he teaches.

2.2. Scientific and scientific applied activity

Since 2010 annually Senior Assistant P. Penchev PhD, participated in 13 research projects, specifically funded by the state budget at the TU-Gabrovo.

The citation report submitted by the candidate includes 39 citations, of which 27 are in IF journals, 10 in foreign journals, 1 in a conference abroad, 1 in a PhD thesis in Germany. Indisputable proof of the level of scientific works are the citations in high IF journals (International Communications in Heat and Mass Transfer (IF: 6.4), Applied Thermal Engineering (IF: 6.1), Thermal Science and Engineering Progress (IF: 5.1), International Journal of Heat and Mass Transfer (IF: 5.0), International Journal of Thermal Sciences (IF: 4.9)). This fully meets and exceeds the requirement of indicator D. From the reference in Scopus, at the time of writing this opinion, it appeared that Senior Assistant P. Penchev has 33 citations from 3 tracked articles and his h-index is equal to 3.

2.3. Implementation activity

The candidate has about 20 years of experience in the design and implementation of gas, heating, ventilation, heat pump and air conditioning installations. He develops and implements in heat exchange devices the results of scientific research related to enhanced of heat transfer, in various heat systems at sites where he was a contractor or consultant. The materials present a list of 33 sites and photographic material of 9 sites for implementation in heat exchangers and drying installations.

3. Contributions. Significance of contributions to science and practice

The candidate's contributions Senior Assistant P. Penchev, reflected in his scientific output, are mainly scientific-applied and applied in nature. The author's reference for contributions includes 1 scientific, 12 scientific-applied and 2 applied contributions.

3.1. Scientific contributions

• Critical analysis of the criterion for evaluation enhanced of heat transfer techniques based on the limitation of fixed pumping power, which leads to erroneous results. It has been shown that when the thermal performance of two heat transfer ducts is compared, they should be put under equal conditions, such as fixed heat exchange area, mass flow rate and inlet temperature [2.1.1, 5].

3.2. Scientific-applied contributions

• Evaluation of the effect of using different techniques for enhanced of heat transfer, based on the generated entropy minimization method, when studying the characteristics of shell and tube heat exchangers [2.2.1, 3.1.1, 4.1.1, 4.1.2, 4.2.3].

• The best heat transfer enhanced techniques for application in shell and tube heat exchangers have been determined experimentally and theoretically [3.1.1, 3.1.2, 4.1.1, 4.2.1, 4.2.3, 4.2.4].

• Developed kinetic models through the vapor space transport equations and obtained dependences for the moisture evaporation area and drying intensity of 50/50 polyester/cotton textile materials [2.2.2, 3.1.3, 3.1.4].

• In an experimental study of the characteristics of a "water-to-water" heat pump system using a new type of heat exchanger, significantly higher conversion coefficients compared to conventional heat pumps have been proven [3.1.9].

3.3. Applied Contributions

• Investigation of the characteristics of heat exchange systems and devices, the results of which are useful for practical application [3.1.5, 3.1.7, 3.1.8, 3.1.9].

• The created generalized methodology for design of fountaining layer dryers and the obtained results for the angles of natural slope and bulk density of wood shavings are useful for the design of fountaining layer drying installations [4.2.2, 3.1.6].

• A test setup developed for testing the characteristics of a "water-water" heat pump system [3.1.9].

4. Evaluation of the candidate's personal contribution

In the competition materials, references-declarations about the participation of the co-authors in the collective publications (or separation protocols) are not presented, which does not allow to accurately assess the candidate's personal contribution, so I accept them with equal participation. In all other materials, I fully acknowledge the personal contribution of the applicant.

5. Critical remarks and recommendations

• I noticed a discrepancy in the number of citations between "List of citations" (40 num.), "Reference on the implementation of min. requirement ..... " (In the minimum requirement of TU-Gabrovo - 67 num.), and according to my count they are 39.

• In 3 of the articles [3.1.5, 3.1.7, 3.1.8] the same scheme is used. To a large extent, this is of course due to the similarity in the subject matter, but I consider it not a good practice to use the same matrix when publishing, especially since the last two articles are presented as part I and part II.

• In the author reference of the contributions (I-B-5, 6 and II-B-1) with the wording “Investigation of …” a contribution is claimed. Researching anything in itself cannot be a contribution. A contribution is the result of the research, which should be concretely justified.

• I would recommend to Senior Assistant P. Penchev to continue his research work and publish the obtained results in refereed editions with an impact factor.

6. Personal impressions

I have had direct impressions of my colleague Penchev ever since he graduated as a student in the "Power Engineering" department at TU-Gabrovo in 2000, which is a period of 24 years. During this period, he was continuously active in improving his professional qualifications and technical competence. This is confirmed by the above mentioned regarding his implementation activity and the significant number of sites for which he was a contractor or consultant. He actively participated in training courses and seminars of leading companies in the field, such as Viessmann, Brasov, Romania, 2006, Bosch, Sofia, 2009, 2010, 2015 and 2023. and others such as Hoval and Oventrop.

His membership in the Union of Scientists - Stara Zagora branch and the Bulgarian Academy of Sciences and Arts is also worth mentioning.

7. Conclusion:

Given the above, I propose senior assistant Plamen Yordanov Penchev PhD to take up the academic position of "Associate Professor", in area of higher education - 5. Technical Sciences, professional Field - 5.4. Energetics, and scientific specialty – “Industrial Heat Engineering”.

October, 2024 Jury Member: /signature/

/Assoc. Prof. Valentin Petkov PhD/