S T A N D P O I N T

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on the materials applied in the competition for the occupation of for the academic position of "full professor"
in the field of higher education 4. Natural sciences, mathematics and informatics,
professional field 4.5 Mathematics (Mathematical analysis),
announced in State Gazette, no. 94 / 12.11.2021 and on the website of Plovdiv University "Paisii Hilendarski" for the needs of the Department of Mathematical Analysis at the Faculty of Mathematics and Informatics,

with the only candidate: Assoc. Prof. Hristo Stefanov Kiskinov, Ph.D.

The basis

By order № RD-21-298 of 10.02.2022 of the Rector of Plovdiv University "Paisii Hilendarski" (PU) I am included as a member of the scientific jury in the above competition for the academic position of "Full Professor" for the needs of the Department of Mathematical analysis at FMI.

1. General presentation of the procedure and the applicant

In the announced competition the only candidate is Assoc. Prof. Hristo Stefanov Kiskinov, Ph.D. He has submitted all the required legal documents to the present procedure. The minimum national requirements for holding the academic position of "professor" are met, according to the Regulations for the implementation of the current Law on the Development of Academic Staff in the Republic of Bulgaria, as well as the additional requirements of the FMI of the University. I accept all documents without remarks. The candidate is included in the list of habilitated persons with scientometric indicators in the Register of Academic Positions and Dissertations of NACID.

Assoc. Prof. Kiskinov defended his dissertation for the educational and scientific degree "Doctor" at PU in 2012, in the professional stream 4.5 Mathematics (Mathematical Analysis). His total work experience is over 32 years, which all is a pedagogical experience. From 1989 to 2014, he worked as an assistant, senior, and chief assistant at the FMI of PU. Since 2014 he has been an associate professor in the Department of Mathematical Analysis at the Faculty of Mathematics and Informatics at PU. Since 2019 he has been the head of the same department.

The candidate has active participation in 10 scientific and educational projects, and a number of participations with reports at scientific conferences and forums. He is a member of the Union of Bulgarian Mathematicians (UBM) and the American Mathematical Society

(AMS) and is an active reviewer of recognized mathematical journals, Mathematical Reviews, ZMath, and more.

2. Main scientific and scientific-applied contributions of the candidate

The conducted research and the results of Assoc. Prof. Dr. Hristo Kiskinov have been published in a total of 55 papers, of which 52 scientific articles, 2 textbooks, and one student's guide. Of his works, 25 are included in the current procedure, including 24 articles and one textbook. All submitted works have been published since 2014, after his habilitation as an associate professor. The large number of articles with impact factor (11) published in prestigious scientific journals such as *Mathematics*, with quartile Q1 (2 articles), *Fractal and Fractional*, Q1 (1 article), *Fractional Calculus and Applied Analysis*, Q1 (1 article), *The European Physical Journal Special Topics*, Q2 (1 article), *Filomat*, Q2 (2 articles), *Integral Transforms and Special Functions*, Q2 (1 article), and others, make an excellent impression. Ten articles in journals and conferences are presented for the competition, with impact rank and referenced in the Web of Science (Clarivate) and/or Scopus, as well as 3 other articles referenced in the databases of Zentralblatt für Mathematik and Mathematical Reviews. Assoc. Prof. Dr. Kiskinov has included in the documents a list of citations of his works, with a total of 131 references. Of these, 44 are in editions with an impact factor. I believe that the presented works and citations irrefutably show that the legal requirements and the additional requirements of the FMI of the Plovdiv University "Paisii Hilendarski" for the academic position "Professor" have been exceeded.

In its content, the research relates mainly to functional and real analysis, differential equations and some applications. The candidate has systematized his scientific results in three areas, which I accept.

The first area covers 7 works in the field of functional and real analysis. The fixed point theorem is proved for nonlinear operators in uniform spaces with a uniform structure of a saturated family of pseudometrics. An application for nonlinear abstract Volterra integral equations of the second kind is made. The exponential dichotomy of a homogeneous impulse equation in a Banach space is studied. Sufficient conditions have been found for the existence of Ψ-bounded solutions of a class of nonlinear perturbed impulse differential equations with a weighted Ψ-dichotomous linear part in an arbitrary Banach space. For a class of abstract integral equations with two nonlinear Volterra-type operators in metric spaces, sufficient conditions for the existence and uniqueness of their solutions are derived. The properties of conformable derivatives of different orders in Banach spaces are also studied. It has been proven that if a function has equal left-side and right-side fractional Caputo derivatives in a given interval, it is a constant.

In the second direction are presented 14 papers with results in fractional differential equations and systems with delayed argument. They are divided into two groups. The first group includes 9 publications that study delayed differential fractional systems. Explicit sufficient conditions for the global asymptotic stability of a linear fractional differential system with distributed delays, whose fractional derivatives are of the Riemann-Liouville or Caputo type, are derived. Autonomous linear systems with distributed delays and

distributed order fractional derivatives are also considered, as the existence, uniqueness, and a priori evaluation of the solution of the initial problem are proved. For fractional systems with Riemann-Liouville derivatives and distributed delays, the conditions for the existence and uniqueness of the solutions for setting different initial conditions with a physical aspect are derived. In particular, the case of an initial problem with non-continuous initial conditions, partially expressed by Riemann-Liouville fractional derivatives, is also considered. An integral representation of the solutions of a fractional system with distributed delays is obtained. In addition, an initial problem for fractional differential equations with a delay under a discontinuous initial function is studied. Asymptotic stability of the considered fractional systems with nonlinear perturbation was established. The conditions for the existence and uniqueness of the solutions of a fractional linear system with distributed delay and Caputo derivatives with rationally incommensurable differentiation orders and bounded Lebesgue measurable initial conditions are studied. The existence of an absolutely continuous fundamental matrix of a fractional linear system with distributed delays has been proved.

The other works from the second direction include five publications to study problems for neutral differential fractional systems. Explicit sufficient conditions for the existence and uniqueness of the solution of the initial problem for a neutral linear fractional differential system with distributed delays and fractional Riemann-Liouville and Caputo derivatives with rationally incommensurable differentiation orders are obtained. A general case of a nonlinear fractional delay system with a linear neutral part and variable delays has been studied in detail, and theorems for asymptotic stability of the solutions have been proved. A formula for integral representation of the general solution of a linear autonomous neutral system with several delays is proved. Sufficient conditions are obtained for the global asymptotic stability of the zero solution of a neutral linear system with nonlinear perturbation if the zero solution of the unperturbed neutral linear system is globally asymptotically stable. The influence of the memory on the asymptotic nature of the solutions of these systems has been studied. It was found that the conditions and the results obtained are similar to those in the case of delayed systems with integer derivatives.

The third area includes 3 articles in the field of mathematical modeling and application of mathematics. A new Monod-type model from population dynamics for a distributed delay bioreactor has been proposed, taking into account the influence of mortality on bacterial growth. The model is described by Cauchy's problem, for which the existence and uniqueness of a globally absolutely continuous solution under non-negative initial conditions has been proven. A similar approach has been applied to study the influence of delayed and instantaneous mortality in bacterial populations in periodic aerobic cultivation of microorganisms, and the influence of the amount of nutrient substrate in finite or infinite time periods. The third paper examines the saturation of a modified Weibull cumulative distribution function in the Hausdorff sense, with application in different fields.

The scientific works of Assoc. Prof. Dr. Kiskinov, presented for the competition, fully correspond to the professional field 4.5 Mathematics (Mathematical Analysis). In my

opinion, the obtained scientific results are original and at a very high scientific level. This is confirmed both by the quality of the publications and by a large number of citations in renowned publications with impact factor and impact rank. I declare that I have not found evidence of plagiarism.

3. Assessment of the candidate's pedagogical preparation and activity

Assoc. Prof. Dr. Kiskinov has extensive experience in teaching and learning. He has given lectures and exercises to full-time and part-time undergraduate students at FMI in the following disciplines: "Mathematical Fundamentals of Informatics"; "Discrete Mathematics", "Discrete Mathematics in Business", "Discrete Structures", "Theoretical Informatics", "Translation Methods", "Programming of Post and Turing Machines and Unsolvable Algorithmic Problems", "Chaos Theory and Computer Applications" and others. He is the author and co-author of two textbooks and a student's guide for FMI students. The textbook "Introduction to Discrete Mathematics" presented for this procedure is an excellent example of a correct and comprehensive presentation of the study material, supported by carefully selected tasks for exercises and solutions to them.

Assoc. Prof. Dr. Kiskinov conducts lectures and exercises at a high scientific and methodological level, applying the most modern active methods and tools in the teaching process. He has led three successfully defended FMI graduates.

He was the research supervisor of a successfully defended doctoral student at FMI in the professional field of 4.5 Mathematics.

The candidate has participated in 9 research projects, many of which are international.

The highest assessment can be given for his pedagogical preparation and activity.

4. Critical notes and recommendations

I have no significant critical remarks. I can recommend to Assoc. Prof. Dr. Kiskinov, in his future work, to publish his main scientific results in a monograph.

CONCLUSION

After getting acquainted in detail with the submitted documents on the procedure, scientific papers, scientometric indicators, and teaching activities of the candidate, I believe that all criteria of the minimum national requirements of ZRASRB and the Rules of ZRASRB on the professional field of the competition and additional FMI requirements of PU are fulfilled. This gives me grounds to give a general **positive assessment** of the candidate and propose Assoc. Prof. Dr. Hristo Stefanov Kiskinov to take the academic position of "full professor" in the professional field 4.5 Mathematics (Mathematical Analysis), for the FMI at the University of Plovdiv "Paisii Hilendarski."

Date: 09 March 2022 **MEMBER OF THE SCIENTIFIC JURY:**

Plovdiv **/Prof. Snezhana Gocheva-Ilieva, D.Sc./**