

# STATEMENT

on the competition for the academic position

“Associate Professor”

in professional field 4.5 Mathematics (Mathematical Logic),

at Sofia University “St. Kliment Ohridski” (SU),

Faculty of Mathematics and Informatics,

announced in State Gazette No.105/11.12.2020 and the internet sites of FMI and SU

This statement is written and submitted by Assoc. Prof. Trifon Anchev Trifonov — FMI, professional field 4.6. Informatics and Computer Science (Programming), appointed to the academic jury for this competition by the Rector of SU in accordance with Order ПД 38–84/10.02.2021.

A **single candidate** has submitted an application for this competition:

- Assist. Prof. Stefan Vladimirov Gerdjikov, PhD, FMI

## I. General Description of the Submitted Documents:

### 1. Application Details

The documents submitted by the candidate are in full compliance with the requirements of the Academic Staff Development Act (ZRASRB), the Regulations Act for the Implementation of ZRASRB (PPZRASRB), and the Regulations Act about the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at SU (PURPNSZADSU).

For the purposes of the competition Assist. Prof. Stefan Vladimirov Gerdjikov, PhD has presented a total of 9 titles, including 9 publications in domestic and international scientific issues and conferences.

The candidate has not submitted any further documents in addition to the documents required by way of procedure.

### 2. Short Biographical Data

Stefan Gerdjikov’s academic career begins in 2005 when he was employed as a researcher at the Technical University of Karlsruhe while being an exchange student within the Erasmus programme. After successfully completing his Bachelor’s degree at FMI he was appointed an Assistant Professor at the department of Computer Informatics at the faculty and simultaneously obtained a Master’s degree in Informatics in the Master’s programme “Logic and algorithms”. In 2009 he was admitted as a doctoral student at the department of Mathematical Logic and Applications and soon afterwards started work as a programmer at the Institute of Information and Communication Technologies (IICT) at the Bulgarian Academy of Sciences. In 2012 Stefan Gerdjikov returned to FMI as a mathematician, and soon afterwards was appointed an Assistant Professor at the department of Mathematical Logic and Applications. After successfully obtaining a doctoral degree in 2014 he was appointed a Chief Assistant Professor at FMI and a Marie-Curie Fellow at the Center for Information and Language Processing at the Ludwig-Maximilians-Universität München. Since 2016 he is also a part-time Chief Assistant at IICT.

During the period 2009–2013 Stefan Gerdjikov participated in four scientific projects, two of which were international and with European financing. As a student he ranked

second and third on Bulgarian and international competitions in Mathematics, and for his achievements was awarded the order of “Kliment Ohridski” from FMI. It is quite impressive that the candidate is fluent in five foreign languages, for two of which he holds internationally recognized certificates.

### 3. General Evaluation of Scientific Work and Professional Achievements

The scientific research of Assist. Prof. Stefan Vladimirov Gerdjikov, PhD is focused almost entirely in the field of Computer Linguistics, more specifically in efficient algorithms for processing of formal languages. His first results in this field date as back as 2012, and 15 of his total of 16 publications are in this area. The major problems studied by the candidate are:

- the development of new algorithms and the improvement of existing ones for solving a variety of problems related to formal languages, including exact and approximate word search in a dictionary, correction of texts, and construction of efficient representations of dictionaries;
- the development of efficient constructions of finite-state machines (automata, bi-machines, sequential and subsequential transducers), representing sets of words (languages) and transformations over words;
- the characterization of algebraic properties of monoids, which allow the efficient representation of machines and functions operating on them (e.g. via minimization, determinization, or sequentialization).

After a detailed review of the submitted scientific publications I confirm that:

- a) the submitted publications are in full compliance with the minimal national requirements under Art. 2B (2) and (3) of ZRASRB, as well as with the additional requirements of SU for the academic position “Associate Professor” in the professional field of this competition;
- b) none of the submitted publications have been submitted in a preceding procedure for acquiring a scientific title or an academic position;
- c) there is no lawful evidence for plagiarism in the submitted publications.

### 4. Description and Evaluation of Teaching Activities

Stefan Gerdjikov was a lecturer in 7 courses in different Bachelor’s and Master’s programmes at FMI, 3 of which are compulsory and 4 are elective. Additionally, the candidate has been teaching exercises on a total of 15 courses, 10 of which are compulsory or compulsorily-elective, and 5 are elective. Most of these courses are among the fundamental Theoretical Computer Science disciplines that are of major importance for the specialties in the field of Informatics and Computer Science at FMI. Despite not specifically mentioned in the candidate’s CV, I happen to know that he had a significant contribution in the designing of the curriculum of at least two of the elective courses he has been lecturing. It is clear that Stefan Gerdjikov is well-prepared to teach not only theoretical mathematical courses, but also practical courses in programming, which makes him an extremely valuable member of FMI’s teaching staff. Impressively, he is also the head and one of the creators of the Master’s programme “Computer Linguistics” at FMI, which is known to provide its graduates with an excellent training both in theoretical and practical concepts.

In addition to his teaching activities at FMI, in the past 13 years Stefan Gerdjikov has actively participated in the training of the national team in Mathematics, being its coach and co-coach in the past two years. He had previously also led FMI’s team participating in the International Mathematics Competition for University Students.

The candidate was an advisor to one Master student and consultant to two other Master students, all three having successfully defended their theses. He was also member of the programme committees of two editions of an international conference held in Bulgaria.

## 5. Analysis of the Content of the Theoretical and Applied Contributions Described in the Submitted Publications

For the purposes of the competition a total of 9 papers have been presented, including:

- 4 in prestigious journals with Impact Factor [B.3,Γ.1,Γ.2,Γ.3];
- 5 in conference proceedings with SJR [B.1,B.2,B.4,Γ.4,Γ.5].

It is important to note that the papers are published in a variety of journals and proceedings with only two of them published in the proceedings of the same conference. The candidate is the sole author of [B.1] and [B.4], and in the other 7 papers he is a co-author. All publications included a hyperlink to an electronic version.

The presented report for compliance with the minimal national requirements includes information for a total of 17 citations of the papers [Γ.1,Γ.2,Γ.4,Γ.5] with a wide variety of referencing authors. The presented papers and citations significantly exceed the required minima for the position of Associate Professor.

The candidate has provided an exceptionally detailed description of his scientific contributions in the presented publications, taking an extreme care to describe the contribution of individual authors as objectively and impartially as possible. To this end he has provided a detailed chronological account of the research activities leading up to each respective publication. In my personal opinion, in his efforts to be objective Stefan Gerdjikov has inadvertently understated his own contribution in the joint works presented for the competition.

The scientific contributions of the candidate could be summarized as follows:

- efficient bimachine constructions [B.2,B.3];
- characterization of algebraic properties of monoids corresponding to convenient properties of (sub)sequential transducers [B.1] and functions [B.4] operating over these monoids;
- correspondence between two classes of monoids (mge-monoids and monoids admitting maximal factorization) [Γ.3];
- generalization of an algorithm for minimal decomposition of simple polygons [Γ.1];
- efficient algorithms for similarity search [Γ.2,Γ.4,Γ.5].

## 6. Critical Remarks and Recommendations

A have no significant critical remarks towards the candidate and the presented documents. A very minor remark: it would be convenient if a unified numbering of the publications presented for this competition is used across all presented documents and reports.

My recommendation to the candidate is to continue his collaboration with Master students and young researchers, and, whenever possible, with doctoral students.

## 7. Personal Impressions

I know Stefan Gerdjikov since 2002 when I was a teaching assistant of his class in the introductory programming courses. As early as the first weeks he stood out as one of the top students, impressing with his extensive knowledge in Mathematics and

Computer Science, his bright mind, and resourcefulness. He was highly respected by his classmates for his affable character, kindness, and readiness to help. I have always been impressed with his candor, honesty, and high morality. Ever since the construction of the fifth floor of FMI's building I have the pleasure of sharing an office with Stefan, which gave me numerous opportunities for interesting and enthralling discussions on a variety of topics. I have often benefited from his advice on the courses I have been teaching, as well as on scientific questions related to my own research. As a teacher Stefan Gerdjikov is respected by students and colleagues and is renowned as a experienced specialist in his field.

## 8. Conclusion

Based on the review of the documents and scientific publications submitted for this competition, as well as on the analysis of their significance and the theoretical and applied contributions, I hereby confirm that the scientific achievements of the candidate meet and exceed the requirements of ZRASRB, PPZRASRB, and PURPNSZADSU for acquiring the academic position "Associate Professor" in the scientific and professional field of this competition. More specifically, the candidate satisfies the minimal national requirements of the professional field and no plagiarism has been detected in the submitted scientific publications submitted.

I hereby state my **positive** assessment of the application of Assist. Prof. Stefan Vladimirov Gerdjikov, PhD.

## II. GENERAL CONCLUSION

Based on the above, I hereby **recommend** to the scientific jury to propose to the competent authority of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to elect Assist. Prof. Stefan Vladimirov Gerdjikov, PhD to the academic position "Associate Professor" in professional field 4.5 Mathematics (Mathematical Logic).

April 5, 2021

Prepared by: \_\_\_\_\_  
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