

## **OPINION**

**in a competition for an academic position**

**“Professor”**

**in professional field 4.5 Mathematics (Operations Research),**

**for the needs of Sofia University “St. Kliment Ohridski ” (SU),**

**Faculty of Mathematics and Informatics (FMI), Department of Probability, Operations  
Research and Statistics (PORS),**

**announced in State Gazette no. 21 of 13.03.2020 and on the websites of FMI and Sofia  
University (with extended deadline for submission of documents until 14.07.2020)**

The opinion was prepared by **Prof. DSc. Maroussia Nikiforova Bojkova** - Department of Probability, operations research and statistics (PORS) at FMI-SU, in my capacity as a member of the scientific jury for the competition in the professional field 4.5. Mathematics (Operations Research) according to Order № RD 38 - 265 / 10.07.2020 of the Rector of Sofia University.

The only candidate for participation in the announced competition who has submitted documents is **Assoc. Prof. DSc Nadya Peycheva Zlateva**, from the Department of Probability, Operational Research and Statistics at FMI-SU.

### **I. GENERAL DESCRIPTION OF THE SUBMITTED MATERIALS**

#### **1. Details of the application**

The candidate Assoc. Prof. Nadia Zlateva participates in the competition with all the necessary documents in accordance with the requirements of Act On Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules of Implementation of ADASRB (RIADASRB) and the Rules on the Conditions and Procedures for Acquiring Degrees and Occupation of Academic Positions at Sofia University (RCPADOAPSU).

For participation in the competition Assoc. Prof. Nadia Zlateva presented a list of a total of 2 dissertations - respectively for acquiring a PHD degree and the scientific degree ‘Doctor of Science’, 33 titles of all publications, incl. 29 scientific publications in national and international scientific journals and scientific forums and 4 - others, of which 8 articles were submitted for participation in the competition - 6 published and 2 accepted for publication. The articles proposed by the candidate do not repeat the ones presented for obtaining the educational and scientific degree “Doctor” and the scientific degree “Doctor of Sciences”, as well as for holding the academic position “Associate Professor. The submitted documents contain: the announcement in the State Gazette; application for participation in the competition, CV; diplomas for master, doctor, doctor of sciences and associate professor; additional agreements, official note and certificate of work experience, issued by Sofia University; documents showing compliance with the minimum

requirements; as well as data on the scientific activity of the candidate, which will be commented below.

## **2. Professional and biographical data about the candidate**

Nadia Zlateva graduated with a Master's degree in Mathematics at Sofia University "St. Kl. Ohridski", specialization in Operations Research in 1992 with honors and a second specialty "teacher of mathematics". In the period 1993-1996 she was a PhD student at Sofia University, where under the supervision of Prof. Pando Georgiev she defended her PhD dissertation on "Subdifferential calculus and variational methods in non-smooth analysis". During his doctoral studies he completed a 6-month specialization at the University of Bordeaux, France working with Prof. Robert Deville within the framework of the TEMPUS project of the European Union (EU). From 2002 to 2003 she was awarded a post-doc position at the University of Montpellier, France as a Marie Curie Fellow (18 months), where she worked with Prof. Lionel Thibault, and from 2004 to 2005 she held a 6-month post-doc specialization within the research network "Evolutionary Equations" under the VI Framework Program of the EU at the University of Bretagne Occidental, Brest, France.

In the period 1994-1999 the candidate worked as a part-time assistant at FMI-Sofia University and in 1997-1998 she started as a mathematician at IMI-BAS and held sequentially the positions of research associate III degree until 2000, and until 2006 - research associate I degree (part time) and guest lecturer at FMI-SU. From 2000 to 2005 she was a senior assistant at the PORS Department and from 2005 until now she has been working as an Associate Professor at the same department.

In 2018 she defended the scientific degree "Doctor of Science" (Dr. Sci.) at Sofia University with the topic of the dissertation "Variation analysis - methods and applications". From 2008 to 2012 and in the period 2017-2018, Assoc. Prof. Zlateva was Head of the PORS Department at the FMI of Sofia University, and in the period 2011-2017 she was Vice-Dean of the FMI responsible for Research, Scientific Projects and Doctoral Training, and in different periods she was a member of the Faculty Council of FMI and a member of the General Assembly of Sofia University.

Assoc. Prof. Zlateva has participated in several projects of the Bulgarian Science Foundation at the Ministry of Education and Science. She has been a member of the expert councils of three successfully completed educational projects funded by EU structural funds.

## **3. General characteristics of the scientific works and achievements of the candidate**

To participate in the competition, the candidate has submitted 8 scientific publications for review, 6 of which were published and visible in the world databases SCOPUS and Web of Science and 2 accepted papers will be also published in a journal with an impact factor.

An evidence for the high quality of the candidate's research is that all 8 articles are in journals with an impact factor. The distribution by quartiles is as follows: 1 is in category Q1, 5 in Q2, 1 in Q3 and 1 in Q4 with a **total impact factor of 6,674** and a **total SJR of 6,59**. Among the journals in

which the candidate's articles have been published are authoritative ones such as: **Proceedings of the American Mathematical Society, Journal of Convex Analysis, Journal of Optimization Theory and Applications and Comptes rendus de l'Academie Bulgare des Sciences.**

Below is a table with the minimum number of points on indicators for the academic position "Professor" in professional field 4.5 Mathematics at Sofia University and the indicators of Assoc. Prof. Zlateva, which shows that the candidate has excellent achievements and exceeds the required minimum.

**Table . Minimum number of points according to indicators of the requirements under Art. 2b of the Law on Natural Sciences, Mathematics and Informatics, professional field 4.5. Mathematics**

Criteria	Requirements for „Professor“ position	Indicators of Assoc. Prof. Zlateva
A. Dissertation work for PhD degree	50	50
B4. Habilitation work - scientific publications in journals that are referenced and indexed in world-famous databases of scientific information (Web of Science and SCOPUS)	100	135
G7 Scientific publications in journals that are referenced and indexed in world-famous databases with scientific information (Web of Science and SCOPUS), outside the habilitation work	200	321
D11 Citation in scientific journals, monographs, collective volumes and patents, referenced and indexed in world-famous databases of scientific information (Web of Science and SCOPUS)	100	240
E - total	100	125
<b>Total</b>	<b>550</b>	<b>871</b>

According to the list of citations, the total number of citations in articles and monographs is 274 and 16 citations in dissertations and habilitation theses, 30 of them proposed in the competition and all are in sources, indexed and referenced in world-famous databases of scientific information (SCOPUS and Web of Science) and carry 240 points. It is interesting to note that with only 4 articles the candidate received 219 citations, which is an undoubted proof to both quality and distinction of scientific results worldwide. Among the names citing these works are those of world-famous mathematicians such as: M. Fabian, J.-P. Penot, Goncharov et al.

From the submitted documents and declarations, it can be seen that:

- a) the scientific works meet the minimum national requirements (under Art. 2b, para. 2 and 3 of ADASRB) and respectively the additional requirements of Sofia University for acquiring the academic position “Professor” in the scientific field and professional direction of the competition;
- b) the scientific papers submitted by the candidate are not used in previous procedures for acquiring a scientific title and academic position;
- c) there is no legally proven plagiarism in the scientific papers submitted at the competition.

#### **4. Characteristics and evaluation of the candidate's teaching activity**

Assoc. Prof. Zlateva has many years of active and successful teaching activity at the FMI of SU. She has taught courses in Linear Optimization, Nonlinear Optimization, Operations Research, Mathematical Optimization 1 and 2 in the bachelor's degree, and has led exercises in mathematical analysis. Assoc. Prof. Zlateva shows exceptional responsibility and high requirements towards the students. For all courses she provides materials that are constantly updated. She has a good name and respect among students.

#### **5. Analysis of the content of the scientific and scientific-applied achievements of the candidate contained in the materials for participation in the competition**

The main scientific results of Assoc. Prof. Zlateva are in the field of variational calculus and optimal control, including areas such as non-smooth analysis, analysis of multi-valued mappings, variational principles and others.

Assoc. Prof. Zlateva has grouped her publications submitted for participation in the competition in three groups. The first group is dedicated to the use of perturbation spaces to minimize integral functionals. The articles [2b, 3b] in this group are devoted to a variational problem for minimizing an infinite-dimensional integral functional. The articles in the second group [5b, 6b] are related to results of the type of surjectivity of mappings in Frechet spaces and new proofs of Nash and Moser's Theorem are obtained (see, for example, RS Hamilton, The Inverse Theorem of Nash and Moser, Bulletin of AMS 7 (1), 1982, 65–222). The multi-valued mappings approach reveals the connection of Nash and Moser's theorem with one of the central concepts of variational analysis - metric regularity, which is essentially used in the candidate's new approach.

The third group of articles [1b, 4b, 8b, 7b] brings together new proofs of known results in the field of variational analysis. As the candidate herself noted: *“such results are interesting mostly from an educational point of view. In addition, new and fundamentally different proof of known results helps to highlight their essential characteristics, and this understanding leads to new methods for developing the theory.”*

In [1b], a simple proof of the classical theorem of Moreau and Rockefeller that the proper continuously convex function in Banach space is determined up to a constant by its subdifferential, is presented. The proof in [1b] is similar to the proof of the classical theorem from the analysis

that a monotone function is Riemann integrable. It uses neither duality nor explicit one-dimensional arguments.

In [4b] a new proof of the maximum monotonicity of the subdifferential of a convex function is obtained. The article [8b] is devoted to a new method for proving the theorem of Korea, Joffre and Thibault that the monotonicity of the subdifferential leads to a convexity of the function. This new method is based on barrier functions. The use of barrier functions helps to overcome the main technical difficulties when working with semi-continuous from below functions. In [7b] a new proof is presented, related to the result of Frankovska in the recent book of Ioffe (A. Ioffe, Variational Analysis of Regular Mappings: Theory and Applications, Springer Monographs in Mathematics, Springer, 2017), showing that the metric regularity of a multi-valued mapping can be characterized by the regularity of its contingent variation - a concept that expands the concept of contingent derivative.

All publications are co-authored with Assoc. Prof. Milen Ivanov. I believe that the candidate's contribution to the joint publications is completely equal.

## **6. Critical remarks and recommendations**

There are some inaccuracies of a technical nature. For example, in the list of citations, the last citation is of article [5b]. I believe that the article in question was mentioned in the list by mistake. However, this in no way affects the quality of the candidate's scientific results.

I will allow myself to recommend to the candidate to invest work and efforts for dissemination of her achievements in our country by devoting part of her efforts to educating her followers in Bulgaria. However, I must admit that she already has a PhD student and in fact she is actively working towards attracting talented and distinguished students to the field of Operations Research.

## **7. Personal impressions of the candidate**

I have known Assoc. Prof. Zlateva for many years working together at the PORS Department. I have direct impressions from her development in recent years. Although she devoted much of her time to administrative duties for the benefit of the FMI, the most striking of which was the preparation of the exclusive FMI project for the UNITE Center of Excellence, she successfully defended her dissertation for the Doctor of Science degree in 2018.

I would like to mention her principle position and competence in decision-making, both administratively and scientifically. She has an authority and a good reputation in the faculty.

## **Conclusion on the application**

After getting acquainted with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, **I confirm that the scientific achievements of Assoc. Prof. Nadia Zlateva meet the requirements of ADASRB, the RIADASRB and the RCPADOAPSU** for the occupation the academic position "Professor" in the scientific field and professional direction of the competition. In particular, the candidate satisfies the minimum national requirements in the

professional field and no plagiarism has been established in the scientific papers submitted at the competition. I give my **positive assessment of the candidacy**.

## **II. OVERALL CONCLUSION**

Based on the above, I recommend the scientific jury to propose to the competent electoral body of the Faculty of Mathematics and Informatics at Sofia University „St. Kliment Ohridski” **to elect Assoc. Prof. DSc. Nadya Peycheva Zlateva to take the academic position “Professor” in the professional field 4.5. Mathematics (Operations Research)**.

7.09.2020

Opinion is prepared by: .....

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(Prof. DSc. Maroussia Bojkova)