

OPINION

by Ivan Blagoev Bazhlekov, associate professor at IMI - BAS,
on materials submitted for participation in a competition
for holding the academic position "professor",
scientific field 4. Natural sciences, mathematics and informatics,
professional field 4.5. Mathematics,
specialty "Mathematical modeling and application of
the mathematics of 3D digitization and microstructural analysis,"
Institute of Information and Communication Technologies - BAS,
published in the State Gazette, issue 103 of 12.12.2023

1. Contest details

The competition for the occupation of the academic position "professor" for the needs of the Department "Scientific Computations with Laboratory for 3D Digitalization and Microstructure Analysis" at IICT – BAS, published in the State Gazette, issue 103 on 12.12.2023. Documents were submitted within the deadline by one candidate - Ivan Georgiev Georgiev, associate professor at IICT-BAS. The set of documents submitted by the only candidate for the competition is complete. The scientific jury for the competition was selected on 24.01.2024, and was appointed by order 40 of 09.02.2024. of the Director of IICT. At the first meeting of the scientific jury held on 14.02.2024. a decision was made in my capacity as a member of the jury to prepare an opinion on the candidate's materials for this competition.

2. Brief biographical data

Ivan Georgiev graduated master degree in Mathematics in 1999 at "St. Kliment Ohridski". He defended Ph. D. thesis "Iteration methods for non-conforming finite elements" in professional field 4.5 Mathematics, scientific specialty "Computational mathematics" at IPOI-BAS in 2007. In the period 2003 to 2006 he worked as a mathematician at IMI-BAS , and from 2007 to 2014 he was assistant professor at the same institute. Since 2015 Ivan Georgiev is associate professor at IICT-BAS, while also holding a second position at IMI-BAS, where he is currently an associate member of the department of "Mathematical Modeling and Numerical Analysis". As of 2021 Ivan Georgiev is the scientific secretary of the BAS - direction "Information and Communication Sciences and Technologies"

3. General description of the presented materials

The materials presented by Assoc. Prof. Ivan Georgiev for participation in the competition have been prepared in accordance with the Academic Staff Development Act (ASDA) in the Republic of Bulgaria, the Regulations for its implementation and the relevant regulations of the Bulgarian Academy of Sciences and the Institute of Information and Communication Technologies - BAS. The set of submitted documents (application, curriculum vitae, and diplomas, list of scientific publications and citations, summaries of publications, references and declarations) is complete and complies with the requirements of the above-mentioned normative documents.

The scientific publications submitted for participation in the competition are 21, all published in the period 2015-2024. Of these publications, 3 are in specialized international journals with an impact factor (here I also add work [22], which is with IF 1.4 for 2022.), 15 are articles in SJR impact-ranked journals, two in peer-reviewed international conference proceedings, and one in a journal referenced in the ACM Digital Library. Of the publications presented in the contest, 3 have two authors, 5 have three and 13 have more than three authors. None of the presented works have been used in the previous competitions and procedures in which the candidate participated.

From the materials presented by Assoc. Prof. Ivan Georgiev regarding the competition, it can be seen that the candidate fully satisfies both the national requirements (ASDA and RAASDA) as well as the specific requirements in the regulations of BAS and IICT-BAS for occupying the academic position of "professor", as follows: Group A – 50 points with a requirement of at least 50 points; Group B – 120 points with a minimum requirement of 100 points; Group D – 302 points with a minimum requirement of 260 points; Group D – 342 points with a minimum requirement of 140 points; Group E – 200 points with a requirement of at least 150 points.

4. Scientific and applied scientific contributions

Assoc. Prof. Ivan Georgiev's scientific interests are in the field of Mathematical Modeling and in particular in applications in 3D digitization, visualization, prototyping and microstructural analysis. The scientific works submitted for participation in the competition fall on some important areas, which I will discuss briefly, and to cite the works I will follow the numbering from the submitted list of publications. The presented 21 publications are numbered from [2] to [22], and contributions from works [5] and [6] are not reflected in the reference.

The works [2, 9, 10 and 22] are devoted to image segmentation methods that are applied to real data obtained by industrial X-ray computed tomography of porous materials. A hybrid numerical-experimental homogenization strategy is proposed to determine

important characteristics (e.g. elasticity) of closed-pore materials [8]. As a continuation in this direction, in the works [3, 4 and 7] various methods for determining the effective material characteristics of composite materials by applying microstructural analysis and high-performance calculations are investigated. I believe that contributions from works [5 and 6] can also be attributed to the above groups, where, from a theoretical point of view, various models are developed to describe the relationship between the geometrical, mechanical and physical parameters of the fillers and the matrix with the macroscopic effective properties of the composites, such as strength-deformation characteristics of fiber concrete for example.

In the paper [17], a technology for three-dimensional tomographic reconstruction of homogeneous objects with a high density of inclusions is developed, an original method for choosing points for interpolation is proposed and a mathematical algorithm described, which ensures the application of two-dimensional interpolation correction of the projections.

In [20 and 21], the morphology of the residual porosity is studied and conclusions are drawn about the relationship between the structure and properties of silicate materials obtained using a large percentage of metallurgical waste. The effect of particle size on the final materials and on their mechanical and thermal properties is also investigated.

In [14 and 16], the effectiveness of the developed methods and tools for three-dimensional digitization in the study and characterization of bone samples is demonstrated.

The advantages of the precise reconstruction of microstructural objects by methods used in computed tomography are demonstrated in the simulation of: blood flows in blood vessels [13]; fluid flow in porous media [11 and 12], as in models for pollutant removal in subsurface wetland flows [18 and 19].

A new approach for rapid prototyping by 3D printing and chemical metallization is proposed in [15]. The advantages of the approach are demonstrated by the possibilities of creating lightweight broadband polymer antenna prototypes on a standard metal pyramidal antenna. It is worth noting that the publication in question [15] from 2017 has been cited by Scopus publications 25 times.

5. Citation of the candidate's scientific publications

From the list of 57 citations presented by the candidate, 47 citations are to the publications with which he participated in the competition, and 10 citations to another publication. The submitted citations correspond to 342 points, which many times exceeds the minimum requirement of 140 points. Of the publications presented in the competition

with the most citations are the works [15] – 25 citations and [16] – 16 citations. Data from Scopus show 149 independent citations (as of 27.03.2024) of works by Assoc. Prof. Ivan Georgiev with an h-index of 7. For some of the presented publications (for example [15], [16] and [21]) the number of citations is higher than that presented by the applicant. This shows that the college in the area accepts the candidate's work well and interest in it is growing.

6. Assessment personal contribution of the candidate

After the analysis of the publications submitted for the competition, I believe that the contribution of Assoc. Prof. Georgiev is equal to that of the other authors. I have not noticed any signs of plagiarism and self-plagiarism.

7. Critical remarks and recommendations

I have no critical remarks on the materials submitted by the candidate for the competition. I would recommend Assoc. Prof. Ivan Georgiev to participate more actively in teaching work in the future. This would contribute to the transfer of knowledge and experience to young scientists (students and Ph. D. students).

8. Personal impressions.

I have known Ivan Georgiev since 2003, when he started working in the Department of "Mathematical Modeling and Numerical Analysis" at IMI - BAS. He is an established scientist in the field of 3D digitization and microstructural analysis with organizational skills and experience. Prof. Ivan Georgiev is a responsible and enjoys great respect among his colleagues.

9. Conclusion.

On the basis of the submitted documents, the scientific and applied contributions, I believe that Associate Professor Ivan Georgiev Georgiev satisfies all the national requirements, the rules of the IICT and the BAS for its application under the current procedure.

I strongly recommend Ivan Georgiev Georgiev be elected to the academic position of "Professor" at IICT - BAS, scientific field: 4. Natural sciences, mathematics and informatics, professional field 4.5. Mathematics, with a scientific specialty "Mathematical Modeling and Application of Mathematics in 3D Digitization and Microstructural Analysis".

Sofia,

04.03.2024

Signature:

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