

ATTITUDE OF REVIEWER

for Assoc. Prof. Dr. Vejdi Ismailov Hasanov

in the competition for acquiring the academic position "Professor" at the Faculty of Mathematics and Informatics at Konstantin Preslavsky University of Shumen, in area of higher education 4. Natural sciences, mathematics and informatics, professional field 4.5. Mathematics (Computational Mathematics), published in Newspaper of State, issue 55, July 12, 2019

Prepared the Attitude of Reviewer: Prof. Dr. Nikolay Veselinov Kyurkchiev

By order No RD-16-090/11.09.2019 of the Rector of Konstantin Preslavsky University of Shumen I am a certain member of the scientific jury in area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5. Mathematics (Computational Mathematics).

To participate in the announced competition for "Professor" has submitted documents Assoc. Prof. Vejdi Ismailov Hasanov, PhD from department "Economics and Mathematical Modelling" in FMI at Konstantin Preslavsky University of Shumen.

Required documents for participation in the competition have been submitted in impeccable form.

The candidate - Assoc. Prof. Dr. Vejdi Hasanov is presented in the competition for "professor" with 12 scientific publications and three textbooks.

The papers submitted have been published as follows: 6 in Impact Factor journals (general IF = 5.769 - based on Web of Science), of which 2 articles are rated - Q1; 1 article with rate - Q2; 2 Q3 rated articles and 1 Q4 rated article; 4 in journals with SJR (total SJR = 0.912) and 2 articles respectively in Math. Balkanica and Inn. in Modeling and Anal. J. Res.

The candidate also participated in the competition with three individual textbooks - Lectures on Numerical Methods (2014); Linear Optimization (2019) and A Guide to Numerical Methods with Matlab (2019), Konstantin Preslavsky University of Shumen Publishing House.

The presented articles and textbooks are published after the acquisition of the academic title "associate professor" by the applicant, corresponds to all the requirements, conditions and criteria of the Law on the Development of the Academic Staff in the Republic of Bulgaria, Rules for applying of the mentioned above law, Rules for the conditions and order for acquiring academic degrees and academic positions at Konstantin Preslavsky University of Shumen for applying of ZRASRB.

Main scientific and scientific-applied results of the applicant:

I will conditionally group the candidate's scientific papers presented in the competition into several thematic areas:

1. Perturbation analysis of positive definite solutions of equations

$$X \pm A^* X^{-1} A = Q.$$

In article No 1 of the submitted list of publications for participation in the competition new perturbation limits were obtained for the maximum positive solution of the above equations,

using the technique proposed in the previous joint article of the author with Prof. Ivan Ivanov (2006).

2. Deriving sufficient conditions for the existence of a positive definite solution of a class of matrix equations of the form:

$$X + A^*X^{-1}A - B^*X^{-1}B = I.$$

I will note that the sufficient conditions obtained (see article No 3 of the submitted list of publications) are of a weakened type compared to those obtained by other authors (see, for example, Berzig and Duan).

3. Obtaining perturbation estimates for the stability with respect to the linear positive operator Π solutions of the equations:

$$A^*X + XA - XGX + Q + \Pi(X) = 0$$

$$X - A^*X(I + GX)^{-1}XA - Q - \Pi(X) = 0,$$

which are linearly perturbed equations of known Riccati equations.

The corresponding perturbed equations are considered

$$\tilde{A}^*\tilde{X} + \tilde{X}\tilde{A} - \tilde{X}\tilde{G}\tilde{X} + \tilde{Q} + \tilde{\Pi}(\tilde{X}) = 0$$

$$\tilde{X} - \tilde{A}^*\tilde{X}(I + \tilde{G}\tilde{X})^{-1}\tilde{X}\tilde{A} - \tilde{Q} - \tilde{\Pi}(\tilde{X}) = 0$$

and with a technique (using some of the ideas of Sun and Ivanov) a precise estimate was obtained for $\|X - \tilde{X}\|$ and significant technical difficulties were overcome (see Article No 4 of the list of publications presented).

Personally, I like research in the conditional field (articles No 5–7 of the attached list of publications).

4. Algorithms for calculating the maximum positive definite solution of the equation:

$$X + \sum_{i=1}^m A_i^*X^{-1}A_i = Q$$

and, in particular, the proven global convergence theorem using the Newton method and additional studies that provide a very appropriate choice of initial approximation (article No 5) as well as a detailed study of the convergence rate of the method of simple iteration and two of its modifications, which do not use the matrix inversion (article No 6).

I will state explicitly that a Stein modification is proposed and studied in detail and the theorem for the R-linear convergence of the method is proved.

5. Obtaining perturbation estimates for:

- the positive definite solution of the equation (article No 8)

$$X - \sum_{i=1}^m A_i^*X^{-1}A_i = Q,$$

- the maximum positive definite solution of the equation (article No 9)

$$X + \sum_{i=1}^m A_i^* X^{-1} A_i = Q$$

- the extreme solution of a class of matrix equations (article No 10).

In this group of publications some theorems have been proved under weaker constraints, see for example, the estimation of Yin and Fang of 2013 (which generalize famous estimate of Hasanov and Ivanov from 2006); generalizing estimates of Duan (2011), Xiu (2001), and others.

Numerical examples are also considered, with the candidate - Dr. Hasanov also posing a number of problems that remain to be solved - for future research!

Article 11 provides the necessary and sufficient conditions for the existence of positive definite solutions and for the existence of a minimum positive definite solution for the matrix equation - see conditional direction 2.

In article No 12 (jointly with Borisova) a comparative analysis is proposed with a number of known estimates (for example of Sun, Yin - Fang, Konstantinov et al., Hasanov) for classes of matrix equations. Some quantitative and qualitative comparisons are given. The claim of the candidate in the "author reference ..." that "the assessments of and ours in many cases have competitive indicators" needs of course of refinement due to the specifics and intrinsic features properties of each. This is also my only note on the materials presented for the competition.

I give a high mark for the applicant's work in the conditionally divided by me fields of science. Basically, these serious results are contained in articles in which the lead author is Assoc. Prof. Dr. Vejdi Hasanov. I have not found "plagiarism" in the work of the candidate within the meaning of ZRAS in the Republic of Bulgaria.

Three individual textbooks presented in the competition - Lectures on Numerical Methods (2014); Linear Optimization (2019) and A Guide to Numerical Methods with Matlab (2019), Konstantin Preslavsky University Publishing House, Shumen are all written at a high professional level.

The required number of points by groups of indicators for the occupation of the academic position "Professor" is covered.

Citations, Impact Factor, Resonance from the publications of Assoc. Prof. Dr. Vejdi Hasanov

The candidate submits an impressive list of 327 citations (which do not repeat those presented for the position of "assistant professor").

The candidate's scientific works have a wide national and international recognition. Much of the "List of citations for participation in the contest" is in reputable journals - Comp. Math. Appl., J. Appl. Math. Abstr. Appl. Anal., Comptes Rendus de L'Acad. Bulg. Sci., Adv. Diff. Eq., Studies in Comp. Int., Appl. Math. Comp., Linear and Multilinear Algebra, Numerical Algorithms, etc.

The minimum requirements for this criterion are also covered.

All this proves strongly that the scientific results in the field of Computational Mathematics have been made available to the scientific community abroad and in our country.

Assoc. Prof. V. Hasanov is the head of: a) 5 scientific-research projects (university); b) Erasmus and Erasmus+ mobility.

The candidate has two PhD students: A. Ali (deregistered with the right of defense); D. Borisova (fourth year).

Assoc. Prof. Hasanov also presented the required reference for the lectures he developed for the needs of Konstantin Preslavsky University of Shumen.

The additional requirements of the FMI at Konstantin Preslavsky University of Shumen for the acquisition of the academic position of "Professor" have been fulfilled.

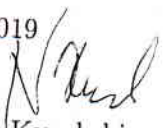
CONCLUSION.

From all of the above the applicant's works presented in the competition it is clear that in them have received sufficient scientific contributions in terms of quantity and quality. Considering the long-standing and very good learning-teaching activity, I am fully convinced that Assoc. Prof. Dr. Vejdi Ismailov Hasanov meets the requirements of the ZRASRB, the Regulations for the implementation of the ZRASRB, the Rules of Konstantin Preslavsky University of Shumen application of the ZRASRB for the occupation of the academic position of "Professor".

Therefore, my conclusion for occupation of the announced by the competition academic position "Professor" by Assoc. Prof. Dr. Vejdi Ismailov Hasanov is POSITIVE.

I propose that the Honorable Scientific Jury unanimously propose to the FMI of Konstantin Preslavsky University of Shumen to elect the candidate Assoc. Prof. Dr. Vejdi Ismailov Hasanov for the academic position of "Professor" in the field of higher education 4. Natural sciences, mathematics and computer science, professional field 4.5. Mathematics (Computational Mathematics).

October 30, 2019

Signature: 

/Prof. Nikolay Kyurkchiev, PhD/