

REVIEW

by Professor, Dipl. Eng. Nevena Stoyanova Mileva, PhD at University of Plovdiv “Paisii Hilendarski” on the materials, submitted for participation in the competition for taking the academic position of ‘Professor’ at Plovdiv University “Paisii Hilendarski” ,

in the higher education area ‘Technical Sciences’, professional field 5.2 Electric Power Engineering, Electronics and Automation (Automated Information Processing and Control Systems)

A candidate, participating in the competition for holding the academic position „Professor”, announced in State Gazette, issue 40 of 14th May 2021 and on the website of Plovdiv University "Paisii Hilendarski" for the needs of the Department of Electronics, Communications and Information Technology at the Faculty of Physics and technology is Associate Professor Dipl. Eng. Rumen Kostadinov Popov, PhD.

1. General presentation of the submitted materials **Предмет:**

By order No. P33-4298 of 10-th August 2021 of the Rector of Plovdiv University "Paisii Hilendarski", I was appointed as a member of the Scientific Jury of the competition for taking the academic position ‘Professor’ at PU in the higher education area ‘Technical Sciences’, professional field 5.2 ‘Electric Power Engineering, Electronics and Automation’, announced for the needs of the Department of Electronics, Communications and Information Technology at the Faculty of Physics and technology. The only candidate, who has submitted documents for participation in the announced competition is Associate Professor Dipl. Eng. Rumen Kostadinov Popov, PhD, from PU “Paisii Hilendarski”. The submitted set of documents meets all the requirements of laws and regulations.

The set of paper materials presented by Assoc. Prof. Dr. Rumen Kostadinov Popov is in accordance with the Regulations for development of the academic staff of the University of Plovdiv, and includes the following documents:

1. Application for admission to a competition for holding an academic position "Professor";
2. European format CV;
3. Diploma for completed higher education;
4. Diploma for the educational and scientific degree "Doctor";
5. Two diplomas for academic position "associate professor";
6. List of scientific papers;
7. Information for accordance to the minimum national and additional faculty requirements;
8. Declaration of originality and authenticity
9. Annotations of the materials under art. 76 (1) of PRASPU, including self-assessment of the contributions;

10. Certificate of work experience;
11. Documents for educational work;
12. Documents for research activity;
13. Other documents (documents and certificates).

The candidate Assoc. Prof. Rumen Kostadinov Popov, PhD has submitted totally 34 scientific papers, 1 published book based on a defended dissertation for the award of a scientific degree "Doctor", 1 university textbook, 3 textbooks and a list of 9 research projects. 34 scientific papers are accepted for review, which are outside the dissertation and are reported in the final evaluation, 1 textbook, 3 manuals and 9 research projects. The classification of scientific papers by relevant headings, in the country and abroad, is as follows:

A) by indicator B4 are presented 10 scientific papers (equivalent to a monograph), published in editions that are referenced and indexed in world-famous databases with scientific information - Web of Science and Scopus. All have an Impact Factor in the range of 0.229 to 8.001 [B4.1- B4.10] and are presented in full text.

B) according to indicator Γ 7, 10 scientific papers are presented in editions that are referenced and indexed in world-famous databases with scientific information - Web of Science and Scopus. 5 of them have Impact Factor. The publications are also presented in full text.

C) according to indicator Γ 8, 14 scientific papers are presented in unrefereed journals with scientific review or in edited collective volumes. 11 of them are written in English and only 3 are in Bulgarian. All publications in this group are also given in full text.

Documents (in the form of a certificate) for participation and for implemented developments in the form of stands for training in various disciplines and for participation in international and national research projects and for conducting lecture courses in foreign higher education institutions are also presented, in English.

The extremely good and precise arrangement of the documents and materials submitted for the competition is impressive.

2. Brief biographical data of the candidate

Assoc. Prof. Rumen Kostadinov Popov, PhD was born in 1964. He completed his secondary education in 1982 at the Technical School of Electrical Engineering in Plovdiv. In 1990 he received a master's degree in the Faculty of Automatic Control Systems from the University of Tula, majoring in Automatic Control Systems. Since 1991 until 2011 works as an assistant, senior assistant and chief assistant at the Technical University - Sofia, Plovdiv branch. He obtained his doctorate in 2008 at the University of Ruse "Angel Kanchev". In 2011 holds the position of "Associate Professor" at the Technical University - Sofia, Plovdiv branch in direction 5.2 and with the specialty "Au-

tomated Information Processing and Control Systems". From 2012 to 2013 he was an associate professor at the European Polytechnic University - Pernik, majoring in Measurement Technology. Since 2015 he has been working as an associate professor at Plovdiv University "Paisii Hilendarski". He currently has almost 30 years of teaching experience. I believe that the presented professional biography of Assoc. Prof. Rumen Kostadinov Popov, PhD fully meets the requirements of the announced competition.

3. General information on the candidate's activity

Evaluation of the educational and pedagogical activity

Assoc. Prof. Rumen Popov presented a report on his classroom and extracurricular activity in the last 6 years, according to which, he has conducted lectures and exercises in 15 disciplines: "General Electrical Engineering"; "Electrical Engineering 2"; "Computer simulation"; "Automation of the electric power system"; "Signals and systems"; "Fundamentals of engineering design"; "Fundamentals of Communications"; "Analog circuitry"; "Electronic circuitry"; "Sensors and actuators"; "Programmable logic controllers"; "Design of PV systems"; "Workshop with PP for engineering solutions"; "Matlab Workshop" and " Energy Storage Systems ". It has issued on paper: a textbook "Programmable Logic Controllers - Guide for Programming Controllers Zelio Logic"; one manual "Solar Radiation Measurement - Guide on Solar Radiation Energy and Lighting Calculations" and one guide "Signals and Systems". He has also published an electronic manual: "Video exercises on" Sensors and actuators ".

The candidate has reported the supervising of 11 successfully defended graduates in the Faculty of Physics and Technology of the University of Plovdiv. From the presented materials it is evident that Assoc. Prof. Popov has two graduated PhD students (in his capacity of second supervisor). As the dean of the faculty, I know that he is currently supervising two more PhD students (one full-time and one part-time).

The publication of a large number of articles with the participation of students and PhD students (18), including students from abroad, shows that Assoc. Prof. Popov works very actively with them and involves them in his research work.

The analysis of the above makes me give a high assessment of the quality of the educational and pedagogical activity of Assoc. Prof. Dr. Rumen Kostadinov Popov.

Issues related to the research activity:

Data for participation in a total of 9 research projects (5 international and 4 national) are presented, of which he is the leader of two (one international and one national). The sum of the indicators under point E of the table for the minimum national requirements is 290, at norm 150 (almost twice exceeding the criterion). Assoc. Prof. Popov is a member of the Union of Automation and In-

formatics and the Bulgarian Geothermal Association. The candidate has twice given 40-hour lecture courses in English in KazNu, Almaty - Kazakhstan. The high results achieved by him in his research work are most clearly expressed in his publications. The participant in the competition has submitted a total of 34 publications, of which: 10 on indicator B4 (indexed in Web of Science and Scopus); 10 by indicator G7 (indexed in Web of Science and Scopus) and 14 by indicator G8 (in unreferenced journals with scientific review or in edited collective volumes). All but 3 publications are in English and all are collective. In most of the articles Assoc. Prof. Popov is the first or second author, which does not raise doubts about his authorship. Impressive is the large number of publications with the participation of students and PhD students (18). It makes a good impression that the results of the research activities of Assoc. Prof. Popov are applied in the practical training of students through the creation of the laboratory equipment of the Department of EKIT and the Faculty of Physics and Technology.

Contributions (scientific, scientific-applied, applied) and citations

After getting acquainted in detail with the submitted materials, I acknowledge all the contributions stated by the applicant in the publications under criterion B4, which I give summarized and in short form:

Scientific contributions

1. Three PCM types of paraffin E53, E46 and ECP [B4.1] are characterized thermo-physically (phase transition temperatures, latent heat, heat capacity - at constant pressure, density and thermal conductivity);
2. For the first time a large-scale and systematic comparison between field and laboratory tests to determine the thermal characteristics of ground heat exchangers and between different approaches to laboratory tests has been accomplished [B4.5];
3. Mathematical modeling and 3-D numerical simulation studies of:
 - heat storages with paraffins were performed and the factors influencing the heat transfer process before the physical experiment [B4.2, B4.3]
 - the process of conducting a test to determine the soil thermal characteristics [B4.10];
4. A new hybrid approach and method for measuring the efficiency borehole heat exchangers (BHE) and the surrounding underground thermal properties has been proposed and tested, which combines the traditional thermal response test (TRT) with the method of well temperature relaxation TRT based on two-dimensional radial conductive heat transfer [B4.6];

5. Developed and tested (in the LabVIEW™ environment) is a new, original set of virtual tools. It allows for the provision of online or offline calculations of measurement uncertainty, as well as testing of statistical hypotheses [B4.7].

Scientific applied contributions

1. Mathematical modeling and 3-D numerical simulation studies of: heat accumulators with paraffins were performed and the factors influencing the heat transfer process before the physical experiment [B4.2, B4.3] and the process of conducting a test to determine the thermal characteristics [B4.10];
2. A new hybrid approach and method for measuring the efficiency of borehole heat exchangers (BHE) and the surrounding underground thermal properties has been proposed and tested, which combines the traditional thermal response test (TRT) with the method of well temperature relaxation TRT based on two-dimensional radial conductive heat transfer [B4.6];
3. Developed and tested (in the LabVIEW™ environment) is a new, original set of virtual tools. It allows for the provision of online or offline calculations of measurement uncertainty, as well as testing of statistical hypotheses [B4.7].

Applied contributions

1. An overview of the available options for modeling shallow geothermal energy storages (SGES) has been performed. The main analytical and numerical models and methods related to the thermal behavior of SGES are presented [B4.9];
2. A small hybrid installation containing daily and seasonal accumulators and supporting five different operating modes with an emphasis on borehole heat exchanger (BHE), a heating mode with a ground-source heat pump and subsequent natural relaxation was studied. A methodology to determine the energy efficiency of the various regimes has been developed. [B4.8];
3. A number of experimental 7-day tests to determine the thermal characteristics of the soil in the region of Plovdiv were performed. The data from the measurements were processed and values to characterize the thermal resistance of BHE and the thermal conductivity of the soil were obtained [B4.6, B4.8 B4.10].

I also acknowledge, without describing them in detail, the contributions of the publications by criteria [Γ7 and Γ8].

The materials for the competition present detailed data on the citations of only one publication "Thermo-physical characterization of some paraffins used as phase change materials for thermal energy storage" (43 pieces, of which 35 in Web of Science and / or Scopus). This many times exceeds

the minimum national and faculty requirements. The sum of the indicators under point E from 12 to 15 for Assoc. Prof. Popov is 366 points, with a minimum national requirement of 100 points. This is 3.7 times the requirements of the criterion). It is stated that only the publications from group B4 have over 120 noticed citations.

I think that the contributions presented by the candidate and the large number of citations of his scientific publications are quite sufficient for the academic position of "professor".

4. Assessment of the candidate's personal contribution

The analysis of the scientific works presented by Assoc. Prof. Rumen Popov shows that although there are no independent publications, in 5 of them he is the first author, and in another 7 he is in second place, which is why I think that to a great extent the formulated Assoc. Prof. Rumen Popov's contributions and results are his personal merit. In addition, he is the sole author of the university textbook he published, the two printed manuals and the electronic edition "Video exercises on sensors and actuators". An additional confirmation of the authorship of his scientific publications is the application of these studies in practice, in the elaboration of laboratory equipment. This equipment are used for the training of students at the Faculty of Physics and Technology of University of Plovdiv "Paisii Hilendarski".

5. Critical remarks and recommendations

I do not have significant critical remarks and recommendations on the materials provided to me for this review.

I would recommend to the candidate to be actively involved in research teams of the Faculty of Physics and Technology, as his skills and experience can contribute to higher results, and especially to make a great contribution to the commercialization of the results of research activity of the faculty.

CONCLUSION

The documents and materials submitted by Assoc. Prof. Eng. Rumen Kostadinov Popov, PhD meet all the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria.

The candidate in the competition has submitted a significant number of scientific papers published after the materials used in the academic position of "Associate Professor". In the papers of the candidate there are original scientific, scientific - applied and applied contributions, which have received international recognition, as most of them are published in journals and scientific collec-

tions published by international publishers. His theoretical developments have practical applicability, as some of them are directly oriented to the educational work. The scientific and teaching qualification of Assoc. Prof. Dr. Rumen Kostadinov Popov is undoubted.

The results achieved by Assoc. Prof. Dr. Rumen Popov in the teaching and research activities fully comply with the specific requirements of the Faculty of Physics and Technology, formulated to follow the Regulations of the University of Plovdiv for the application of ZRASRB.

After getting acquainted with the materials and scientific papers presented in the competition and analyzing their significance and contributions in the scientific, scientific-applied and applied fields contained in them, I find it reasonable to give my positive assessment and strongly recommend the Scientific Jury to prepare a report-proposal to The Faculty Council of the Faculty of Physics and Technology to elect Assoc. Prof. Eng. Rumen Kostadinov Popov, PhD to hold the academic position of "Professor" at the University of Plovdiv "P. Hilendarski "in professional field 5.2 Electrical engineering, electronics and automation (scientific specialty Automated Information Processing and Control Systems).

30 September 2021

Reviewer:

(Prof. Nevena Mileva, PhD)