

REVIEW

**regarding a competition announced by Technical University of Gabrovo,
to occupy an academic position "associate professor"
in the field of higher education 5. Technical sciences,
professional direction 5.4 Energy,
specialty "Industrial heat engineering"
promulgated in the SG, issue 54 of 25.06.2024,
with candidate Plamen Yordanov Penchev, Ph.D**

Reviewer: Professor Jordan Todorov Maximov, DSc, PhD

Only one candidate participated in the competition: Plamen Yordanov Penchev, PhD, born on 23.11.1976. He works at TU-Gabrovo, Department of "Energy Engineering", and holds the academic position of "chief assistant".

1. Evaluation of the scientific-research, scientific-applied and publication activity of the candidate after the procedure for PhD degree

According to this indicator, the candidate Dr. Plamen Penchev participated in the competition with the following assets:

1) Dissertation abstract on the topic "Intensification of heat exchange by combining tubes with deep-rolled spiral turbulators and spiral strips" (2006) for obtaining the educational and scientific degree "Doctor" – 1. The dissertation is on the scientific specialty 02.06.13 "Industrial heat engineering";

2) Journal articles with an impact factor indexed by Web of Science and Scopus – 1 (2.1.1*). The applicant has submitted a manuscript; the name of the journal is not indicated (from the abbreviation contained in the number of the manuscript, I judge that it is Thermal Science); I found no online publication with that name (12.10.2024);

3) Articles in refereed foreign journals without an impact factor – 2

The journals, the number of authors and the candidate's place among the authors are:

- Thermal Science (2006): publication 2.2.1 (3 authors, II author),
- International Journal of Emerging Technologies in Computational and Applied Sciences (2013): publication 2.2.1 (3 authors, II author);

4) Articles in journals in the country – 9

The journals, the number of authors and the candidate's place among the authors are:

- Mechanics of Machines (2003): publication 3.1.1 (2 authors, II author),

* The numbering is according to the one made by the candidate in file "6. List of publications - contest.pdf"

- Technical University of Gabrovo (2005): publication 3.1.2 (2 authors, II author),
- Textiles and clothing: publication 3.1.3 (2011) (3 authors, III author), publication 3.1.4 (2012) (3 authors, II author),
- Science & Technologies (edition of the Union of Scientists in Stara Zagora): publication 3.1.5 (2016) (1 authors, I author); publication 3.1.6 (2016) (1 author, I author), 3.1.7 (2020) (1 author, I author), 3.1.8 (2020) (1 author, I author), 3.1.9 (2023) (1 author, I author);

5) Reports at scientific conferences abroad – 2: 4.1.1 (2004) (2 authors, II author), 4.1.2. (2003) (3 authors, II author);

6) Reports of scientific conferences in Bulgaria – 4: 4.2.1 (2002) (2 authors, I author), 4.2.2 (2002) (2 authors, I author), 4.2.3 (2003) (2 authors, II author), 4.2.4 (2005) (1 authors, I author);

7) Monograph – 1 issued in 2024

With the exception of the authorship, which has already been reviewed, and manuscript 2.1.1 (I did not find an on-line publication with such a name as of 12.10.2024), I agree to review all works (18 in number), since, in my opinion, they can be included in the scientific specialty of the competition. Elementary statistical analysis shows the following:

- Seven of the publications (including the monograph) are independent, i.e., there are no co-authors. Independent publications (without the monograph) are only and only on forums in Stara Zagora;
- In none of the publications abroad, the candidate is the first author.
- The time span of the publications on the contest is 22 years, and the number of these publications (without the authorship and 2.1.1) is 18, i.e., less than one publication (on the contest) per year. It is likely that the applicant's priorities were outside of scientific activity.

The results of Dr. Plamen Penchev's research work can be summarized in four main groups as follows:

- A. Study of the efficiency of heat exchangers: 2.2.1, 3.1.1, 3.1.2, 3.1.9, 4.1.1, 4.1.2, 4.2.1, 4.2.3, 4.2.4;
- B. Modeling the drying process of industrial materials: 2.2.2, 3.1.3, 3.1.4;
- C. Combined water heating systems: 3.1.5, 3.1.7, 3.1.8, 4.2.2;
- D. Study of the characteristics of bulk material: 3.1.6.

The candidate's citation list of his works (dissertation publications are also included here; for example, the three dissertation impact factor publications have a total of 28 citations) showed a total of 40 citations. Of the competition publications, only 2.2.1 was cited: 6 + 3 + 3 citations (or 60 + 9 + 6 points, according to the minimum national requirements – Appendix 1 to Article 1a, Paragraph 1 of the Regulations for the Implementation of the Law on the Development of the Academic Staff).

The candidate has submitted a certificate of participation as a researcher in 7 research projects at TU-Gabrovo (financed by the State Budget for the activities inherent to the Higher Schools), having different durations, for the period 2010-2023.

Dr. Penchev presented a list containing 32 points, with built (together with the company ZIP ENGINEERING EOOD) thermal engineering facilities and installations. In the last 33rd point, more than 700 designed and built household gas, heat pump and heating installations are reported in more than six cities in Bulgaria.

On the basis of all the above, it can be concluded that the candidate appears primarily as a practitioner, with extensive experience in the design and construction of heating and refrigeration installations.

2. Evaluation of the educational activity and qualification of the candidate

Dr. Plamen Penchev is the author of two textbooks: 1) textbook "Gas supply" and 2) course of lectures and assignments "Heat exchange devices". Both textbooks were released in 2024.

From the reference submitted by the candidate, it can be seen that he has led lecture courses in seven academic disciplines as follows: 1) Educational and qualification degree "Bachelor: Heat Exchangers, Heat and Gas Supply, Refrigeration Technology, Drying Technology; 2) Educational and qualification degree "master's degree: Refrigeration installations, Refrigeration and freezing, Gas supply systems.

During the period 2021 – 2023, Dr. Penchev was the supervisor of 20 graduate students.

The candidate has presented information on "innovations in teaching methods", such as: 1) Organized visit of students to sites related to the disciplines they are studying; 2) Presentations of leading companies, where students receive information about the latest achievements, etc.

Based on the above, I believe that Dr. Plamen Penchev has the necessary pedagogical training and qualifications to hold the academic position of "docent" at TU Gabrovo.

3. Meeting the minimum requirements for holding the academic position of "associate professor" set out in the 2019 LDASRB

The candidate Dr. Plamen Penchev participated in the competition (group B, indicator 3) with a habilitation thesis (monograph) on the topic: "Intensification of heat transfer with pipe inserts: how can we define the best benefit". The monograph, of 104 pages (double spaced), is written in English and has the same title as publication 2.1.1, which I could not find as of today (12.10.2024). A critical analysis of the criterion for evaluating heat exchange intensification approaches based on the fixed pumping power constraint is performed and it is shown that criteria FG-1a and FG-1b should be used. In general, in the presentation I see the clear style of his scientific supervisor, and I hope that the candidate has borrowed this style. I acknowledge the contributions made in the monograph.

According to indicator groups Γ and Δ , Dr. Penchev's assets exceed the minimum national requirements.

4. Main scientific-applied, applied contributions and teaching-methodical contributions

I find the contributions in the applicant's works to be significant and sufficient.

Regardless of the author's view, my accepted contributions are summarized and classified as follows:

1) *Scientific applied contributions*

A. Creation of new classifications, methods, constructions, algorithms, etc.

- Improving the efficiency of heat exchangers using the method of minimizing the generated entropy (2.2.1, 3.1.1, 4.1.1, 4.1.2, 4.2.3).
- Designs of elements of heat exchangers, intensifying heat exchange (3.1.2, 4.2.1, 4.2.4).
- Kinetic models for drying textile materials (2.2.2, 3.1.3, 3.1.4).
- Combined system for heating boiler water and water for domestic hot water supply (3.1.5, 3.1.7, 3.1.8).
- Behavior characteristics of shell-and-tube heat exchangers and of a water-to-water heat pump system in a new type of heat exchanger (4.2.4, 3.1.9).
- General methodology for the design of dryers with a fountaining layer (4.2.2).

B. Obtaining and proving new facts

- The criterion for evaluating heat exchange intensification approaches based on the fixed pumping power constraint leads to inaccurate results, therefore criteria FG-1a and FG-1b should be used (Monograph).
- Results of a comparison of the characteristics of different techniques for heat exchange intensification in shell and tube heat exchangers (3.1.1, 3.1.2, 4.1.1, 4.2.1, 4.2.3).
- Characteristics of a tube-in-tube heat exchanger with a strip in the annular space (2.2.1, 4.1.2).
- Dependences on the area of moisture evaporation and the drying intensity of textile materials (2.2.2, 3.1.3, 3.1.4).
- Heat transfer coefficients for condensation of water vapor on horizontal deep-rolled tubes with spiral strips (4.2.4).

2) Applied Contributions

- Database of the characteristics of a system with solar collectors and a heat exchanger with spirally rolled pipes for heating domestic hot and boiler water (3.1.5, 3.1.7, 3.1.8).
- Experimental results on natural slope angles and bulk density of sawdust applied to the design of fluidized bed and fountaining layer (3.1.6).
- Bench for testing the characteristics of a water-to-water heat pump system using a new type of heat exchanger with spirally wound, internally and externally finned tubes (3.1.9).

3) Teaching and methodical contributions

- I accept the candidate's claims for educational and methodological contributions (2 textbooks).

5. Significance of contributions to science and practice

The results of the scientific-research and teaching-methodical activities of Dr Plamen Penchev have an applied orientation and ultimately aim to serve the engineering practice and the education of students.

6. Notes and recommendations

I don't know the candidate personally. I judge his affairs. I would recommend him to devote more time to work at TU Gabrovo. And let's not forget that going deep into the routine hinders creative development.

7. Conclusion

Based on all of the above, *I propose that chief assistant Dr. Plamen Yordanov Penchev take the academic position of "associate professor" at the Technical University - Gabrovo*, in the field of higher education 5. Technical sciences, in the professional direction 5.4 Energy, specialty "Industrial heat engineering".

12.10.2024

Gabrovo

Reviewer: /signature/

Professor Jordan Maximov, DSc, PhD