REVIEW

By Prof. Boyan Georgiev Zlatanov, Dr.Sci.

University of Plovdiv Paisii Hilendarski

Faculty of Mathematics and Informatics

On the documents submitted for a participation in the competition for an occupation of the academic position "Professor" at the Faculty of Mathematics and Informatics in University of Plovdiv Paisii Hilendarski on **Research area: 4.** Natural sciences, mathematics and informatics, **Professional field 4.5.** Mathematics (Differential equations), announced in the State Gazette no. 92 of 18.11.2022 and on the web site of the University of Plovdiv Paisii Hilendarski, where Atanaska Tencheva Georgieva , PhD an Assoc. Prof. from University of Plovdiv Paisii Hilendarski participates as a candidate – **the only one** candidate.

By Order № РД 20-285/14.02.2023 of the Rector of the University of Plovdiv Paisii Hilendarski, I was appointed as a member of the Scientific Jury of the competition for the occupation of the academic position "Associate Professor" in on Research area: 4. Natural sciences, mathematics and informatics, Professional field 4.5. Mathematics (Differential equations).

As a member of the jury I, obliged to write a review, have received all the necessary documents attached to the application of Associate Prof. Atanaska Tencheva Georgieva, PhD to the Rector of the University of Plovdiv Paisii Hilendarski for participation in the competition. The documents are well designed and arranged.

For the participation in the announced competition **just one candidate** (Associate Prof. Atanaska Tencheva Georgieva, PhD) has submitted documents. She has enclosed two reports to satisfy the minimum national requirements and the additional requirements of the Faculty of Mathematics and Informatics (FMI) at Plovdiv University "Paisii Hilendarski" (PU). She is listed in NACID with satisfying the minimal national requirements for the academic position of Associate Prof. (Docent). He has presented his diploma for PhD degree, already obtained in 2009.

The candidate has received his PhD in 2009, thus she satisfies the minimum national requirements and has a score of 50 points for the group of indicators "A".

The candidate has been an associate professor since February 2012. It makes a good impression that the candidate is registered in NACID as an associate professor with scientific-metric indicators

The candidate satisfies the requirement for group of indicators "B" -150 points.

The candidate satisfies the requirement for group of indicators "Г" with 708 points.

It makes a good impression that the candidate has presented: 1 publications with Q1, 4 with Q2. She has participated in a total of 8 publications with an IF.

Assoc. Prof. Atanaska Tencheva Georgieva participated with 32 citations in WoS and/or SCOPUS, which satisfies the Law on the Development of the Academic Staff in the Republic of Bulgaria and therefore satisfies the requirement for group of indicators "Д" with 256 points.

According to indicator “E”, the candidate participated with 163 points. The difference in the presented report (190 points) is because the candidate did not divide one of the textbooks by the number of authors.

This short review shows that the applicant meets the minimum national requirements.

The candidate participates with:

23 publications (20 required by the additional requirement of FMI at PU),

23 articles in journals (12 required by the additional requirements of the Faculty of Mathematics and Informatics),

8 publications with IF, (8 required by the additional requirement of FMI at PU),

32 citations (20 required by the additional requirement of the FMI at PU),

2 textbooks (1 required by the additional requirements of the FMI at PU),

Assoc. Prof. Georgieva is the scientific supervisor of 2 successfully finished PhD student in FMI at PU

This short and formal review shows that all minimum national requirements and the additional requirements of the Faculty of Mathematics and Informatics are met.

GENERAL CHARACTERISTICS OF CANDIDATE ACTIVITIES

EVALUATION OF EDUCATIONAL AND PEDAGOGICAL ACTIVITY

Assoc. Prof. Atanaska Tencheva Georgieva, PhD was born in 1968. She graduated successively Mathematical School "Acad. Kiril Popov”, Plovdiv, Sofia University “St. Kliment Ohridski”, Faculty of Mathematics and Informatics with a 5-year course of full-time study in Mathematics and specialization Complex Analysis and Topology, which equates to a master's degree and obtained the PhD degree in 2009 in Plovdiv Paisii Hilendarski University. She has been working as an assistant, senior assistant, chief assistant and associate professor since 1993.

I know the candidate personally, when he started working at FMI at PU in the department of Real analysis, after her transfer from the University of Food Technologies - Plovdiv. Many informal conversations have convinced me that she has a wealth of mathematical knowledge. In contacts with the candidate over the years, I have convinced myself that she has the desire to develop and acquire scientific knowledge.

EVALUATION OF SCIENTIFIC AND SCIENTIFIC-APPLIED ACTIVITIES

The candidate has correctly divided his scientific contributions into three directions

1) Approximate solutions of fuzzy integral equations

2) Ordinary differential equations

3) Integral equations.

The applicant has included as a field 4) "Textbooks", which in my opinion should not be included in this list.

1) There are 13 publications in the field of approximate solutions of fuzzy integral equations. Analytical solutions of two-dimensional fuzzy Volterra-Fredholm integro-differential equation are found. Using the method of homotopic perturbations, the approximate solution of a two-dimensional fuzzy functional-integral equation of Volterra are obtained. Sufficient conditions for the existence of this unique solution are proven. A fuzzy homotopic perturbation method is constructed for solving fuzzy integral equations. A nonlinear problem for a two-dimensional fuzzy Volterra-Fredholm integral equation in the crisped case is studied. A fuzzy variant of Adomian's method is constructed. Sufficient conditions for the equivalence of the fuzzy variants of the homotopic perturbation method and the Adomian method for the nonlinear two-dimensional fuzzy Volterra-Fredholm integral equation in the crisped case are found. The problem of finding approximate solutions for a two-dimensional fuzzy Volterra-Fredholm integral equation is investigated and an estimate of the error between the exact and the approximate solution is investigated.

Iterative methods for the successive approximations using fuzzy cubature and quadrature rectangles formulas are constructed. Using these methods, the numerical solutions of two-dimensional fuzzy integral equations were found. A nonlinear two-dimensional fuzzy Hammerstein functional-integral equation is considered. The iterative procedure is based on fuzzy Haar wavelets. Error estimates for the class of fuzzy Lipschitz functions are obtained for a class of two-dimensional nonlinear Fredholm fuzzy functional integral. A nonlinear fuzzy functional integral equation Urisohn-Volterra is studied. The stability of the method with respect to the first approximation is investigated. A non-linear two-dimensional fuzzy Urison integral equation considered. The iterative method is based on Simpson's fuzzy quadrature formula. An estimate of the error is given in terms of a modulus of continuity.

2) There are 7 publications in the field of ordinary differential equations. Sufficient conditions for the existence of Lp(k)-equivalence between a linear and a nonlinear perturbed impulsive differential equations with an unbounded linear part in an arbitrary Banach space are found. Generalized ψ-exponential and ψ-ordinary dichotomies for homogeneous linear and nonlinear differential equations in Banach space are considered and sufficient conditions for the existence of ψ-bounded solutions of the inhomogeneous equations are found. Introduced the notion of Lp(h,k) – solution of a linear momentum differential equation in a Banach space. Possible applications of linear control systems with impulses are considered. Parametric stability for nonlinear differential equations with "maxima" are investigated. Explicit and easily verifiable sufficient conditions for the existence of several types of non-oscillating solutions of a linear delayed system of neutral type with distributed delay are found.

3) There are 3 publications in the field of integral equations. Generalizations of linear and nonlinear Volterra integral equations of the first and second order when the independent variable belongs to an arbitrary non-compact metric space or Hausdorff space, are considered. A numerical method is proposed for finding a numerical solution of a perturbed linear integral equation of Volterra.

From the list of observed citations, which are indexed in WoS and/or SCOPUS, all of the citations are of scientists outside Bulgaria, which shows that the research topic is relevant and the candidate's results contribute to the enrichment of knowledge in it.

It makes a good impression that Assoc. Prof. Georgieva participates as a referee in MathReview.

Two textbooks are presented. The textbook "Mathematics" contains a course of lectures and exercise tasks, consistent with the program of the discipline "Higher Mathematics" for the bachelor's degree of the Faculty of Technology at the University of Food Technologies - Plovdiv.

The textbook "Ordinary Differential Equations Course" was written on the basis of the author's lectures on "Ordinary Differential Equations" for the Mathematics and Applied Mathematics majors at FMI at Plovdiv University "Paisii. Hilendarski" as well as "Differential Equations" for the Mathematics and Informatics majors; Mathematics, informatics and information technologies; Information technologies, mathematics and educational management in the branch-Smolyan at Plovdiv University "Paisii. Hilendarski". The lecture course covers the basics of the theory of ordinary differential equations. The classical aspects of this theory are presented as well as some applied issues.

I have not found "plagiarism" in the works of the candidate in the sense of the "Law on the Development of the Academic Staff in the Republic of Bulgaria" in the Republic of Bulgaria.

WORK WITH STUDENTS

During her teaching work, Assoc. Prof. Georgieva assigns course and homework to students for individual self work, related to the studied material, which then he reviews and evaluates.

PARTICIPATION IN SCIENTIFIC FORUMS

It makes a good impression that Prof. Georgieva has 18 publications in scientific forums throughout the years.

CRITICAL NOTES

A review of the candidate's participation in scientific forums shows that she has mainly participated in the international conference published by AIP, with several papers in her participation. In the future, I recommend that Prof. Georgieva participate in other conferences, both in Bulgaria and abroad, and not to present several reports at the same forum. Prof. Georgieva's co-authors are from Bulgaria. I would recommend to the candidate if he can also find colleagues from abroad for joint work. This will enrich the candidate's research.

CONCLUSION

In my opinion the candidate Assoc. Prof. Atanaska Tencheva Georgieva, PhD has obtained enough results both in quality and quantity. The presented documents meet 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 University of Plovdiv "Paisii Hilendarski" to occupy the academic position "Professor". Therefore I give my **strictly positive assessment and I recommend to the Scientific Jury to prepare a report-proposal to the Scientific Council of the Faculty of Mathematics and Informatics at the University of Plovdiv "Paisii Hilendarski" for the election of Assoc. Prof. Atanaska Tencheva Georgieva, PhD for the academic position "Professor"** in the University of Plovdiv "Paisii Hilendarski" in Research area: 4. Natural sciences, mathematics and informatics, Professional field 4.5. Mathematics (Differential equations)

29.03.2023
Plovdiv

Signature: .....
/Prof. Boyan Zlatanov, Dr.Sci./