

OPINION

by

Prof. DSc. Miglena Nikolaeva Koleva,
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for

the competition for occupation of the academic position "Professor" in the professional field 4.5 „Mathematics“, speciality „Computational mathematics, announced in the State Gazette, issue 48/ 13.06.2025 for the needs of department of „Mathematics, Informatics and Natural Sciences“, Technical University of Gabrovo, with an applicant
Assoc. Prof. DSc. Milena Radoslavova Racheva

1. Description of the presented materials

As a member of the Scientific Jury, determined on 19.09.2025 with order no. 3-01-387 of the Rector of the Technical University of Gabrovo and regarding to the decisions in the first meeting of the Scientific Jury on 29.09.2025 r. to prepare an opinion, I received the following documents: Diploma for completed higher education; Diploma for the educational and scientific degree "Doctor"; Certificate of appointment to the academic position "Associate Professor"; Diploma for the scientific degree "Doctor of Sciences"; Curriculum vitae in the European format; list of publications submitted for participation in the competition; List of publications submitted for the acquisition of the PhD degree and the Doctor of Sciences degree; list of publications submitted for holding the academic position "Associate Professor"; copies of each publication; list of citations; information on the impact factor of the journals in which the author has published; author's statement of contributions to the scientific works; extended habilitation reference; abstracts of the scientific works; statement of compliance with the minimum national requirements and the requirements of the Regulations for the acquisition of scientific degrees and the holding of academic positions at the Technical University of Gabrovo for the academic position "Professor"; abstracts of the reviewed publications in English and Bulgarian; declaration of authenticity of the submitted information; list of other scientific achievements.

The submitted documents are in accordance with Law for Development of Academic Staff in Republic of Bulgaria (LDASRB), the Regulations for applying LDASRB and the rules and conditions of the Technical University - Gabrovo for acquiring scientific degrees and holding academic positions.

2. Brief biographic information about the candidate

Assoc. Prof. DSc. Milena Racheva graduated from the High School of Mathematics “Nikola Obreshkov” in Kazanlak in 1984. In 1990, she obtained her Master’s degree in Mathematics with a specialization in Mathematical Modeling from the Faculty of Mathematics and Informatics at Sofia University “St. Kliment Ohridski“. She joined the Technical University of Gabrovo in 1995 as an Assistant Professor in the Department of Mathematics. She earned her PhD degree (Educational and Scientific Degree “Doctor”) in Computational Mathematics (scientific field 01.01.09) in 2003 at the Institute for Parallel Processing – Bulgarian Academy of Sciences. Since 2006, she has held the academic position of Associate Professor in Computational Mathematics (01.01.09) at the Technical University of Gabrovo. In 2014, she obtained the Doctor of Sciences degree in the scientific field Mathematics (01.01.09 Computational Mathematics) from the Institute of Information and Communication Technologies – Bulgarian Academy of Sciences..

3. General characteristics of the presented materials

Assoc. Prof. DSc. Milena Racheva has submitted 37 publications for the competition for the academic position of “Professor.” Of these, 4 are presented as a Habilitation thesis under indicator group “B.” There are 10 articles published in international journals ranked in SJR, and 3 publications in journals with an impact factor – 8.6 (quartile Q1), 8.9, and 8.10 (quartile Q4). A total of 15 publications are indexed in Scopus and/or Web of Science, and 2 are indexed in Zentralblatt.

Assoc. Prof. DSc. PhD Milena Racheva has submitted 2 textbooks for the competition – 20.1 (from 2018) and 20.2 (from 2008). She is the sole author of one of them, while the other is co-authored with two collaborators.

A list of 96 citations has been provided. Of these, 92 are indexed in Scopus and/or Web of Science, and 4 in Zentralblatt.

Assoc. Prof. DSc. Milena Racheva has supervised a PhD student who successfully defended in 2021. The candidate has been the principal investigator of 5 university-level research projects during the period 2012–2025 and, between 2006 and 2025, has participated as a member of the research team in 12 university-level projects, as well as in projects funded by the National Science Fund and the European Union.

The information submitted by the candidate regarding compliance with the minimum national requirements under Article 2b, paragraphs 2 and 3 of the LDASRB, as well as the requirements of the Technical University of Gabrovo, can be summarized as follows:

- Group of indicators A – 50 points (minimum required: 50);
- Group of indicators B – 120 points (minimum required: 100);
- Group of indicators G – 423 points (minimum required: 200);
- Group of indicators D – 752 points (minimum required: 100);
- Group of indicators E – 218.33 points (minimum required: 100).

Groups B and G include publications, while the points in Group E are derived from the following indicators: E12 – obtained scientific degree “Doctor of Sciences”; E13 – successfully

supervised PhD student; E14 – participation in a national scientific or educational project; E19 – publication of a university textbook.

For four of the indicator groups (B, G, D, and E), the candidate's points exceed the minimum required according to the specific requirements of the Technical University of Gabrovo.

Assoc. Prof. DSc. Milena Racheva has also submitted a report demonstrating that she meets the minimum requirements of the Technical University of Gabrovo for holding the academic position of "Professor."

In the report on compliance with the minimum national requirements, a parallel point evaluation is also presented for indicator groups B and G, where the impact factor of articles published after 2005 is considered, including those published in journals whose impact factor was discontinued after 2005. I believe that an article has an impact factor if, in the year of its publication, the journal in which it appeared had an impact factor, and the value assigned to the article should correspond to the journal's impact factor for that year. For this reason, for the respective articles, I have assigned points for publications in journals ranked in SJR, but without an impact factor. The difference between the two scoring approaches is minor — in both cases, the required minimum number of points is exceeded.

From the documents submitted for the competition, it is evident that the candidate meets both the minimum national requirements and the additional requirements of the Technical University of Gabrovo for holding the academic position of "Professor".

4. General characteristic of the scientific and applied-scientific contribution of the applicant

The scientific and applied contributions in the publications of Assoc. Prof. PhD Milena Racheva are formulated in three groups:

1) *Acceleration of convergence and minimization of requirements for finite element spaces.* The combination of a priori and a posteriori approaches in finite element analysis leads to efficient methods for accelerating convergence. A preliminary reduction of model differential equations to a lower-order system in a new variational form has been proposed, which allows the use of linear finite elements even for high-order problems. The a posteriori use of the finite element solution provides two-sided estimates of eigenvalues through the combination of conforming and nonconforming methods.

2) *Other theoretical and theoretical-applied results in computational mathematics.* Theoretical stability estimates and a priori error estimates of optimal order have been developed for the numerical solution of fractional-order integro-differential equations with weakly singular kernels, modeling problems in viscoelasticity. Results are presented for the modification and combination of nonconforming finite elements, including variants of the Morley element. An FE/ILE algorithm has been proposed for solving problems in unbounded domains by combining finite and infinite elements, ensuring the continuity of the basis functions. Properties of linear systems arising from isoparametric finite element discretizations have been formulated and proven, as well as results on the approximation of trigonometric harmonics and discrete Fourier transforms applicable in engineering practice.

3) *The role of computational mathematics in education and its direct application in engineering research and practice.* Part of the publications focuses on the implementation of computational mathematics methods using modern software tools to enhance interest and effectiveness in engineering education. Publications are presented that provide practical guidance and comparisons of mathematical software systems. New mathematical models from technical mechanics have been developed, analyzing bars and cylinders under various loads, along with their variational formulations. Significant attention is devoted to issues related to energy efficiency, renewable energy sources, and electric vehicles.

The research activity of Assoc. Prof. DCs. Milena Racheva fully corresponds to the scientific field of "Computational Mathematics." I have not found any evidence of plagiarism in the candidate's works within the meaning of Law for Development of Academic Staff in Republic of Bulgaria.

5. Reflection of the candidate's works in the works of other scientists

Assoc. Prof. DSc. Milena Racheva has submitted a list of 96 citations for her participation in the competition for the position of "Professor," all of which are in works by foreign authors.

6. Evaluation of the personal contribution of the candidate

Assoc. Prof. PhD Milena Racheva is participating in the competition with 5 individual and 32 joint publications. I have no doubts regarding her equal and personal contribution to each of them.

7. Teaching activity

Assoc. Prof. DSc. Milena Racheva has over 30 years of teaching experience. The candidate has contributed to the development and introduction of two academic courses: "Modern Mathematical Methods for Electrical Engineers" for the Master's degree program and "Applied Mathematics" for the Bachelor's degree program.

8. Personal impressions

I have known Assoc. Prof. DSc. Milena Racheva for more than 20 years. We have participated in the same scientific conferences and forums. She is responsible, hardworking, and dedicated in both her work and scientific research.

9. Conclusion

On the basis of the presented documents for the competition, the contributions and the significance of the scientific works, I believe that Assoc. Prof. DSc. Milena Racheva fully satisfies the indicators for holding the academic position "professor", according to the criteria of LDASRB, the Regulations for the Application of LDASRB and the specific requirements of Technical University of Gabrovo.

I strongly recommend the scientific jury to propose to the Faculty Council of Technical University of Gabrovo to elect Assoc. Prof. DSc. Milena Radoslavova Racheva to hold the academic position "professor" in the field of higher education 4. "Natural Sciences,

Mathematics and Informatics", professional field 4.5 "Mathematics", specialty "Computational Mathematics" for the needs of department of „Mathematics, Informatics and Natural Sciences“, Technical University of Gabrovo.

29.10.2025

Author of the opinion:.....

(Prof. DSc. Miglena Koleva)