O P I N I O N

by Full Member of BAS Oleg Krastev Mushkarov,
Institute of Mathematics and Informatics, BAS

on a contest for academic position "Associate professor"at the Institute of Mathematics and Informatics - BAS, Area of Higher Education: *4. Natural Sciences, Mathematics and Informatics*, Professional Area: *4.5 Mathematics*, Scientific Specialty: *Geometry and Topology* (Convex Geometry in Topological Vector Spaces), announced in State Gazette, No. 69/ 11.08.2023.

I am presenting this Opinion as a member of a Scientific Jury, formed with Order № 467/10. 10. 2023 г. of the Director of the Institute of Mathematics and Informatics Prof. Peter Boyvalenkov. It is prepared according to the requirements of:

- The Law Act for Development of the Academic Staff in the Republic of Bulgaria (LADASRB);
- The Statutes for application of LADASRB;
- The Statutes for the conditions and regulations for acquiring academic degrees and occupying academic posts in BAS;
- The Statutes for the conditions and regulations for acquiring academic degrees and occupying academic posts in IMI-BAS;

1. General description of the materials obtained

Only one candidate submitted documents for participation in the announced competition – Stoyu Barov, PhD from the "Analysis, Geometry and Topology"section of IMI-BAS. My presented set of materials contains: Professional curriculum vitae with information on teaching activities, participation in research projects and a list of all scientific publications, Diplomas of higher education in Sofia University and PhD of the University of Alabama with its legalization by BAS, list of scientific publications for the competition, reference for citations, etc. All documents and materials presented for the competition are carefully prepared and give a clear idea of the scientific and pedagogical activity of the candidate.

2. Biographical data of the applicant

Stoyu Barov was born on March 25, 1964 in the village of Lesichevo, regiuon Pazarzhik. From 1984 to 1989, he was a student at Sofia University. In 1992, he defended his thesis on general topology with the supervisor Prof. G. Dimov. From 1999 to 2001 he was a PhD student at University of Alabama, USA. In the same year, he defended his PhD thesis "On sets with convex shadows" under the suprvision of prof. Jan Dijkstra. It was legalized by the Bulgarian Academy of Sciences on 22.06.2015 and he was awarded the educational and scientific degree *Doctor* in Geometry and Topology. From 1992 to 1998 Stoyu Barov was a mathematician at IMI-BAS, from 1998 to 2001 a Graduate Teaching Assistant at The University of Alabama and from 2001 to 2004 an Assistant Professor at Ball State University, USA. Since 2004 he has been a researcher at IMI-BAS.

3. General characteristics of the applicant's activity

Teaching experience

Stoyu Barov has an active teaching activity. In the period 1993-2004 he taught classes on Calculus I, Calculus II, Applied Differential Equations, Discrete Mathematics,

Intermediate Algebra, Applied Calculus, Business Calculus, Mathematics and its Applications and Linear Algebra at the Faculty of Mathematics and Informatics of Sofia University, University of Alabama and Ball State University.

Research Grants

- Grant 040.11.120 given by the Netherlands Organization for Scientific Research (NWO)
- One-year Ball State Research Grant
- A member of the three-year grant MM-420/94 given by the Bulgarian National Foundation for Scientific Researches at the Bulgarian Ministry of Education
- A member of the three-year grant MM-28/91 given by the Bulgarian National Foundation for Scientific Researches at the Bulgarian Ministry of Education

Scientometric data

S. Barov has submitted for consideration under the application procedure 15 research articles which have not been presented in association to his PhD thesis. Three of them have been published in Compt. Rend. Acad. Bulg. Sci. and the others in international mathematical journals - Bollettino U. M. I.(1), Pacific J. Math.(1, IF 0,476), Topology Proceedings(2), Fundamenta Mathematicae(2, IF 0,487, IF 0,609), Transactions of Amer. Math. Soc.(1, IF 1,014), Comment. Math. Univ. Carolin.(2, IF 0,2), Proc. Amer. Math. Soc.(1, IF 0,614), Journal of Topology and Analysis(1), Topology and its Applications(1, IF 0,562).

He is the sole author of 6 of these articles, other 6 are joint with J. Dijkstra and in 3 articles he has two co-authors- 2 with G. Dimov and S. Nedev and 1 with J. Dijkstra and M. van der Meer. It is my opinion that in the joint articles the contribution of the applicant is equivalent to each of the co-authors. S. Barov has attached a list of 17 citations of the papers submitted for this procedure.

General characteristic of the applicant's scientific activity.

The main scientific interests of S. Barov are in the areas of General Topology, Selection Theory and Geometric Topology. His contributions in these areas are described in detail in the attached applicant review. Of these, I will note the following:

1. The internal characterization of the so-called HS-spaces, inspired by the assertion of H. J. Schmidt that every Hausdorff HS-space is a T3-space [1,2], and the results on the so-called star-countable covers which give a positive answer to an open problem of Michael and Nagami in the particular case of such covers [3,4,8].

2. The results on continuous selections, the generalizations of results of M. Frantz and the characterization of paracompact spaces by means of selections [6,11].

3. The results on convex geometry and geometric tomography of closed convex sets in $\mathbb{R}^n$ and the Hilbert space l^2, motivated by the following two questions:

а). What are the topological and the geometric properties of a closed subset of $\mathbb{R}^n$ or l^2 such that its projections on the planes with fixed dimension are convex sets?

б). Find the "minimal imitations"of a given closed convex set in $\mathbb{R}^n$ or l^2, i.e. its closed subsets of minimal dimension which have the same projections on the planes of fixed dimension.

In the first direction I would mention the results for l^2 in [9,13] and that for $\mathbb{R}^n$ in [10,12]. In particular, Theorems 7 and 9 in [13] for closed convex sets in l^2 having empty geometric interior. An interesting corollary of the first theorem is the fact that these sets can not be imitated by other closed sets. In this direction are also the results on shadows of Cantor sets with prescribed dimension [14].

The papers [15,16,17] are devoted to the connection between exposed and extremal points of a close convex set in $\mathbb{R}^n$ or l^2 with respect to their linear subspaces of a fixed dimension. A nice result in this direction is the Krein-Milman type theorem proven in [17].

A review of the applicant's works shows that he is a well established scientist with substantial achievements in General Topology and Convex Geometry

CONCLUSION

The materials submitted by Dr. Stoyu Barov for the procedure demonstrate that he is satisfying the requirements of the Law Act for Development of the Academic Staff in the Republic of Bulgaria (LADASRB), the Statutes for application of LADASRB, the Statutes for the conditions and regulations for acquiring academic degrees and occupying academic posts in BAS, and the Statutes for the conditions and regulations for acquiring academic degrees and occupying academic posts in IMI-BAS, for occupying the academic post "Associate professor". There is no data for plagiarism. I assess very positively his long-time research and pedagogical activity and recommend with conviction to the honorable jury to propose to the Scientific Council of IMI-BAS to elect Dr. Stoyu Barov as an "Associate professor"in the Area of Higher Education: *4. Natural Sciences, Mathematics and Informatics*, Professional Area: *4.5 Mathematics*, Scientific Specialty: *Geometry and Topology*(Convex Geometry in Topological vector spaces)

17.11.2023 г. Signature:

(acad. Oleg Mushkarov)