ATTITUDE OF REVIEWER

for Assist. Prof. Maria Tonkova Vasileva-Chilibinova, Ph.D.,
participant in the contest for the academic position of 'Associate Professor'
at the Faculty of Mathematics and Informatics
at the Plovdiv University 'Paisii Hilendarski'
by field of higher education
4. Natural sciences, mathematics and informatics,
professional direction
4.5. Mathematics
(Approximation models and applications),
announced in the Newspaper of State, no. 96, November 17, 2023

Prepared by: Prof. Dr. Anton Iliev Iliev

By order №RD-21-389/16.02.2024 of the Rector of Plovdiv University 'Paisii Hilendarski' based on the report of the Dean of FMI - Prof. Dr. Angel Golev, I have been appointed as a member of the Scientific Jury by field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.5. Mathematics (Approximation Models and Applications).

For participation in the announced competition for 'Associate Professor' documents was submitted by Assist. Prof. Dr. Maria Tonkova Vasileva-Chilibinova.

The admission committee was appointed by order №RD-21-261/01.02.2024 of the Rector of Plovdiv University 'Paisii Hilendarski'. At its meeting on 20.02.2024, the commission admitted to the competition the only candidate Assist. Prof. Dr. Maria Tonkova Vasileva-Chilibinova.

I have received all the necessary documents for participation in the competition on electronic media.

The candidate has grouped the scientific works presented in the competition into two thematic areas, structured in annotations of the materials.

Main contributions

- A study of iterative methods with a high order of convergence for simultaneous approximation of the zeros of polynomials;
- Approximation of classes of sigmoidal (cumulative) functions in terms of the Hausdorff metric.

The first group of papers is devoted to refining and obtaining more accurate estimates of the convergence domain of classical methods for simultaneously searching for zeros of polynomials. Essentially, in this group of studies, the method developed by Prof. Sc.D. Petko Proinov theory. With its help, it becomes possible to improve the previously known estimates of the convergence of the methods of Gargantini-Farmer-Loizou, Nourein, Ehrlich, other their modifications and generalizations by leading specialists in this scientific field - Kyurkchiev, Andreev, Popov, Petkovic, Rancic, Ivanov, Machado, Lopes and others. The high number of citations with an impact factor of these articles gives me reason to give them a maximum rating. I would define the results achieved here as scientific-applied due to their solid theoretical basis and the possibility of their real practical use.

Scientific research in the second thematic direction is aimed at approximating classes of sigmoidal (cumulative) functions about the Hausdorff metric. The founder of the Bulgarian school of Hausdorff approximations is the notable Bulgarian mathematician Academician Prof. Sc.D. Blagovest Sendov. The important characteristic 'saturation' in the Hausdorff sense is investigated. Both theoretical and applied results have been achieved, which are illustrated with a number of illustrative examples. Here, too, evidence of a significant number of citations is attached, which once again emphasizes the high relevance of the candidate's research.

Reference for publications and citations

The candidate presents 12 high-quality scientific publications, 1 serious scientific monograph and 1 unique textbook for students in the competition for 'Associate Professor'.

In journals with Impact Factor (total IF 10.777 - from the WoS base), 4 articles were published in journals with IF with grades - Q1 (2 issues) and Q2 (2 issues) and 7 were in issues with SJR.

The requirement for the required number of articles, which were not presented for the acquisition of the educational and scientific degree 'Doctor' (2016), is fulfilled, which satisfies the requirements in the sense of the ZRASRB, the Regulations for the implementation of the ZRASRB and the Regulations of the PU 'Paisii Hilendarski' for the implementation of the ZRASRB.

The applicant submitted a total list of 149 citations, of which 72 were in IF journals. Total IF is 199.372 and grades from Q1 to Q4.

Special attention deserves the textbook on 'Insurance Mathematics', written in co-authorship with Prof. Ph.D. Nikolay Kyurkchiev. It lays real theoretical and practical foundations for the knowledge of future actuaries, insurers, brokers, etc. This textbook has no analogue not only in the Republic of Bulgaria, but also outside the borders of our country.

New approximation models are presented and investigated in the scientific monograph. Models based on statistical distributions aimed at modeling the behavior of data sets have been

proposed. An analysis of new classes of activation functions was performed. A smooth approximation is considered using the Gaussian function for the error.

During the preparation of the review, I identified 7 more IF citations of the candidate's research papers, making the total IF of citations over 222.

In an article:
Shams, M.; Rafiq, N.; Carpentieri, B.; Ahmad Mir, N. A New Approach to Multiroot Vectorial Problems: Highly Efficient Parallel Computing Schemes. Fractal Fract. 2024, 8, 162, ISSN: 2504-3110, IF: 5.4.

are cited

Proinov, P.D.; Vasileva, M.T. A new family of high-order ehrlich-type iterative methods. Mathematics 2021, 9, 1855.

Proinov, P.D.; Vasileva, M.T. On the convergence of high-order Ehrlich-type iterative methods for approximating all zeros of a polynomial simultaneously. J. Ineq. Appl. 2015, 1, 1–25.

In an article:
Kyurkchiev, N.; Zaevski, T.; Iliev, A.; Kyurkchiev, V.; Rahnev, A. Nonlinear Dynamics of a New Class of Micro-Electromechanical Oscillators—Open Problems. Symmetry 2024, 16, 253, ISSN: 2073-8994, IF: 2.7.

are cited

Proinov, P.; Vasileva, M. Local and Semilocal Convergence of Nourein's Iterative Method for Finding All Zeros of a Polynomial Simultaneously. Symmetry 2020, 12, 1801.
Proinov, P.; Vasileva, M. On the convergence of high-order Gargantini-Farmer-Loizou type iterative methods for simultaneous approximation of polynomial zeros. Appl. Math. Comput. 2019, 361, 202–214.

In an article:
Kyurkchiev, N.; Zaevski, T.; Iliev, A.; Kyurkchiev, V.; Rahnev, A. Modeling of Some Classes of Extended Oscillators: Simulations, Algorithms, Generating Chaos, and Open Problems. Algorithms 2024, 17, 121, ISSN:1999-4893, IF: 2.3.

are cited:

Proinov, P.; Vasileva, M. On the convergence of high-order Ehrlich-type iterative methods for approximating all zeros of a polynomial simultaneously. J. of Inequalities and Applications, 2015, 336.
Proinov, P.D.; Vasileva, M.T. Local and Semilocal Convergence of Nourein's Iterative Method for Finding All Zeros of a Polynomial Simultaneously. Symmetry 2020, 12, 1801.
Proinov, P. D.; Vasileva, M. T. On the convergence of high-order Gargantini-Farmer-Loizou type iterative methods for simultaneous approximation of polynomial zeros. Applied Mathematics and Computation 2019, 361, 202-214.

The minimal national requirements for the required points by groups of indicators for acquiring the academic position 'Associate Professor' have been met.

The additional faculty requirements of the FMI at the PU on PRAS in RB of the FMI at the PU for holding the position of 'Associate Professor' have been met, namely - at least 8 publications, at least 5 publications in journals, at least 3 being in journals with an impact factor, at least 1 textbook and evidence of at least 5 citations.

I have not found any 'plagiarism' in the candidate's works in the sense of ZRAS in the RB.

Assist. Prof. M. Vasileva-Chilibinova, PhD, presented a service note for participation in 5 scientific research projects, of which 1 is national.

Everything said so far gives me the conviction to give a positive assessment of the candidate's overall research activity.

CONCLUSION

From everything established about the candidate's works presented in the competition, it is clear that she has received sufficient scientific and applied contributions in the field of 'Approximation models and applications'.

From the references presented, it is clear that there is a very good educational and teaching activity, which strengthens my conviction that Assistant Professor Maria Vasileva-Chilibinova, PhD, meets the requirements of the ZRASRB, the Rules for the Implementation of the ZRASRB, the Regulations of the PU 'Paisii Hilendarski' for the implementation of the ZRASRB for the occupation of the academic position 'Associate Professor'.

My conclusion regarding the occupation of the academic position 'Associate Professor' announced by the competition from Assistant Professor Dr. Maria Tonkova Vasileva-Chilibinova is STRONGLY POSITIVE.

I propose to the honorable Scientific Jury to unanimously propose to the Faculty Council of the Faculty of Mathematics and Informatics at Plovdiv University 'Paisii Hilendarski' to elect the candidate Assistant Professor Dr. Maria Tonkova Vasileva-Chilibinova for the academic position 'Associate Professor' in the Faculty of Mathematics and Informatics at the Plovdiv University 'Paisii Hilendarski' by field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.5. Mathematics (Approximation Models and Applications).

March 20, 2024   Signature: ....

                                                                    /Prof. Dr. Anton Iliev/