R E V I E W

for the competition for the academic position
"Professor"
in the Professional Field 4.5 Mathematics
(Operations research),

for the needs of the Sofia University "St. Kliment Ohridski", Faculty of Mathematics and Informatics (FMI of SU),

announced in Newspaper of State, No.21 from 13.03.2020
and on the Internet pages of FMI and SU

The review is written by Prof. DSc Mikhail Ivanov Krastanov from Михаил Иванов Кръстанов from FMI of SU as a member of the Scientific Jury for the competition by Order No. РД 38-265/10.07.2020 of the Rector of the Sofia University.

The only applicant who has applied for the position is

Assoc. Prof. DSc Nadia Pejcheva Zlateva

from the Department of Probability, operations research and statistics at the Faculty of Mathematics and Informatics of the Sofia University "St. Kliment Ohridski".

I. Description of the presented documents

1   Information concerning the documentation

The documentation presented by the applicant is in accordance with the requirements of the law and the accompanying rules of the Sofia University.

The applicant for the position Assoc. Prof. Ph. DSc. Nadia Peicheva Zlateva in the competition with 8 publications in foreign scientific issues. She has also added 22 other documents which concern: the announcement for the competition; the statement that she wants to apply for the position; CV; diplomas for M.Sci., Ph.D., Assoc. Professorship; documents confirming her position at the Sofia University "St. Kliment Ohridski"; proofs that she covers the minimal scientific requirements of the law for the position; a list of all her publications, extracts from the systems "Authors", SCOPUS and WoS showing the SJR and IF of the journals in which her papers are published, a description of the results in the presented papers, a list of citations, two scanned letters: the first one with the decision of Research Directorate of the European Commission to confirm the selection of the Marie Curie Individual Fellowship Proposal of Nadia

Zlateva and the second from the Coordinator of the scientific agreement HPRN-CT-2002-00281, Funded under: FP5-HUMAN POTENTIAL, confirming her participation.

All documents are well prepared and are easy to work with. The description of the results is comprehensive and correctly reflects the contributions of the applicant.

2   Information for the applicant

In 1993 Assoc. Prof. Ph. DSc. Nadia Peicheva Zlateva graduated in FMI at Sofia University "St. Kliment Ohridski" obtaining MSc degree in Mathematics (Operation research) and Secondary speciality Teacher in Mathematics and Informatics. She was a PhD student in the Sofia University in the period March 1993 – December 1996 with a break during the period February – July 1994 for a sixth months specialization under the guidance of Prof. R. Devill. In 1999 shw defended her PhD thesis and acquired a PhD educational and scientific degree. In the period February 2002 – July 2003 she obtained a post-doctoral position in the Montpellier University under the guidance of Prof. Lionel Thibault. In the period October 2004 – March 2005 she obtained a post-doctoral position in the University of Brest in the FP6 scientific network "Evolution Equations". From February 1997 till February 2006 she is with the Institute of Mathematics and informatics at the Bulgarian Academy of Sciences as a Researcher and Senior Researcher. Since February 2006 she is with the Faculty of Mathematics and Informatics at the Sofia University "St. Kliment Ohridski". First as a Lecturer (from 1994 till 1999), next as a visiting assoc. professor (in 2000) and after that at a permanent position as Assistant Professor (from 2000 till 2005) and Assoc. Professor (from 2005 till now) in the department Probability, Operations Research and Statistics. I have to note that she was Head of the department Probability, Operations Research and Statistics (from March 2008 till March 2012). She was vice-dean of the Faculty of Mathematics and Informatics during the period June 2011 – January 2017.

3   General characteristic of the scientific work and achievements of the applicant

Assoc. Prof. Ph. DSc. Nadia Peicheva Zlateva applies in the present competition with 8 papers in peer-reviewed scientific journals. Six of them are already published and the last two are accepted for publication. All journals have impact factor or impact range. Three of them are in journals in the first quartile in the areas "Mathematics", "Applied mathematics" and "Control & Optimization" of WoS and/or SCOPUS. I am not surprised that all papers are coauthored with Assoc. Prof. Milen Ivanov and I have no doubts that Zlateva has contributed at least an equal share to all joint publications.

I have to note that the scientific publications have not been used in previous

applications and no plagiarism has been established in them. Moreover, it could be seen from the given below table that the scientific publications satisfy the minimal requirements of the law and the accompanying rules of the Sofia University for the academic position "Professor" in the scientific field of the competition:

Group	A	Б	В	Г	Д	Е
Minimum points requierd	50	–	100	200	100	100
Points achieved	50	–	135	321	240	125

4 Characteristics and evaluation of the teaching activity of the applicant

The teaching activity of Assoc. Prof. Ph. DSc. Nadia Peicheva Zlateva started in 1994 in the Faculty of Mathematics and Informatics at the Sofia University "St. Kliment Ohridski" and continues till now. From the beginning in 2001 till now she has full classroom employment. She teaches courses on Linear optimization and Nonlinear optimization. These courses are obligatory for the students from the specialties Applied Mathematics and Statistics. Also, she teaches the course on Operations research which is obligatory for the students from the specialties Informatics and Computer Sciences and optional for the students from the specialties Software engineering and IT systems. She has carefully prepared and regularly updated lecture notes for these courses that could be find in the system Moodle. As far as I know, she enjoys respect and esteem among her collaborators Andrei Drenski, Georgi Angelov, Silvi-Maria Gjurova, Detelina Kirova, Mikhail Hamamdjiev and Matei Konstantinov. Matej pass successfully trough an exam and now he is a PhD student of Zlateva.

5 Analysis of the scientific achievements of the applicant contained in the documents and publications presented for the competition

One of the applied 8 papers is published in the Proceedings of the American Mathematical Society, четири в Journal of Convex Analysis, 2 in the Journal of Optimization Theory and Applications and 1 in Comptes rendus de l' Académie bulgare des Sciences. All these papers are published in the period 2008 - 2020 and are co-authored with Assoc. Prof. PhD Milen Ivanov. I have no doubts that Zlateva has contributed at least an equal share to all these joint publications. Also, Zlateva is presented abstracts of these

papers in English as well as in Bulgarian. Moreover, she has add a file with her scientific contributions. Each paper falls in one of the following directions:

1. Using perturbation spaces for minimization of integral functionals. Infinite-dimensional variants of the basic problem for calculus of variations (with fixed left end-point and free right end-point) are considered. The following problem is considered in [26]

$$
\left(V_{\|\cdot\|}\right)\begin{cases} \displaystyle\int_0^\infty \left(\|v(t)\|^2 + f(u(t))\right) dt \to \min \\ \\ \displaystyle u(t) = a + \int_0^t v(s)ds, \ v \in L^2([0,\infty], X), \end{cases}
\tag{1}
$$

where X is a Banach space, f is a convex function with nin-negative values and closed epigraph, $f(0) = 0$ and $f \geq k\|\cdot\|$ for some constant $k > 0$.

The following problem is considered in the paper [36]

$$
\left(P_f\right)\begin{cases} \displaystyle\int_0^1 \left(f(u(t),t)\right) dt \to \min \\ \\ u : [0,1] \to X \text{ is a 1-Lipschitz continuous function with } u(0) = 0, \end{cases}
\tag{2}
$$

where X is a Banach space, $f : X \times [0,1] \to \mathbb{R}$ is bounded from below function with closed epigraph, $f(0) = 0$ and $\displaystyle\int_0^1 f(0,t)dt < \infty$.

A suitable perturbation space is defined in the both papers such that when the integrand is perturbed by a function from this space the obtained problem is of same type. Moreover, it is proved there that for each $\varepsilon > 0$ there exists solvable ε-closed perturbed problem.

2. Surjectivity of maps in Fréchet spaces.

One of the approaches to study the solvability problem of nonlinear problems with C^∞ data i closely related to the applicability of the Nash–Moser theorem. The basic idea is to approximate the nonlinear problem by a linear one. Then, the solvability of the linear problem implies (under suitable assumptions) the solvability of the original nonlinear problem.

A surjectivity result for multi-valued maps with closed epigraph is proved in the paper [56]. This result is formulated in the terms of suitable defined graphical, derivative for multi-valued maps whose domain is a linear metric space. The proof is based based on an abstract iteration scheme developed by Assoc. Prof. Zlateva and Assoc. Prof. Milen Ivanov. Moreover, it is introduced the concept

for Π-surjectivity of multi-valued maps defined on a Fréchet space whose images belong to another Fréchet space. Sufficient conditions (in terms of a graphical derivative of a multi-valued map) for (weak) Π-surjectivity are proved. As a corollary, a surjectivity result for a continuous single-valued strongly Gвteaux differentiable map (with uniform estimates over all seminorms) is obtained. It have to be noted that this result include the most important cases of infinitely smooth functions defined on compact subset of finite-dimensional linear spaces. Different proof of the last result in this paper is given in the paper [6б] for merely Gвteaux differentiable function continuous single-valued functions.

3. New proofs of well know results in the field of the variational analysis.

The papers [1б], [4б], [7б] и [8б] falls in this group.

In the paper [1б] it is given a new proof of the of the following classical Moreau–Rockafellar theorem that a proper convex semicontinuous from below function defined on a Banach space is determined by its subdifferenital up to a constant. The corresponding proof is similar to the proof of the classical theorem that a monotone function is Riemann integrable. It is based on the Ekeland variational principle and on the classical formula of Moreau–Rockafellar for the sum of the subdifferentials of a proper convex semicontinuous from below function and a convex continuous function.

In the paper [4б] it is given a new proof of the maximal minotonicity of the subdifferential of a convex function. This proof is based on a simpler proof (in the convex case) of a sufficient condition of minimality of Minty type.

The metric regularity is one of the important concepts of the variational analysis that is applied for solving different , problems (for example, I know different applications of this concept in the mathematical control theory). A characterization of this property is obtained in the paper [6б]. This characterization is in terms of the so called contingent variation of a multi-valued map. This result extends a known result of Frankowska from 1990 in the following sense: the result of Frankowska characterize the local module of regularity while the characterization in [6б] is global. I have to note that both proofs are different but are based on the Ekeland variational principle.

A new approach is proposed in the paper [8б] to prove the following orrea-Jofrй-Thibault's theorem: Let X be a Banach space, ∂ is an admissible subdifferential and $f : X \to \mathbb{R} \cup \{+\infty\}$ is a proper semicontinuous from below function. If ∂ is a monotone operator, then f is a convex function. This approach is based on the Ekeland variational principle and uses barrier functions. Two additional properties of the admissible subdifferential are established as well as an extension of a result Jules and Lassonde from 2014.

6 Critical remarks and recommendations

I have no critical remarks and recommendations

7 Personal impressions for the applicant

I know Assoc. Prof. Nadia Zlateva for almost 30 years and have the possibility to observe how she grow up as a mathematician. She stands out with precision, high scientific morality, criticism and self-criticism towards her scientific and pedagogical activity. She has a high collegial spirit and definitely organizational skills. She has a well-deserved authority not only in the Department of Probabilities, Operational research and Statistics, but also in the entire Mathematical College.

8 Conclusion for the application

Conclusion for the application After my careful and critical reading of the documentation and the publications presented for the competition and my analysis of their significance and the scientific and scientific-applied contributions **I confirm** that the scientific contributions are sufficient (as required by the law and the additional requirements of the Sofia University) for the position "Professor" in the scientific field of the competition. In particular, the applicant satisfies the minimal national requirements for the scientific field and there is not a plagiarism in the presented publications for the competition.

I give my **positive evaluation** for the application.

II. CONCLUSION

I recommend the Scientific Jury to suggest that the Council of the Faculty of Mathematics and Informatics of the Sofia University "St. Kliment Ohridski" to elect Assoc. Prof. DSc Nadia Pejcheva Zlateva for the academic position "Professor" in the professional field 4.5 Mathematics (Operations research).

September 5, 2020   Referee:
Sofia

/Prof. DSc Mikhail Iv. Krastanov/