

Attitude of Reviewer

for assistant professor Pavlina Khristova Atanasova, PhD
for competition in academic position "Associated Professor"
in the Faculty of Mathematics and Informatics
at the University of Plovdiv "Paisii Hilendarski"
in area of higher education 4. Natural Sciences, Mathematics and Informatics,
professional field 4.5. Mathematics (Computational Mathematics), published in
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Prepared the Attitude of Reviewer: Prof. Dr. Nikolay Veselinov Kyurkchiev

By order No P33-3779/12.07.2019 of the Rector of University of Plovdiv "Paisii Hilendarski" I am a certain member of the scientific jury in area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5. Mathematics (Computational Mathematics).

To participate in the announced competition for "Associated Professor" has submitted documents Assistant Prof. Pavlina Khristova Atanasova, PhD.

I have received all the required documents for participation in the competition in printed and in electronic forms.

The candidate has grouped the scientific papers presented in the competition in several thematic areas, one of which is: Numerical modeling of Josephson's nanostructures as a natural continuation of the research from thesis of P. Atanasova.

A significant part of the publications presented in the competition are dedicated to this conditional direction and are related to the study and prognosis of processes in Josephson's contacts.

The mathematical model is based on the known sine-Gordon equation and its various modifications. The set boundary-value problems (boundary in the stationary case) are nonlinear and multivariable, which requires serious numerical simulation.

In my opinion, the main contributions of the candidate are:

Consideration of a new approach to the construction of volt-ampere (I-V) characteristics, applied in the physics of long Josephson's contacts (articles NN: 3 and 5 of the submitted for the competition list of publications).

The second article is in common with the known capacities of JINR, Dubna - Prof. ScD Shukrinov (Laboratory of Theoretical Physics) and Prof. Zemlyanaya (Information Technology Laboratory), and is dedicated to the analysis of states in the contact, depending on the border conditions.

I am convinced that the numerical experiments conducted by doctor P. Atanasova at a later stage help to arrive to important conclusions about the static distributions of the magnetic flux in the contact and the analysis of the relationship between the fluconic and the constant solutions.

The second group of publications (NN: 4, 6, 7, 8 and 10 of the presented list of publications for participation in the competition) is dedicated to more complex nanostructures - long Josephson's contacts with a second harmonics in the current-phase dependence. This leads to the double sine-Gordon equation and the need for detailed investigation of the complex of stable and unstable static distributions of the magnetic flux.

The publications under NN: 7-8 investigate the influence of the second harmonic on the system through the specialized software module implemented by the candidate and the large number of numerical experiments conducted that reveal the relationship between Meissner's, multifluxon and newly discovered magnetic flux distributions.

The ideas for finding bifurcation solutions (which were realized in the dissertation work for the candidate for the study of symmetrical double layer Josephson's contacts) are applied to models of Josephson's contacts, in which participates a second harmonics in the current-phase dependence (publications NN 6 and 10).

The study of bifurcation dependencies is conducted on the basis of specialized software developed by the candidate.

The third group of publications (NN: 11, 13, 14 and 16 of the list of publications for participation in the competition) is in part a continuation of the candidate's results (from the dissertation work on the study of two-layer contacts) and successfully expanded for a stack of Josephson's contacts.

The corresponding system of nonlinear partial differential equations is solved using a standard three-point approximation with finite differences on the spatial coordinate and using the Runge-Kutta method to solve the corresponding Cauchy task.

The created parallel algorithm is implemented through the MPI (Message Passing Interface) and for one of the parallel algorithms is shown that provide 9-times acceleration of the calculations.

Models of Josephson's contacts with magnetic impulses are discussed in articles NN: 18 and 19.

When solving the corresponding differential equations, considerable computational difficulties have been overcome in the spintronic model of Josephson's contact.

Reference for publications and citations by Assistant Prof. Pavlina Khristova Atanasova, PhD

The candidate is presented for the "Associate Professor" competition with 19 scientific publications (3 of them are presented for acquiring position of "assistant professor").

Three articles were published in Impact Factor journals (total IF = 3.021 - based on Web of Science), Q2, Q3 and Q4 respectively, and 9 in SJR journals (total SJR = 2.206).

The candidate also participated in the competition with 3 teaching books (2 of them are University Publishing House Paisii Hilendarski - Plovdiv, for one of which is presented sharing protocol between co-authors - for equal participation).

These works are not presented for the acquisition of the educational and scientific degree "doctor" (2011), which satisfies the requirements in the sense of ZRASRB, the Regulations for the implementation of ZRASRB and the Rules of PU "Paisii Hilendarski" for the implementation of the ZRASRB.

The applicant has submitted a list of 12 citations, of which 7 are in journals with IF; total IF: = 6.759 and scores from Q1 to Q4.

Remark 1. In the process of preparing the opinion for the candidate I found annoying inaccuracy – in "Citations list", citations with NN 5 and 8 are duplicated, which require reduction in "Reference for compliance with minimum national requirements" in Group "D" instead of 92 becomes 84. This, of course, is not fatal, because at least 50 of this indicator is required!

Remark 2. During the preparation of the Opinion, I found that the publication No 13 (from a list of publications to participate in the competition) was also cited in:

N. A. Kutovskiy, A. V. Nechaevskiy, G. A. Ososkov, D. I. Pryakhina, V. V. Trofimov, Simulation of interprocessor interactions for MPI-applications in the cloud infrastructure, COMPUTER RESEARCH AND MODELING 2017 VOL. 9 NO. 6 P. 955–963 DOI: 10.20537/2076-7633-2017-9-6-955-963 with **SJR=0.19**

The citation No. 7 with **SJR: = 0.192** (not noted by the candidate).

This indicates that the minimum requirements to this indicator also have been exceeded.

In general, the minimal national requirements for required points by groups of indicators for the academic position of "Associate Professor" have been satisfied.

The additional requirements of FMI in connection to PRAS in the RB of the PU for acquiring the position were fulfilled, namely at least 5 publications in journals; at least 3 publications in IF journals and evidence of at least 5 citations.

I have not found plagiarism in the candidate's works within the meaning of the ZRAS in RB.

I will expressly note that Assistant Prof. P. Atanasova presented a reference list for participation in 17 scientific-research and educational projects (4 to NPD of the University of Plovdiv and 13 international, mostly joint projects between JINR-Dubna and Bulgaria, where the candidate is the head of 9 of them.

This is also one of my reasons to give high mark to the applicant's overall research work.

CONCLUSION.

All that has been said so far about the candidate's submissions in the competition is clear that it is received sufficient scientific contributions in the area of "Numerical Modeling of Josephson's nanostructures".

As I have in mind the very good teaching activity, I am fully convinced that Assist. Prof. Pavlina Atanasova meets the requirements of the ZRASRB, the Regulations for the implementation of the ZRASRB, the Rules of the University of Plovdiv "Paisii Hilendarski" for the application of the ZRASRB for acquiring the academic position "associate professor".

Therefore, my conclusion on the appointment of the announced by the competition academic position "Associate Professor" for Assist. Prof. Pavlina Khristova Atanasova, PhD is POSITIVE.

I suggest to the Honorable Scientific Jury to propose unanimously to FS of FMI at University of Plovdiv "Paisii Hilendarski" to choose the candidate Assist. Prof. Pavlina Khristova Atanasova, PhD for the Academic Position "Associate Professor" in area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5. Mathematics (Computational Mathematics).

September 1, 2019

Signature:

/Prof. Nikolay Kyurkchiev, PhD/