SCIENTIFIC OPINION

for a procedure for obtaining an academic position "Professor"
in the professional field 4.5 "Mathematics",
specialty "Mathematical Modeling and Application of Mathematics ",
published in the State Gazette no. 41 / 21.05.2019 for the needs
of section "Parallel Algorithms" section, at IICT - BAS,
with the only candidate Assoc. Prof. Dr. Pencho Genov Marinov

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General description of the presented materials

As a member of the Scientific Jury, determined by Order No. 241 / 01.10.2019 of the Director
of IICT-BAS Prof. Dr. Habil Galya Angelova and the decision of the Scientific Jury on the
procedure, I was appointed to prepare an opinion and accordingly received the following
documents electronically:
1) a curriculum vitae in the European sample;
2) copy of: diploma of educational and scientific degree "doctor" (candidate of
and a Certificate of Scientific Degree, Senior Associate Second degree "(equivalent of"
associate professor ");
3) a certificate of internship in the specialty;
4) a list of scientific publications for the competition;
5) a list of quotations for the competition and a reference from SCOPUS;
6) abstracts of the scientific publications for the competition - (a) in English and
(b) in Bulgarian;
7) a reference for meeting the minimum requirements of IICT-BAS;
8) assurances and declarations for participation / leadership in scientific projects;
9) a reference to the original scientific and applied scientific contributions;
10) a declaration of absence of proven plagiarism in the law scientific works;
11) a copy of the scientific publications for participation in the competition;
12) a disc (CD) containing the materials described.

The above documents completely exhaust the list of documents required under the Academic
Staff Development Act (ASDA) and according to the specific requirements adopted by the
Scientific Council of IICT-BAS for the procedure for occupying an academic position of
"Professor".

1. Brief biographical information

Pencho Marinov was born on 01.04.1955. From 1975 to 1980 he studied at the Faculty of Mathematics and Mechanics at Sofia University. Kliment Ohridski "and graduated with a master's degree. In 1993 he defended his PhD thesis in the field of mathematical sciences (diploma from the Higher School of Economics) on the topic "Approximation algorithms with rational functions regarding the Hausdorff distance" with scientific consultant Assoc. Prof. Andrey Andreev. It will be noted here that this topic does not remain isolated and is later further developed in many of the applicant's subsequent scientific developments (see below).

The candidate for the Procedure Pencho Marinov during the period 1980 - 1985 worked at the Central Laboratory of Space Research - BAS, where he was a mathematician until 1983, and then a research associate of the 3rd century, dealing with data processing from space experiments, as well as modeling of processes in the ionosphere. Since 1985 he has been working at IICT-BAS (with the change of names over the years), as a Ph.D. III, II, I Art. (1985 - 2001) and Associate Professor (Assoc. Prof. II Art.) From 2001 - till now. The skills that the applicant possesses and uses are rich in: working on the first grid - clusters and supercomputers in Bulgaria, working with computers and installation software under: DOS, Windows, UNIX, Linux (Unix-like OS), using Programming languages: FORTRAN, C / C ++, and for MPI parallelization, OpenMP.

2. General characteristics of the applicant's scientific activity

I did not find a complete list of publications by Assoc. Prof. Pencho Marinov (however, a list of 62 candidate's cited publications is provided in document 05). For the competition, he submitted a list of 33 scholarly publications in which he authored or co-authored, all of which have been since 2003 (his habilitation is from 2001) and have not been used in previous procedures. According to SONIX data: for publications (66 WoS, Scopus), respectively: 5-Q1; 7-Q2; 25-Q3; 13-Q4; 14-SJR, 2-w / o. A list of selected independent citations is presented, as reflected in the Scopus, WoS, worldwide scientific databases. The citations are: 137 visible in Scopus, WoS, out of 202; h-index = 10, cited in the last 10 years 250, 322 in total (self-citations are of course excluded). This rich information is presented in document 05, incl. and graphically! A list of 143 citations to 4 of the papers was presented [03, 04, 05, 06]. For the sake of completeness, I will note the grouping of articles on IF by quartiles: 6 are Q1, 10 are Q2, 13 are Q3, 4 are Q4, doc. 07.

In the presented materials, important (in my opinion) is the information about the candidate's Assoc. Prof. Marinov participation in national and international scientific projects for the period is presented (see Doc. 08) - a total of 30 projects, 16 of which are national and 14 international. This project activity proves the relevance of the international and national research conducted by the candidate in the competition!

The guidance of PhD students is not a mandatory requirement under the ASDA and the ICTI Regulations, but for me the construction of future researchers is a professional duty of any

serious scientist! I applaud positively the efforts of Assoc. Prof. Marinov in this direction - the joint leadership of a Ph.D. approved Thesis.

3. Scientific and applied scientific contributions

The publications in the Author Reference are grouped (albeit conditional) into the following thematic cycles:

1. Development of algorithms for best approximations with rational functions and their application to problems with fractional partial derivatives.
These are works [30], [33] from the list co-authored with colleagues in the section "Scientific calculations". Both are in quartile Q1.

2. Tasks in the field of inter-criteria analysis and index matrices.
The work in this area is related to the cooperation with the Institute of Biophysics and Biomedical Engineering (IBFBMI-BAS).

3. Tasks for processing data from brain activity records.
The project the candidate is working on is DN 12/6 with the NSF in collaboration with the Institute of Neurobiology (INB-BAS).

4. Use of the Grid Infrastructure for Plasma Behavior Modeling Problems in Fusion Reactors.
You have been working in this area more than 10 years ago (2007).

5. Space physics problem models and algorithms.
Details follow below.

The procedure is announced in the specialty "Mathematical modeling and application of mathematics". Both the applicant's overall scientific activity and the publications submitted for this procedure correspond to the profile of the competition. I would like to make explicit the wide range of methods and techniques used - from purely analytical through modeling to computer simulations involving high-performance (supercomputer) calculations.

4. Major scientific and applied contributions of the applicant

The author's reference presents a highly synthesized presentation of the original contributions to the works presented for the present procedure, as well as their place in contemporary research based on their scientific and social significance and their development prospects. I will not elaborate on the individual contributions, but I would like to briefly characterize some of the results in substance.

4.1. As the first of the topics listed above is closest to me, I will briefly address it. These are developments in the field of numerical solution of algebraic systems of the kind

$$(A^{\alpha} + q\,I)\,u = f, \quad 0 < \alpha < 1,\ q > 0;\ u,\ f \in R^{N},$$

where A is a symmetric and positive definite matrix, which is obtained after approximation by finite differences (or finite elements) of a boundary-value second-order fractional diffusion

problem in the region of R^d. A class of decision methods based on the Best Uniform Rational Approximation (BURA) of a particular scalar function in a single interval is numerically analyzed and studied. Such a method is related to the numerical solution of problems with the fractional diffusion of spatial variables associated with the so-called "p-Laplacian operator". There has been a recent boom in results in this area of nonlocal analysis in Equations of Mathematical Physics. It will be noted that there is still a great deal of undeveloped field in terms of both theoretical PDE results and their numerical analogues. In my opinion, in this topic comes a successful application of the applicant's development. I will only mention one post from recent months that has not been included in the competition posts, but in my opinion with great future effect:

S. Harizanov, R. Lazarov, P. Marinov, S. Margenov, and J. Pasciak. Analysis of numerical methods for spectral fractional elliptic equations based on the best uniform rational approximation. arXiv preprint arXiv: 1905.08155, 2019.

4.2. The topic "Models and algorithms for space physics problems" are the main results that made the most significant contribution to the scientific-metric indicators of the candidate. The main publications on this topic are in the scientific publication Advances in Space Research [1-5, 6-9,13,14,17, 20, 28]. The applicant's international research projects are exactly from this section, as are most citations. The main coordinator here is Prof. Iv. Kutiev. The most extensive publications are related to the magazine Space Weather and Space Climate and the collaboration with colleagues from the Greek side - the Observatory of Athens. The models that have been created in this area have found a wide accent on international topics in this field. I will also mention the reference from Prof. Kutiev in 08, on the practical application for the improvement of the existing ionospheric models:
- The electron temperature model in the plasma is part of the International Reference Ionosphere (IRI), adopted by ISO (IRI),
- Models of 2D and 3D-D distribution of the electron concentration in the ionosphere are operationally available through the European DIAS (IRI) system, adopted by the Digital Interactive Atmosphere.

5. Assessment of the applicant's personal contribution

An essential point in this candidate's research is their inherent multidisciplinarity, respectively - teamwork, due to the necessary expertise in areas such as mathematics, physics, biophysics, high-performance calculations (both theoretical and experimental). The joint work is connected with a large number of co-authors of Assoc. Prof. Marinov, both Bulgarians and from abroad. I have not found any documents to formally "split" the contributions between the co-authors and therefore I agree that participation is tantamount. However, in my opinion, apart from the publications in which the alphabetical arrangement of the co-authors was accepted, the role of the candidate was emphasized in some of the others according to the relevant traditions: first, last or correspondent author, i.e. a leading / significant contribution recognized by the author's team.

6. Critical notes and Personal opinion

I have no critical remarks, except one that just sticks to the mark. Presented materials are detailed, but in a way that doesn't advertise them enough! The reviewer has to personally search for the highlights in the publications. This, of course, is related to the extreme modesty of the applicant! I have known Assoc. Prof. Pencho Marinov for many years and I have always seen in his face a well-established professional, ready to work and help in completely different directions! Last but not least: a particularly well-meaning colleague who is sought after and fits in successfully with various scientific teams, which I think is especially important in today's complex time!

7. Conclusion

The presented materials strongly prove the professional expertise of Assoc. Prof. Dr. Pencho Marinov, the importance of his scientific achievements and their approval by the scientific community. My personal impressions of discussions and reports at international and national conferences confirm this conclusion.

The requirements laid down in the Law for the Academic Staff Development Act to the candidates for occupying the academic position of "Professor", as well as the specific requirements for this position, adopted by the Scientific Council of IICT - BAS, have been met by the applicant with great reserve.

With all this in mind, I propose that the Scientific Jury come up with a positive opinion on the application of Assoc. Prof. Dr. Pencho Genov Marinov and with a proposal to the highly respected Scientific Council to select him as a "Professor" in the professional field 4.5 "Mathematics", a scientific specialty " Mathematical modeling and application of mathematics. "

Date:

/ Prof. Dr. Habil Nedyu Popivanov /