REVIEW

By Prof. Nikolay Veselinov Kyurkchiev, PhD,
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On the materials submitted for a participation in the competition for an occupation of the academic position "Associate Professor" in the University of Plovdiv "Paisii Hilendarski" On Research area 4. Natural Sciences, Mathematics and Informatics, Professional field 4.5. Mathematics (Probability theory and mathematical statistics), announced in Newspaper of State, No 99 from 20.11.2020 and on the web site of the University of Plovdiv "Paisii Hilendarsi" for the needs of the Department "Mathematical Analysis" within the Faculty of Mathematics and Informatics, where **Petar Ivanov Kopanov**, PhD, an Assistant Professor in the University of Plovdiv "Paisii Hilendarski" participates as a candidate **– the only one candidate.**

By Order No P33-636/19.02.2021 of the Rector of the University of Plovdiv "Paisii Hilandarski" I was appointed as a member of the Scientific Jury of the competition for the occupation of the academic position "Associate Professor" in the University of Plovdiv "Paisii Hilendarski", On Research area 4. Natural Sciences, Mathematics and Informatics, Professional field 4.5. Mathematics, Scientific specialty "Probability theory and mathematical statistics", for the needs of the Department "Mathematical Analysis" within the Faculty of Mathematics and Informatics.

The set of materials presented by Petar Kopanov in electronic format complies with the Rules for the Development of the Academic Staff of Plovdiv University "Paisii Hilendarski".

The candidate Chief Assistant Petar Kopanov applied with 18 scientific publications and 2 textbooks for university students.

The presented articles are published in: 6 journals with Impact Factor (with a total summing IF=3.768 – according to Web of Science), 2 of them are ranked with - Q1, 1 of them is ranked with – Q3 and 3 of them are ranked with – Q4 (according to Web of Science).

All other scientific articles are published in journals and works of international and national conferences.

The candidate applies with two textbook (University Publisher "Paisii Hilendarski" – Plovdiv) and with two electronic aids (Student Olympiads in Mathematics and Student Olympiads in Computer Mathematics 2014-2020).

The presented publications are articles published after the acquisition of the academic title "chief assistant" 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 University of Plovdiv “Paisii Hilendarski” and the additional requirements of the Faculty of Mathematics and Informatics at University of Plovdiv “Paisii Hilendarski”.

APPLICANT'S KEY SCIENTIFIC AND APPLIED RESEARCH RESULTS ARE:

The candidate has grouped the scientific papers presented in the competition in several thematic areas as follows:

- Research in the field of Probability Theory;
- Applications of Probability Theory in Differential Equations;
- Applications of Probability Theory in (sociology, medicine and other fields of scientific knowledge).

Articles [4], [5], [12], [17] are connected with the first listed above theme, articles [1], [2], [3], [6], [7], [8], [9] are connected with the second listed above theme, and in the 3rd direction - the other articles from the attached list of works for participation in the competition..

In my opinion, the applicant's main scientific and applied research results are the following:

1. The results obtained for analysis of Lin’s condition for functions of random variables and moment determinacy of probability distributions (Kopanov, Stoyanov [4]).

The authors present a general statement and corollaries telling us that Lin’s condition is preserved for frequently used nonlinear transformations known in the literature as Box-Cox transformations. Lin’s condition for products of random variables is also studied.

The results find applications in many scientific fields, including population dynamics, bacterial growth, population ecology, plant biology and statistics.

New conditions allowing to check whether a distribution is uniquely determined by its moments or not are obtained in [5];

2. Detailed studies on the properties of a cumulative distribution function that is related to the Bernoulli process and a generalization of the Cauchy probability distribution ([12], [17]);

3. One of the most significant goals of any insurance risk activity is to achieve a satisfactory model for the probability distribution of the total claim amount.
Based on the exponential distribution A. K. Erlang used the stage method to construct the so–called Erlang distribution function of order k. Some results for Erlang distributed moments of impulses are given by Agarwal, Hristova, O’Regan, Kopanov in [7]. Some related problems – properties of solutions based on properties of Gamma distribution are studied by R Agarwal, S Hristova, P Kopanov, D O'Regan in [3].

The results are relevant for applied insurance mathematics and are intended for the actuary when preparing the strategy “Insurance responsibility”.

In addition, the results obtained in this direction can be successfully applied to new modifications and G-generalized families of the mentioned Erlang and Gamma distributions.

Issues related to the existence, uniqueness and stability of the solutions of different types of differential equations with impulses are also studied, as these impulses occur at random moments.

This is one of my reasons to give a high assessment of the work of the candidate in the conditional second direction.

This is also my specific proposal to the candidate - to continue his research in this scientific field.

4. In the article [14] a well-known test of the signs is applied in order to prove the successful effect of a new specific method of treatment. In the specific study with this test were obtained values of the so-called p-values (probabilities, the differences between the control and experimental groups are random), which are extremely small (between 10^{-9} and 0.00006) and exclude the possibility of success of the new method of treatment to be random.

I have not found **"plagiarism"** in the candidate's works within the meaning of the Law on the Development of the Academic Staff in the Republic of Bulgaria.

The candidate has submitted a reference for 16 citations, of which in Web of Science and /or SCOPUS - eight.

Petar Kopanov participated in International Research Project in the period 2007-2010. He has participated with 7 reports on international and scientific forums.

The applicant has referred to the development of 2 lecture courses for the needs of the Faculty of Mathematics and Informatics at the University of Plovdiv "Paisii Hilendarski".

Remark. During the preparation of my review, I have found that the list of citations is actually larger than the presented one. For example:

Publication No 3 from the presented list of publication for a participation in the procedure is cited also in the articles:

A. Dobreva, Finite time stability for neural networks with supremum, AIP Conf. Proc. (2021); **SJR:=0.190**;

Vinodkumar, A. et al., Exponential stability of random impulsive pantograph equations, Math. Methods in the Appl. Sci., (2021)

The publications: No No 7, 6, 8, 9, 1 from the presented list of publication for a participation in the procedure are cited in the article:

A. Dobreva, Finite time stability for neural networks with supremum, AIP Conf. Proc. (2021); **SJR:=0.190**.

Thus the real impact of the citations is relatively high. All that has been said so far shows that the minimum requirements have been significantly exceeded on this criterion. In general, the minimal national requirements for required points by groups of indicators for the academic position of "Associate Professor" have been satisfied.

Regarding the Additional faculty requirements of FMI at the University of Plovdiv, in the part: activities related to the scientific development of doctoral students, graduates and students and activities for discovering and supporting young talents, I would say that Dr. Petar Kopanov, for a long period of time actively participates in the training of young talents and is the leader of the teams for participation in national competitions and Olympiads.

His efforts in this direction are highly appreciated by the scientific board and the Management of FMI at PU.

CONCLUSION

From all that has been said so far for the candidate's presented documents in the competition it is clear that he have obtained enough in quantity scientific contributions.

Taking into account the long-standing and very good teaching and lecturing activity, I am fully convinced that Assistant Professor Petar Kopanov meets 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" and the additional requirements of the Faculty of Mathematics and Informatics at University of Plovdiv "Paisii Hilendarski" to occupy the academic position "Associate Professor".

All this gives me reason to give my **positive assessment and to recommend to the Scientific Jury to prepare a report-proposal to the Honorable Scientific Faculty Council of the Faculty Mathematics and Informatics for the election of Assistant Professor Petar Kopanov, PhD for the academic position "Associate Professor"** in Plovdiv University "Paisii Hilendarski" on Research area 4. Natural Sciences, Mathematics and Informatics, Professional field 4.5. Mathematics (Probability theory and mathematical statistics).

01.04.2021 Signature: .....

/ Prof. Nikolay Kyurkchiev, PhD /