

OPINION

on a competition for an academic position "Associate Professor" in a professional direction 4.5. Mathematics (Mathematical Logic), for the needs of Sofia University "St. Kliment Ohridski ", Faculty of Mathematics and Informatics , Announced in SG issue 87, 19-10-2021 and on the websites of FMI and Sofia University.

The opinion was prepared by: prof. dr. of mat. Dimitar Ivanov Vakarelov, pensioner, member of the extended staff of the Department of Mathematical Logic and Applications at the Faculty of mathematics and informatics of SU St. Kliment Ohridski in his capacity as a member of the scientific jury of the competition according to the Order of the Rector of Sofia University PA 38-591/10.12.2021

Only one candidate has submitted documents for participation in the announced competition: Ch. Assistant Professor Dr. Ivan Dimitrov Georgiev

I. General description of the submitted materials

1. Documents. The candidate presents all the necessary documents meeting the requirements of the corresponding law and the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at Sofia University "St. Kliment Ohridski "

2. Details of the candidate. In 2007 Ivan Georgiev graduated with honors in Informatics at FMI, Sofia University "St. Kliment Ohridski" (Bachelor of Informatics) and in 2009 he also graduated with honors from the Department of Mathematical Logic at FMI. Dimitar Skordev, he prepared a dissertation (doctor) in the field of constructive analysis on "Subcursive computability in analysis", which he defended in 2016. Since 2009 he has been working at the Asen Zlatarov University, Burgas as an assistant and chief assistant since 2016) in mathematics. He has also worked as a part-time guest lecturer at FMI, lecturing on constructive analysis (2018, 2019) .He is the winner of the award for research and scientific achievements in the field of computer science and mathematical logic in the name of Prof. Ivan Soskov (2014) He is a member of the following international scientific organizations: Computing in Europe (CIE), Computability and Complexity in Analysis (CCA) and the Association of Symbolic Logic (ASL). **3. General characteristics of the scientific works and achievements of the candidate.** The topic in which Ivan Georgiev has been working since the time of his specialization in the department and his doctoral studies is constructive analysis or, as he himself formulates it - complexity and computability in analysis. He has published a total of 20 articles so far, 7 of which are in journals with impact factor, 9 are independent and the rest in combination with other authors. This number, which has been realized for a period of 10 years, speaks of a stable scientific activity. In addition, 4 of his publications have a total of 12 citations, which, despite the short period of publication of the relevant titles, also shows that his results resonate and are continued in the research of other authors. Some of Georgiev's publications are in professional prestigious journals such as: Annals of

Pure and Applied Logic (3 articles), Logical Methods in Computer Science, Mathematical Logic Quarterly, Journal of Logic and Computation, Computability in Europe series (3 articles), Logical Methods in Computer Science, Mathematical Logic Quarterly, Journal of Logic and Computation, Computability in Europe series (3 articles).

3. General characteristics of the scientific works and achievements of the candidate. The topic in which Ivan Georgiev has been working since the time of his specialization in the department and his doctoral studies is constructive analysis or, as he himself formulates it - complexity and computability in analysis. He has published a total of 20 articles so far, of which 7 are in journals with an impact factor, 9 are independent and the rest in combination with other authors. This number, which has been realized for a period of 10 years, speaks of a stable scientific activity. In addition, 4 of his publications have a total of 12 citations, which, despite the short period of publication of the respective titles, also shows that his results leave a resonance and are continued in the research of other authors. Some of Georgiev's publications are in professional prestigious journals such as: Annals of Pure and Applied Logic (3 articles), Logical Methods in Computer Science, Mathematical Logic Quarterly, Journal of Logic and Computation, Computability in Europe series (3 articles).

4. Brief description of the works submitted for the competition and the scientific contributions of the candidate in them. Ivan Georgiev presents 8 publications for participation in the competition, of which numbers 2, 3, 5 and 8 are independent and the rest are co-authored. Georgiev groups the articles on 3 topics: (I) Subcursive representation of irrational numbers, (II) Uniform and conditional computability of real functions, and (III) Multidimensional intuitionistic fuzzy quantifiers.

On topic (I) are articles 1 and 4, which are co-authored:

[1] Georgiev, I., Kristiansen, L., Stephan, F., Computable irrational numbers with representations of surprising complexity.

[4] Georgiev, I., Kristiansen, L., Stephan, F., On General Sum Approximations of Irrational Numbers.

They are devoted to various representations of irrational numbers in natural subrecursive classes that do not allow unlimited search. Georgiev mentions the reason for writing the relevant articles: in 2017 he was a reviewer of 4 and found a number of inaccuracies, which he managed to eliminate. Then, at the suggestion of the authors, they published 4 together and later 1 as an extended version of 4.

On topic (II) are articles 2, 3, 5 and 8, which are independent. Article

[2] Georgiev, I., Uniform and Conditional M^2 -computability of Some Nonelementary Real Functions

is devoted to the complexity of real numbers and real functions in the subrecursive class M_2 , which consists of polynomially bounded and Δ_0 definable total functions in natural numbers. The article

[3] Georgiev, I., On subrecursive complexity of integration

is devoted to the complexity of the operator for integration in the subrecursive class M_2 . In the publication

[5] Georgiev, I., Characterization theorem for the conditionally computable real functions,

a characterization theorem for conditional computability is proved, which expands Prof. Skordev's result for uniform computability of real functions. The article [8] Georgiev, I., Fast Converging Sequence to Euler-Mascheroni Constant is an application of Article 3 on the M_2 -computability of the Euler-Mascheroni constant, which is a solution to an open problem of about 10 years.

Topic (III) is a new topic for Georgiev and is in the field of the logic of fuzzy sets. Research on this topic is included in the articles

[6] Atanassov, K., Georgiev, I., Szmidt, E., Kacprzyk, J., Multidimensional Intuitionistic Fuzzy Quantifiers and Level Operators,

[7] Atanassov, K., Georgiev, I., Szmidt, E., Kacprzyk, J., Multidimensional Intuitionistic Fuzzy Quantifiers.

The results obtained are under contract DFNI-I02 / 5 under the guidance of the first of the co-authors together with participants from abroad. Georgiev participated in the contract as an expert in mathematical logic. 3 groups of multidimensional quantifiers with semantics of fuzzy logic are introduced. The results are motivated by applications in artificial intelligence of decision-making tasks.

5. Critical remarks and recommendations. I have no critical remarks or recommendations on the papers submitted for review.

6. Personal impressions of the candidate. I have known Ivan Georgiev since he was a student at FMI and as a specialist at the department. He was one of the most distinguished and active and excellent students I know. His attitude toward the subject he was listening to was an expression of impressive diligence: he processed his notes most carefully on a computer, and by the end of the course he was ready for an exam. And he did this in every subject, which showed his deep interest and love for mathematics. To this day, I keep some of his notes and recommend them to my students as help material.

II. Conclusion on the application

After getting acquainted with the materials and scientific papers presented in the competition and based on the analysis of their importance and scientific contributions contained in them, I confirm that scientific achievements meet the requirements of the Bulgarian law, Rules for its application and the relevant Rules of

Sofia University " St. Kliment Ohridski" for holding the candidate for the academic position " Associate Professor" in the scientific field and professional direction of the competition. In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been established in the scientific papers submitted at the competition. **I give a high positive assessment of the application.**

CONCLUSION. Based on the above, I recommend to the esteemed scientific jury to propose to the competent body for the selection of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski "Ch. Assistant Professor Dr. Ivan Dimitrov Georgiev to be elected and to take the academic position of "Associate Professor" in the professional field 4.5. Mathematics (Mathematical logic).

Sofia, 03.02.22

Prepared the opinion:

Prof. Dr. of Mat. Prof. Dimitar Vakarelov