OPINION

in a competition for the occupation of the academic position
ASSOCIATE PROFESSOR
at Konstantin Preslavski University of Shumen
in the area of higher education 4 Natural Sciences, Mathematics and Informatics,
professional field 4.5 Mathematics (Mathematical Analysis)

The competition is announced in State Gazette issue 63 on 1 August, 2025
Candidate: Dr. Aynur Abdulova Ali

The opinion is written by the member of the scientific jury: Assoc. Prof. Dr. Yuliya Vancheva Chaparova, University of Ruse

1 Short biographical details of the applicant

Aynur Abdulova Ali has received her master's degree in Mathematics, study specialty Computational and Business Mathematics at Konstantin Preslavski University of Shumen in 2003. In 2021, she defended her doctoral thesis titled *Iterative Methods for Solving Rational Matrix Equations* at the same university. Since 2019 the candidate has consecutively held the assistant and primary assistant positions at Mathematical Analysis Department, and Algebra and Geometry Department, Konstantin Preslavski University of Shumen.

2 General description of the presented materials

Within the present competition, the candidate Dr. Aynur Ali has submitted 5 publications, all of which published in scientific journals possessing impact factor (Web of Science) and SJR (Scopus). All the publications are written in English. None of them is single-authored, one publication is 4 co-authored, the other three are with 5 co-authors, and one is 6 co-authored, respectively.

The high scientific level of journals containing works of Dr. Aynur Ali is very impressive: *Mathematics* AIMS (Web of Science Q1), *Mathematics* MDPI (Web of Science Q1) and *Axioms* MDPI (Web of Science Q1).

3 Impact of candidate's publications on scientific literature (known citations)

Dr. Aynur Ali's total number of publications indexed in Scopus is 7, and the number of citations is 18. Her Hirsh index is 3. In Web of Science her presented works are 7 and they have 14 citations, h – index 2. Her most cited work in Scopus (11 times) is

Hasanov, V.I., Ali, A.A., On convergence of three iterative methods for solving of the matrix equation X+ A∗X^-1A+ B∗X^-1B= Q, *Computational and Applied Mathematics*, 2017, 36(1), pp. 79–87.

4 General description of candidate's activity

4.1 Teaching activity

Dr. Aynur Ali has been a lecturer in Mathematics, parts 2 and 4, and she has conducted seminars in Calculus, Mathematical analysis, parts 1, 2, 3, and 4, Applied Mathematics, and Set theory, mathematical logic and combinatorics for students at

University of Shumen. The candidate has prepared study materials and exam problems needed for the education.

4.2 Scientific Activity

The scientific interests of Dr. Aynur Ali are in the field of Matrix analysis and Fixed point theory with application to matrix equations and systems of matrix equations. She works on the existence and uniqueness of coupled, tripled and n-tupled fixed points of monotone maps satisfying various monotonicity properties acting in partially ordered metric spaces. Her research includes application to finding conditions for existence and uniqueness of positive definite solutions of a system of two matrix equations in which the unknown matrices appear in integer or real powers; application to investigation of oligopolistic market dynamics with three dominated participants using the response functions and a theorem for existence and uniqueness of tripled fixed points; application to existence and uniqueness of solutions of nonlinear systems of n matrix equations applying a theorem for n-tupled fixed points of an ordered n-tuples of maps. The candidate examines also iterative methods for solving rational and irrational matrix equations. She is an author and co-author of scientific works, including research articles, and conference papers indexed in scopus (h-index-3), and google scholar (h-index-4).

4.3 Contributions

The scientific contributions of Dr. Aynur Ali are in the field of the fixed point theory and its application to existence and uniqueness of positive definite solutions of systems of matrix equations. In works [B4.1, 2024] and [Г7.1, 2025] generalizations of the existing results of Guo & Lakshmikantham and Ran & Reurinngs are obtained concerning coupled fixed point of continuous monotone maps in partially ordered metric spaces. The continuity condition is replaced by a weaker condition for various monotone maps. These results are adapted to systems of two matrix equations for which existence and uniqueness of positive definite solution is derived. The new results of Dr. Ali are appliable to more general classes of matrix equations. In works [B4.2, 2025] and [Г7.2, 2025] the idea of coupled fixed point is extended to tripled fixed point of various types monotone contracting maps without continuity assumption. New results for existence and uniqueness of tripled fixed point are obtained which are applied to nonlinear nonsymmetric systems of three matrix equations, in work [Г7.2, 2025], and to finding equilibrium of oligopolistic market with three participants when minimal information is available about the market presence, in work [B4.2, 2025]. In work [Г7.3, 2025], the concept of Samet & Vetro about fixed point of nth order of a map is generalized. For an ordered n-tuples of maps of n variables acting in a partially ordered metric space with a weaker notion for the monotone properties of the maps, related to the partial ordering of the space, existence and uniqueness of n-tupled fixed points is proved. That result unifies the former results of Dr. Ali for n=2 and n=3. The theorem is adapted to systems of n matrix equations. All the results of Dr. Ali concerning existence and uniqueness of fixed points are accompanied by the successive approximation sequences for which error estimates are derived.

5 Personal contributions of the candidate

Under the current procedure, Dr. Aynur Ali participated with a total of 5 publications. I accept that her personal contribution to these works is equivalent to that of the other co-authors.

6 Critical notes

I have no any critical notes.

7 Conclusion

Under the current procedure all the requirements of the Development of Academic Staff in the Republic of Bulgaria Act and the Procedural Rules for Acquisition of Scientific Degrees and Occupation of Academic Positions of Shumen University are fulfilled. Having in mind all the above stated, it is clear that the candidate's submitted papers have received sufficient scientific and applied scientific contributions.

Based on my familiarization with the presented works, their significance, the scientific and applied scientific contributions contained in them, I find it reasonable to propose Dr. Aynur Abdulova Ali to be elected for "associate professor" in professional field 4.5 Mathematics (Mathematical Analysis) at Shumen University.

12 November, 2025

Member of the Scientific Jury:

Assoc. Prof. Dr. Yuliya Chaparova