REVIEW

from Vasil Georgiev Angelov, D.Sc., Ph.D.,
Professor at the University of Mining and Geology "St. Ivan Rilski"

of the materials submitted for participation in the competition
for the academic position of **"professor"**
at Plovdiv University "Paisii Hilendarski"

by: field of higher education 4. Natural Sciences, Mathematics and Informatics,
professional field 4.5 Mathematics;
Mathematical Analysis

In the competition for "professor", announced in the State Gazette, issue 94 of 12.11.2021 and on the website of Plovdiv University "Paisii Hilendarski" for the needs of the Faculty of Mathematics and Informatics, as the only candidate is Assoc. Prof. Hristo Stefanov Kiskinov, PhD, from Plovdiv University "Paisii Hilendarski".

1. General presentation of the received materials

By order № RD-21-298 of February 10, 2022 of the Rector of Plovdiv University "Paisii Hilendarski" (PU) I was appointed a member of the scientific jury of the competition for the academic position "Professor" in PU in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5 Mathematics, Mathematical Analysis, announced for the needs of the Faculty of Mathematics and Informatics (FMI). The only candidate for participation in the announced competition has submitted documents: Assoc. Prof. Dr. Hristo Stefanov Kiskinov from the University of Plovdiv. The set of paper materials presented by Assoc. Prof. Kiskinov is in accordance with the Regulations for the Development of the Academic Staff of the University of Plovdiv and includes all the necessary documents. To participate in the competition, Assoc. Prof. Hristo Kiskinov has submitted a total of 24 scientific publications and one textbook, not used in previous procedures.

2. Brief biographical data

Assoc. Prof. Hristo Kiskinov, PhD, completed his higher education - a full 5-year course in Mathematics and Informatics at FMI at the University of Plovdiv "Paisii Hilendarski" in 1988. In 2012 he defended his dissertation on *"Ordinary differential equations with dichotomous-like linear part in Banach spaces"* and research supervisor Prof. Stepan Kostadinov, D.Sc.

From 1989 to 2014 he passed all the degrees of assistant, and from 2014 he is Associate Professor at the Faculty of Mathematics at the University of Plovdiv at the Department of Mathematical Analysis. Since 2019 he has been the head of the Department of Mathematical Analysis.

3. General characteristics of the candidate's activity

Evaluation of educational and pedagogical activity

The educational and pedagogical activity of the candidate is related to the education of students of bachelor's and master's specialties at the Faculty of Mathematics and Informatics at the University of Plovdiv "Paisii Hilendarski" and the education of doctoral students at FMI. Over the years, Assoc. Prof. Kiskinov has given lectures and exercises in various disciplines at the FMI, most of which are lecture courses created by him. Due to the knowledge of Assoc. Prof. Kiskinov in the field of informatics, the mathematical disciplines led by him are distinguished by the accessibility of the exhibition for students in various computer science specialties. Assoc. Prof. Kiskinov is the research supervisor of Magdalena Assenova Veselinova, who successfully defended in 2017 a PhD-Thesis on "Fractional differential equations with distributed delay" for obtaining the educational and scientific degree "Doctor" (PhD), field of higher education: 4. Natural Sciences, Mathematics and Informatics; professional field 4.5. Mathematics; doctoral program Differential equations. The extracurricular activities of the candidate also include scientific guidance of a number of graduates, as well as numerous written reviews of diploma theses.

The candidate Assoc. Prof. Hristo Kiskinov is the only author of the textbook presented for the procedure, published by Plovdiv University Publishing House. The textbook "Introduction to Discrete Mathematics" is written on the basis of the lectures given by the author on "Discrete Mathematics" for the specialties Mathematics; Applied Mathematics; Business mathematics; Informatics; Mathematics and Informatics; Mathematics, Informatics and Information Technology, Information Technology, Mathematics and Educational Management; as well as in "Discrete Structures" for the specialty of Software Engineering at FMI at the University of Plovdiv "Paisii Hilendarski".

The content of the textbook, set out in 340 pages, consists of an introduction, 6 chapters and a bibliography of 74 titles. The presented curriculum is presented in six chapters. The textbook includes those sections of discrete mathematics, which according to the author are most related to computer science. Boolean functions, formal languages, generating grammars, regular expressions, abstract machines without and with external memory are considered sequentially. Special attention is paid to Post and Turing machines in their role as models of computing machines and their use in the formulation and study of the solvability of classes of algorithmic problems. It is characteristic that there are many examples and solved tasks directly related to the presented material, as well as their good graphic presentation.

Evaluation of scientific and applied research activities

The overall volume of the scientific works of the candidate Assoc. Prof. Kiskinov includes a total of **55** works, of which **52** scientific publications, **2** textbooks and **1** textbook in electronic format. To participate in this competition, he has selected **24 scientific publications** and **1 textbook**, which are not presented for the acquisition of the educational and scientific degree "Doctor" (2011), or for the academic position of "Associate Professor" (2014).

From the presented **24** scientific publications:

- ✓ all 24 are in English;
- ✓ all 24 have been published in peer-reviewed journals;
- ✓ each of the presented 24 publications is indexed in at least one of the leading world-famous databases with specialized scientific information (Web of Science, Scopus, Zentralblatt Math, Mathematical Reviews);
- ✓ 11 are in journals with impact factor (IF), total IF = 15.875, of which 4 are in Q1; 3 are in Q2; 1 is in Q3 and 3 are in Q4;
- ✓ 20 are indexed in the Web of Science;
- ✓ 20 are indexed in SCOPUS, of which all 20 have SJR, total SJR = 8.752;
- ✓ 8 are referred to in Zentralblatt Math;
- ✓ 9 are referred to in Mathematical Reviews;
- ✓ all 24 published papers are co-authored, and the total number of co-authors in the articles is as follows: in 5 are 2, in 10 are 3 and in 9 are 4.

In addition, it can also be noted that Assoc. Prof. Hristo Kiskinov, PhD:

- ✓ has participated in 2 national, 2 regional and 6 university research projects;
- ✓ has participated with scientific reports at 9 international conferences;
- ✓ is a referent of Zentralblatt Math with 19 references written so far;
- ✓ is a referent of Mathematical Reviews with 33 references written so far;
- ✓ is the author of 15 reviews verified in Publons;
- ✓ is a member of the Union of Mathematicians in Bulgaria (UMB) and the American Mathematical Society (AMS).

Contributions (scientific and applied) and citations

I agree with the self-assessment of the candidate that thematically the main scientific and scientific-applied contributions of the candidate in the presented scientific papers can be divided into three main areas.

The first direction - Functional and Real Analysis, includes the works [3] - [5], [12], [18], [21] and [22]. Of these, articles [4] and [5] are devoted to studies of impulse differential equations in Banach spaces, article [3] on a new fixed point theorem in uniform spaces, article [12] on the study of a class of abstract integral equations with two nonlinear operators in metric space, the paper [22] on the study of the properties of conformable derivatives in Banach spaces, the paper [18] on the study of some important properties of conformable derivatives, and the paper [21] on the possibility of Caputo's left and right derivatives to coinside on a given interval.

The second area is devoted to research on fractional differential equations and systems with delayed argument and includes articles [6] - [11], [13], [14], [16], [17], [19], [20], [23] and [24]. For fractional differential equations and systems in the different articles, sufficient conditions are obtained for the existence and uniqueness of the solutions of different types of systems - of delayed type (articles [7], [8], [10], [13], [14], [16], [17], [20] and [23]) or neutral type (articles [6], [9], [11], [19] and [24]), linear or non-linearly disturbed, autonomous or non-autonomous, under different types of initial conditions (including or not derivatives in Riemann-Liouville sense). The studies were performed for different classes of initial functions (continuous,

partially continuous, measurable by Lebesgue, etc.) and for systems with different types of fractional derivatives (Riemann-Liouville, Caputo, Caputo distributed order). Different types of conditions (theoretical, explicit) for different types of stabilities (global asymptotic stability, finite time stability) are obtained. For different fractional differential systems, the existence of fundamental matrices of the corresponding homogeneous systems has been proved, their properties have been studied and integral representations of the solutions have been obtained. In all studied systems, the fractional derivatives have different orders of differentiation, and they are allowed to be rationally incommensurable. The incommensurable order of fractional derivatives means that, unlike many fractional systems studied, the order of fractional derivatives is not the same for the whole system, and moreover, the different orders of fractional derivatives are not just rational numbers, which would allow a common denominator to be found (an approach widely used in some foreign studies).

In the third direction - Mathematical Modeling and Application of Mathematics, the articles [1], [2] and [15] can be included. Article [1] presents a new Monod model for a bioreactor. The main advantage of the proposed model is the ability to account the impact of mortality on the growth of bacterial populations over the entire interval of their average life expectancy through a distributed delay. Under these assumptions, the Cauchy problem is formulated for the considered model and it is proved that it has only a globally absolutely continuous solution under non-negative initial conditions. The dynamics of growth of bacterial populations was also studied. Article [2] offers a generalization of the classic Monod model of a bioreactor, taking into account the effects of delayed and instantaneous mortality in bacterial populations. This model is analyzed in terms of adequacy and applicability for simulation of the process of periodic aerobic cultivation of microorganisms (bacteria, yeast). In the paper [15], a modified Weibull cumulative distribution function is considered and the important "saturation" characteristic for this function in the Hausdorff sense is investigated.

My general impression of the scientific and applied scientific contributions is that they are new and meaningful.

The presented list of noted citations includes **131** citations of 19 scientific papers. From these citations, **66** are in journals indexed in Web of Science and/or Scopus. The citations are essential and are not explicit or implicit self-citations. All 131 citations had not been used by the candidate in previous procedures.

The **Hirsh index** of the candidate (without self-citation) **in Scopus is 5**, which is a very good certificate for his scientific work.

Regarding ***the minimum national scientometric requirements*** for holding the academic position "Professor": According to indicator A, the candidate has 50 points from a dissertation for PhD "Doctor" with a minimum requirement of 50 points (overfulfillment is not possible here). According to indicator B, the candidate has 303 points, received from presented scientific publications in journals, referred to in the world-famous databases, with a minimum requirement of 100 points (ie overfulfillment 303%). According to indicator G, the candidate has 684 points, received from presented scientific publications in journals, referred to in the world-famous databases, with a minimum requirement of 200 points (ie overfulfillment 342%). According to indicator D, the candidate has 528 points, obtained from evidence presented for citations in scientific publications in journals referred to in world-famous databases, with a minimum requirement of 100 points (ie overfulfillment 528%). According to indicator E, the candidate has

110 points, collected by the scientific supervision of a successfully defended PhD student, a presented textbook and participation in 2 national research projects, with a minimum requirement of 100 points (ie overfulfillment 110%). This review shows that all requirements have been met and even significantly exceeded.

Regarding ***the additional requirements of FMI*** for holding the academic position "Professor": 24 publications and 1 textbook are presented, with a minimum requirement of 20 publications and 1 textbook. Of these publications, 24 are in peer-reviewed journals, with a minimum requirement of at least 12 to be in journals. 11 articles have been published in impact factor journals, with a minimum requirement of 8. Evidence is provided for 131 citations, with minimum requirements for at least 20 citations. There is a scientific supervision of one successfully defended PhD student, with a minimum requirement of 1 defended PhD student. This review shows that all additional requirements are met, and not at minimum.

4. Assessment of the personal contribution of the candidate

Despite the fact that the presented publications are co-authored, there is no doubt about the personal participation and contribution of the candidate in the scientific papers submitted for the competition. I did not find any evidence of plagiarism.

5. Critical remarks and recommendations

I have no remarks or recommendations to the candidate.

6. Personal impressions

I have known Hristo Kiskinov for ten years professionally and I have good impressions of his results and wide scientific interests. Assoc. Prof. Dr. Hristo Kiskinov is an established scientist and specialist in the field of differential equations and mathematical analysis. He is a supervisor of a successfully defended PhD student.

CONCLUSION

The documents and materials presented by Assoc. Prof. Hristo Kiskinov, PhD meet all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZRASRB), the Rules for Implementation of ZRASRB and the relevant Rules of Paisii Hilendarski University.

The candidate in the competition has submitted a sufficient number of scientific papers published after the materials used in the defense of the PhD and the competitions for the academic positions of "Chief Assistant" and "Associate Professor". In the works of the candidate there are original scientific and applied contributions that have received international recognition, which is unequivocally evidenced by the large number of citations. His theoretical developments have practical applicability, and some of them are directly oriented to the educational work. The scientific and teaching qualification of Assoc. Prof. Dr. Hristo Kiskinov is undoubted.

The results obtained by Assoc. Prof. Kiskinov in the teaching and research activities exceed the minimum national requirements and the additional requirements of the FMI, adopted in connection with the Regulations of the PU for application of ZRASRB.

Based on the written above, I give my **positive assessment** and **recommend** the Scientific Jury to propose to the Faculty Council of the Faculty of Mathematics and Informatics to elect Assoc. Prof. Hristo Stefanov Kiskinov, PhD to the academic position of **"Professor"** at Paisii Hilendarski University of Plovdiv in: field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5 Mathematics (Mathematical analysis).

28.03.2022 г. **Reviewer:** .....

. **Prof. Vasil Angelov, D.Sc., Ph.D**