

REVIEW

by Prof. Mihail Mihailov Konstantinov, PhD,

Department of Mathematics,

University of Architecture, Civil Engineering and Geodesy,

in a competition for the academic position of "**professor**"

Field of higher education: 4. "Natural Sciences, Mathematics and Informatics";

Professional field: 4.5 "Mathematics (Mathematical Analysis)"

Advertisement in the State Gazette: no. 94 of 12.11.2021;

Assignor of the competition: Plovdiv University "Paisii Hilendarski",

Faculty of Mathematics and Informatics, Department of Mathematical Analysis.

1. Notes on the procedure

The procedure is in accordance with Article 4, paragraph 3 of the Law for Development of the Academic Staff in the Republic of Bulgaria, Article 2, paragraph 8 and Article 57, paragraph 2 in connection with Article 62 of the Regulations for Application of the Law and Article 79, paragraph 2 of the Regulations for the Development of the Academic Staff at the University of Plovdiv "Paisii Hilendarski". By order № RD-21-298 of 10.02.2022 of the Rector of the University of Plovdiv "Paisii Hilendarski" Prof. Rumen Mladenov, PhD, a scientific jury was appointed for the competition, of which I was appointed a member. The jury was approved by a decision of the Faculty Council of the Faculty of Mathematics and Informatics at the University according to protocol number 26 from 09.02.2022. By decision of the first meeting of the scientific jury I was appointed reviewer of the competition for the academic position of "Professor" for the needs of the Department of Mathematical Analysis at the Faculty of Mathematics and Informatics of Plovdiv University "Paisii Hilendarski" according to the announcement in the State Gazette of 12.11.2021.

Documents for participation in the competition were submitted by the only candidate Assoc. Prof. Hristo Kiskinov, PhD. All required documents for the procedure were presented to me in electronic form. The procedure is in accordance with the Law for Development of the Academic Staff of the Republic of Bulgaria and the Regulations for its implementation, as well as the additional requirements formulated in the Regulations for implementation of the law at the Faculty of Mathematics and Informatics of Plovdiv University "Paisii Hilendarski".

2. Description of the presented materials

The set of materials on paper and electronic presented by Assoc. Prof. Hristo Kiskinov is in accordance with the Regulations for development of the academic staff of Plovdiv University "Paisii Hilendarski". The electronic version of the set includes the following documents presented in doc and pdf format:

- order of the Rector of Plovdiv University "Paisii Hilendarski" to appoint a scientific jury for the competition;
- an application form from the candidate for admission to the announced competition for the academic position "Professor";
- author's reference for the scientific contributions;
- complete list of scientific works;
- copies of the works for participation in the competition in full text on electronic media;
- author's reference for the scientific contributions in the works submitted for the competition;
- reference for satisfaction of the minimum requirements of the Law for Development of the Academic Staff in the Republic of Bulgaria and of the Regulations for the Application of the Law;
- CV in European format;
- summaries of the scientific works in English;
- list of citations of the scientific works;
- list of refereed articles and monographs for the reference journal Mathematical Reviews;
- list of refereed articles and monographs for the reference journal Zentralblatt MATH;
- reference for participation in scientific projects from the Department of Scientific and Project Activities at the University of Plovdiv "Paisii Hilendarski";
- certificate of work experience;
- diploma of higher education from Plovdiv University "Paisii Hilendarski" from 1988, specialty "Mathematics and Informatics", qualification "Mathematician with a Specialization in Informatics";
- diploma for PhD degree;
- certificate for the award of the academic position "Associate Professor" from 2014;
- declaration of originality and authenticity of the attached documents;
- reference for the teaching activity with students and doctoral students;
- certificate of membership in professional organizations;
- list of textbooks and teaching aids;

- list of scientific works for the competition;
- reference for the research activity;
- reference for participation in scientific forums;
- reference for participation in scientific and educational projects;
- reference for auditory and extracurricular activities;
- reference for compliance with the additional requirements of the Faculty of Mathematics and Informatics at the University of Plovdiv "Paisii Hilendarski";
- declaration of originality and authenticity of the attached documents.

It can be stated that the submitted documents fully comply with the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for the Application of the Law, as well as the additional requirements of the Faculty of Mathematics and Informatics at Plovdiv University "Paisii Hilendarski" for holding the academic position of "professor".

3. Candidate details

The candidate Mr. Hristo Kiskinov was born in 1963. He graduated from the Faculty of Mathematics and Informatics of the University of Plovdiv "Paisii Hilendarski", degree program in "Mathematics and Informatics", with excellent results. In 2012 he successfully defended a dissertation for the award of the educational and scientific degree "Doctor" (PhD) on "Ordinary differential equations with dichotomous-like linear part in Banach spaces". In 2014 he was promoted to the academic position of "Associate Professor" at the Faculty of Mathematics and Informatics of Plovdiv University "Paisii Hilendarski". During the period from 1989 to 2014 he was successively assistant, senior assistant and chief assistant at the Faculty of Mathematics and Informatics of the University. Since 2019 he has been the head of the Department of Mathematical Analysis at the Faculty. Assoc. Prof. Dr. Hristo Kiskinov is a member of the Union of Mathematicians in Bulgaria and the American Mathematical Society. He is a reviewer of two of the major international reference journals in mathematics, having published dozens of reviews there. His publications are reflected in all major scientific databases and have been cited hundreds of times by Bulgarian and foreign scientists and specialists.

For the competition Assoc. Prof. Dr. Hristo Kiskinov presented all the materials required in the regulations. It can be stated that the minimum national requirements according to the Law for the Development of the Academic Staff in the Republic of Bulgaria, as well as according to the Regulations for its implementation, have been met and even significantly exceeded (especially in their part for the type and number of citations), for holding the academic position of "Professor" at Plovdiv University "Paisii Hilendarski".

4. Personal impressions of the candidate

I have known Mr. Hristo Kiskinov personally for more than 10 years, and in 2012 I was a reviewer of his PhD dissertation. I have excellent impressions of his scientific work. I have no immediate impressions of his teaching work, but I appreciate the textbook on discrete mathematics presented by him for the competition, published by the publishing house of Plovdiv University "Paisii Hilendarski". Assoc. Prof. Dr. Hristo Kiskinov is a respected member of the Department of Mathematical Analysis at the Faculty of Mathematics and Informatics at Plovdiv University "Paisii Hilendarski", and for nearly three years he has been the head of the department.

5. Scientific activity of the candidate

The candidate is the author and co-author of a total of 52 scientific papers, of which 16 have been published in journals with impact factor and 37 - in publications with SJR. 146 citations (excluding auto-citations and hidden auto-citations) of his works in the works of other scientists and specialists at home and abroad were found. Of these citations, 48 are in impact factor editions and 102 are in SJR editions. The works of Assoc. Prof. Hristo Kiskinov have an h-index equal to 5. The main contributions of the candidate are in the field of real and functional analysis, fractional differential equations, systems with delayed argument and mathematical modeling and applications of mathematics and in particular of differential equations.

For the competition the candidate has presented 24 scientific publications and one textbook with minimum requirements for 20 such publications and one textbook. Data for 131 citations are presented, incl. in publications with an impact factor, with minimum requirements for at least 20 such citations. Thus, the requirements for citation are many times exceeded.

The candidate is a reviewer of two of the main abstract journals in mathematics: *Mathematical Reviews* and *Zentralblatt fuer Mathematik*, and has published dozens of reviews there.

Assoc. Prof. Dr. Hristo Kiskinov is a member of the Union of Mathematicians in Bulgaria and the American Mathematical Society.

He has participated with presentations and scientific reports at 9 international scientific conferences. He has also participated in the development of 10 national research projects in the field of mathematics and informatics.

6. Teaching activity of the candidate

The candidate Assoc. Prof. Dr. Hristo Kiskinov has lectured in 8 mathematical disciplines, mainly in the field of discrete mathematics. He also taught exercises in a number of mathematical disciplines until 2014. He was the research supervisor of three defending graduates at the Faculty of

Mathematics and Informatics of Plovdiv University "Paisii Hilendarski" and one successfully defended his PhD dissertation in 2017. He published two textbooks before receiving to the academic position of "Associate Professor" in 2014 and one textbook thereafter.

7. Contributions in the scientific works of the candidate

The topic of the candidate's scientific works is up to date, and the author shows in-depth knowledge of the problems under consideration. As is known, fractional differential equations are more suitable for modeling a number of real processes and dynamical systems than differential equations with ordinary derivatives. Therefore, the results presented by the candidate are applicable both in the theory of differential equations with fractional derivatives and in the mathematical modeling and control of real systems with complex behavior.

The contributions in the candidate's scientific works are diverse. I will briefly analyze only the works submitted for the competition, as well as the attached textbook. The papers (except for the textbook) are in English and all of them have been published in peer-reviewed journals. Each of the papers is indexed in at least one of the world's scientific databases Zentralblatt MATH, Mathematical Reviews, Web of Science and Scopus. Of the articles, 11 are in journals with a total impact factor of almost 16. Regarding quartiles, 4, 3, 1 and 3 of the works are in quartiles Q1, Q2, Q3 and Q4, respectively. Twenty of the papers are indexed in the World of Science database, 20 are indexed in the Scopus database, 9 are reviewed in the abstract journal Mathematical Reviews and 8 are reviewed in the abstract journal Zentralblatt MATH. From the above data and from the data for citations it can be seen that the works of the candidate are well known and highly appreciated by the scientific mathematical community both at home and abroad.

The works of the candidate submitted for the competition can be classified in three directions. The works in direction A. "Functional and real analysis" are 7, namely articles with numbers 3, 4, 5, 12, 13, 18 and 21. The exponential weighted dichotomy for linear differential equations with impulses in Banach spaces is studied. A fixed point theorem with application to such equations is proved, a class of abstract integral equations in metric space is studied and the properties of conformable derivatives in Banach spaces are studied. It is shown that an abstract function has a conformable derivative at a given point exactly when it has an ordinary derivative. As a consequence, conditions are obtained for the existence of a weak solution of a mixed problem for partial differential equations with conformable derivative. Other important properties of conformable derivatives have also been studied. Conditions for matching the left and right Caputo derivatives of a function in a given interval are found.

In direction B. "Fractional differential equations and systems with delayed argument" 14 works are presented: numbers 6, 7, 8, 9, 10, 11, 13, 14, 16, 17, 19, 20, 23 and 24. Sufficient conditions for the existence and uniqueness of the solution of different classes of fractional equations with different types of fractional derivatives and different types of initial conditions are found. Different types of stability (and mainly global asymptotic stability, which is an important characteristic of dynamical systems) of the solutions of these differential equations are also considered. Integral representations of the solutions are also obtained.

In the field of C. "Mathematical modeling and application of mathematics" three works are presented, namely 1, 2 and 15. Models of bioreactor with distributed delay are considered. Conditions have been found for the existence of a global solution of the respective model. These results are of great practical importance and can be used to manage relevant biological processes. Numerical simulations of the models in the computing environment of the Wolfram Mathematica system have been made.

The textbook No. 25 entitled "Introduction to Discrete Mathematics" is presented in the field of textbooks D. It is based on the author's lectures on Discrete Mathematics in several degree programs: Mathematics, Applied Mathematics, Business Mathematics, Informatics, Mathematics and Informatics, Informatics and Information Technology, Information Technology, Mathematics and Educational Management and Software Engineering. The textbook is an impressive educational manual of 341 pages and a bibliography of 74 titles. It is divided into an introduction and 6 chapters on the merits. Boolean functions, formal languages, finite state automata, abstract machines, and Post and Turing machines as computer models are considered. The textbook includes many examples and tasks, as well as graphic illustrations. Relevant solutions are presented for all tasks. The textbook is written at a strict and at the same time accessible level. I personally plan to recommend it to my students this school year.

The contributions described above are significant and have a scientific and applied nature. They can become the basis for new fundamental and applied research in the field of differential equations with fractional derivatives and their applications.

In the works of the candidate I have not found any illegal use (plagiarism) of foreign published results. As far as I can judge, the formulated contributions and the results obtained in the presented collective scientific papers are largely the personal work of the candidate.

8. Recommendations for future activities of the candidate

I recommend that future candidate's work include hyperlinks to the titles of the literature, including a digital object identifier (doi) of bibliographic journal articles, as well as an international standard number (ISBN) for cited books and monographs. It is also possible to consider the inclusion of internal hyperlinks to the formulas and individual parts of the book in a second edition of the useful textbook number 25 in the works submitted to the competition. This will be useful when using future online versions of the textbook. Here I will note that in my humble experience, for modern students the use of hyperlinks is an increasingly natural way to get acquainted with the scientific and educational literature.

As can be seen from the attached materials, the candidate presents himself as a graduate researcher in the field of differential equations and in particular equations with fractional derivatives and transformed argument. At the same time he is a teacher with significant experience in mathematics and computer science. Specifically, I recommend the author to summarize his research in the field of special classes of differential equations (and especially fractional differential equations) and to publish them in a monograph in English in a prestigious international or Bulgarian publishing house. Among the Bulgarian publishing houses with greater visibility are the publishing house of BAS "Hristo G. Danov", the publishing house of Sofia University "St. Kliment Ohridski ", as well as the publishing house of Plovdiv University " Paisii Hilendarski ", which published the textbook number 25. Experience has shown that writing a specialized monograph in a good publishing house in English dramatically improves the visibility of a scientific production the international scientific community.

CONCLUSION

From the above brief analysis it can be concluded that the candidate Assoc. Prof. Dr. Hristo Kiskinov fully meets the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for its implementation, as well as the additional requirements of the Faculty of Mathematics and Informatics to the University of Plovdiv "Paisii Hilendarski" for awarding the academic position "professor". All documents required by the current regulations are presented. The scientific works of the candidate have a total impact factor of 16 and

are reflected in the main scientific databases. The minimum requirements to the Law for the Development of the Academic Staff in the Republic of Bulgaria in terms of the number of scientific papers and textbooks have been reached, and in terms of citations these requirements these requirements have been exceeded many times over.

Due to the above facts and circumstances, I strongly recommend the Honorable Scientific Jury to propose to the Faculty Council of the Faculty of Mathematics and Informatics at Plovdiv University "Paisii Hilendarski" to award the candidate Assoc. Prof. Dr. Hristo Kiskinov academic position "Professor" in field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.5 "Mathematics (Mathematical analysis)".

26.02.2022 г.

Reviewer:

Prof. Mihail Konstantinov