

REVIEW

Competition for the academic position Professor
in the professional field 4 Natural Sciences, Mathematics and Informatics,
professional direction 4.5 Mathematics (Finite geometries),
for Sofia University “St. Kliment Ohridski”
Faculty of Mathematics and Informatics
announced in State Gazette No. 67/04.08.2023
and at the webpages of FMI nad SU

This review is prepared by prof. dr.sci. Peter Gueorguiev Boyvalenkov, Institute of Mathematics and Informatics, BAS, as a member of the Scientific Jury for the competition according to Order № RD-38-576/05.10.2023 of the Rector of Sofia University “St. Kliment Ohridski”.

Within the deadline, documents are submitted by one candidate: assoc. prof. dr.sci. Assia Petrova Rousseva-Landjeva, Faculty of Mathematics and Informatics, Sofia University “St. Kliment Ohridski”.

I. GENERAL DESCRIPTION OF THE PRESENTED MATERIALS

1. Competition information. The documents, presented by the candidate for the competition, correspond to the requirements of the Law, the Rules to the Law, and the Rules of Sofia University “St. Kliment Ohridski” for academic positions.

For participation in the competition, the candidate Assia Petrova Rousseva-Landjeva has presented 18 publications in Bulgarian and foreign scientific journals/proceedings, as 11 of them are in impact factor journals, (6 in Q2, 1 in Q3, and 4 in Q4). These papers are published after 2013, which means that they are not used in the associate professor procedure of the candidate. The remaining documents needed for the competition are also presented according to the law and the rules of FMI. I do not have remarks on the documentation and accept for evaluation all 18 publications.

2. Candidate information. Assia Rousseva has completed her secondary school education in 1983 with 35 GRE, Sofia, and higher education (MS) in 1988 with FMI of Sofia University, specialization Geometry. She has defended PhD dissertation in professional area 4.5 (Mathematics) in scientific specialty 01.01.02 Algebra and Number Theory entitled “Arcs in finite projective geometries and applications in coding theory” with SSC in 2005 as a result of PhD procedure in IMI-BAS and a dissertation for doctor of sciences degree entitled “Finite geometries and codes” in professional field 4 Natural Sciences, Mathematics and Informatics, professional direction 4.5 Mathematics (Geometry) in 2018. She is working in FMI-SU consecutively as assistant, senior assistant, professor assistant and associate professor at present.

3. General characterization of the scientific works and achievements of the candidate. It is seen from the list of all publications of the candidate that assoc. prof. Rousseva-Landjeva has 55 scientific publications. These works are mainly in the field of geometry (finite geometries) and its applications in the coding theory and combinatorics as the candidate continues to work in these areas. Among the presented for the competition 18 publications, 11 are with impact factor, 4 are with impact rank (without impact factor) and 3 are indexed (MathSciNet, zbMATH, IEEE Xplore; without impact factor and SJR). I did not find something to show that some of these publications are used in previous procedures of Rousseva-Landjeva (for PhD, Dr.Sci.) and competitions (for academic positions assistant, senior assistant, professor assistant and associate professor). I did not find signs of plagiarism, proved by law, and I also do not see such signs, including signs for auto-plagiarism. I accept that in the joint publications the contribution of the candidate is equal to the contributions of the corresponding co-authors.

It is shown in the presented reference for completion of the minimal national requirements for the academic position professor in 4.5. Mathematics that the candidate Rousseva-Landjeva exceeds the required minimal number of points in each separate indicator as follows: 120 points for indicator B (with necessary minimum of 100), 543 points for indicator G (with necessary minimum of 200), 124 points for indicator D (with necessary minimum of 100), and 115 points for indicator E (with necessary minimum of 100). In the same reference 19 citations of works of Rousseva-Landjeva are presented.

I had been present at talks of Rousseva-Landjeva at different national and international forums and have the impression that she is able to present well known and new results as well as to motivate her investigations.

4. Characterization and evaluation of the teaching and project activities of the candidate. The scientific career of the candidate so far develops in FMI-SU as it passes consecutively thru all necessary levels and the position Associate professor is held since April 2009. The presented reference shows that lecture courses for several disciplines in Geometry department of FMI-SU, among them mandatory and elective were taught. In the last 10 years (as well as in the most of the previous years) a full workload (auditorium and general) is met. As far as I know, Assia Rousseva-Landjeva is respected and valued as lecturer by the students.

Assoc. prof. Assia Rousseva-Landjeva has participated in two projects with the Bulgarian NSF (where I was a project team leader). I can confirm that she is responsible for her project duties and her contribution for the realization of the above-mentioned projects is essential.

5. Analysis of the scientific and applied achievements of the candidate from the materials for the competition. The scientific interests of Assia Rousseva-Landjeva are in the field of the geometry, more precisely in the investigation of finite geometries and their applications in coding theory and combinatorics. The scientific works presented for the competition concern several important subareas which will be considered separately, as for referencing the papers of Rousseva-Landjeva I will use the numbering from the List of publications for the competition.

In the papers [2,4,10,12,13,15,16,18] questions related to the extendability of linear codes and arcs and related structure of $(t \bmod q)$ -arcs are considered. Such investigations were initiated since 1995 by the first generalizations (Hill-Lisak) of the classical parity check construction for binary codes. In [18], a generalization of the Hill-Lisak theorem is proved (formulated for extendability of arcs). The concept of a $(t \bmod q)$ -arc is introduced in [15,16] and gives the opportunity for analysis of Griesmer codes via analysis of corresponding arcs. In [16], small t are considered and in [15] a general theorem about t -extendability of Griesmer arc is proved. In [4], a classification of the strong $(3 \bmod 5)$ -arcs in $\text{PG}(3,5)$ based on results from [13] is obtained and is continued via geometric constructions in [2]. In [12], it is proved that the $(0 \bmod p)$ -arcs form a vector space (p is a prime), which implies that every $(t \bmod q)$ -arc can be represented as a sum of lifted arcs. These investigations are continued in [10].

The papers [5,8,9,14] are devoted to so-called main problem of coding theory. Estimations are obtained in [14] for the quantity $t_q(k)$ – the difference between the minimum possible length of a linear code over $\text{GF}(q)$ of dimension k and minimum distance d and the Griesmer bound for $k=3$. In [9], special cases are investigated and constructions and classification results are proposed for arcs and blocking sets. In [8], nonexistence results for arcs are proved to lead to corresponding results for Griesmer codes, resolving this way 4 open cases of the main problem. In [5], blocking sets in $\text{PG}(3,q)$ are investigated and classification results are proved for different values of q .

In the papers [3,6,11] codes and arcs with a few distances are considered. In [3,6] two-weight codes of maximal cardinality are considered and a conjecture of the author of this review and his coauthors from 2021 is proved (for $q=2$). In [11] arcs with almost constant weight are investigated and classification results are proved. In the papers [7,17] constructions of affine blocking sets are proposed as in [17] a third (two were known before) infinite class of such sets are constructed. In [1], particular results for the p -rank of incidence matrices of projective Hjelmslev plane over a chain ring with residue field of characteristic p (p is a prime) are proved.

6. Critical remarks and recommendations. I do not have critical remarks on the publications but think that it is desirable to see more active work of Rousseva-Landjeva with students and PhD students. It is clear that there are problems which can be proposed to students for diploma thesis and to PhD students for (parts of) dissertations and such students can be successfully supervised.

7. Personal impressions from the candidate. I have known the candidate since more than 20 years and the impressions from her work are excellent with noticing the above remarks. In my opinion, she will be very useful for FMI-SU as a professor.

8. Conclusion. After my analysis of the materials and scientific publications presented for the competition and taking into account their significance and scientific and applied contributions, I confirm that the scientific achievements comply with the requirements of the Law in Republic of Bulgaria, its Application Rules and the corresponding Rules of SU “Kl. Ohridski” for obtaining by the candidate the academic position „Professor“ in the scientific area and professional direction of the competition. In particular, the candidate satisfies the

minimal national requirements in the professional direction and plagiarism in the presented scientific works is not found. I give my positive evaluation for the candidature.

II. GENERAL CONCLUSION

Based on the above, I **recommend** with great confidence to the Scientific Jury to propose to the Faculty council of Faculty of Mathematics and Informatics of Sofia University “St. Kliment Ohridski” to **elect assoc. prof. dr.sci. Assia Rousseva-Landjeva for the academic position „Professor“** in professional field 4 Natural Sciences, Mathematics and Informatics, professional direction 4.5 Mathematics (Finite geometries).

Sofia, 21.11.2023 г.

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