STATEMENT

By Prof. D.Sci. Ognyan Kounchev, IMI-BAS

On the competition for an academic position of Assoc. Professor

In professional direction 4.5 Mathematics,

For the needs of Institute of Mathematics and Informatics, BAS,

Announced in the State newspaper, number 30/13.04.2021,

and online on the website of IMI-BAS

The present Statement has been prepared by Prof. DSci Ognyan Kounchev, IMI-BAS, as a member of a scientific jury, in the professional direction 4.5 Mathematics, scientific area Differential Equations, by a competition according to an Order number № 105/15.06.2021 by the Director of IMI-BAS, announced in the State newspaper, number 30/13.04.2021. For participation in the competition, the only candidate who has submitted documents is Assist. Borislav Tsonev Yordanov, PhD, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences.

1. Data about the application

The documents submitted by the competition by the candidate comply with the requirements of ZRASRB, PPZRASRB, the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions in the Bulgarian Academy of Sciences (PURPNSZAD-BAS) and the Regulations on the terms and conditions for acquisition scientific degrees and for holding academic positions at the Institute of Mathematics and Informatics at BAS (PURPNSZAD-IMI-BAS).

The documents are regular and correctly reflect both the scientific and teaching activities of the candidate and his employment in national and international research projects.

2. Data about the applicant

Dr. Borislav Yordanov graduated with a bachelor's degree in Mathematics from the Faculty of Mathematics at Sofia University "St. Kliment Ohridski", as well as a master's degree in the same faculty with a degree in Differential Equations in 1991.

In 1998-2002 he was a PhD student at the University of Wisconsin - Milwaukee, WI, USA, where he defended his dissertation for PhD on "Global solutions of nonlinear wave equations with damping", under the supervision of Dr. Albert Milani.

He worked as a researcher at IMI-BAS from 1994-1998, he was an assistant professor at the University of California-Riverside, California, USA and the University of Tennessee-Knoxville, Tennessee, USA, from 2002-2007. Associate member of IMI-BAS from 2011-2013, and assistant from 2013 until now.

In the meantime, he is a visiting scientist and lecturer at the University of Tennessee-Knoxville, Tennessee, USA (2011-2013), as well as at Hokkaido University, Sapporo, Japan, ISP - International Science Program.

3. **General characteristics of the scientific publications and achievements of the candidate**

The scientific activity of Dr. Borislav Yordanov is primarily in the field of partial differential equations of hyperbolic type, describing wave processes, and in particular in the subfields:

a) Low - frequency approximations of the solutions of linear dissipative wave equations and their applications

b) Asymptotic behavior and smoothness of solutions of wave equations with nonlinear dissipation

c) Absence of global solutions of wave equations with power nonlinearity

A general list of publications is presented, containing 23 publications in magazines and 1 preprint, of which 18 for participation in the competition.

The articles have been published since 2005 primarily in renowned journals in mathematics and mathematical physics, such as: in Trans. AMS (2), Discrete and Continuous Dynamical Systems-A, Nonlinear Analysis, Journal of Differential Equations (3), Journal of Mathematical Analysis and Applications (2), Nonlinear Analysis: Theory, Methods and Applications, SIAM Journal on Mathematical Analysis (2)), Journal of the Mathematical Society of Japan (2), Funkcialaj Ekvacioj, Indiana Univ. Math. J., J. Funct. Anal., Journal of non-crystalline solids.

All submitted publications are co-authored. I accept that the candidate's contribution to the joint work is significant and is equal to his co-authors. A list with about 200 latest citations (without auto-citations) of the works participating in the competition is presented, as the above are according to the order of the articles in the list. The full list of citations is significantly larger.

In connection with Art. 2 of the Rules of IMI for the "minimum required points by groups of indicators" for the candidate for associate professor, Dr. Borislav Yordanov, the following is obtained: A - 50 points; B - over 600 points; G - 254 t .; D - 144 points; E - 40 points. In accordance with the criteria, I positively evaluate the scientific work of Borislav Yordanov: The presented articles exceed the minimum national scientometric requirements (under Art. 2b, para. 2 and 3 of ZRASRB) and respectively the additional requirements of IMI-BAS for occupying the academic position "Associate Professor" in the scientific field and professional field of the competition.

The author's reference correctly reflects the content and contributions in the works of Dr. Borislav Yordanov. He works in the field of Partial Differential Equations, related to the study of nonlinear partial differential equations, some of which have applications in physics, and in particular, in the global existence and asymptotic behavior of solutions of second-order hyperbolic PDEs.

The main methods are based on various estimation techniques, as well as on the use of functional analysis methods, where the hyperbolic problems are reduced to equations in a suitable Hilbert space.

Dr. Borislav Yordanov demonstrates competence in the subject of the competition, good awareness in the areas in which he works, the publications are written in clear and precise language.

Due to the limited scope of this Statement, a detailed analysis of all submitted publications is not expected. Following the conditional division into three groups of publications indicated by the author, let us dwell briefly on the works in each group:

a) Articles [6, 10, 11, 12, 14] are devoted to the problems of low-frequency approximations of the solutions of wave equations with linear attenuation and their applications. The results were obtained in the period 2005-2016 and are dedicated to the Cauchy problem for wave equations with dissipation of a special kind, as the right part may depend on the unknown function; in the latter assumption the problem becomes nonlinear. The question of the behavior of the solution in long times has been studied. In particular, a technique based on reducing the problem to a dynamical system in Hilbert spaces using the spectral decomposition of self-coupled operators has been used.

b) In the articles [4, 5, 7, 13, 16] problems related to the asymptotic behavior and smoothness of solutions of wave equations with nonlinear dissipation are considered, and the results are obtained in the period 2007-2017. The subject of research is the interaction between nonlinear attenuation and nonlinear source in wave equations. Here are a few basic tasks: studying the behavior of energy when time grows indefinitely; study the smoothness of the solutions at all positive times, when the initial data have a certain regularity.

c) In the articles [2, 3, 17, 18] issues related to the non-existence of global solutions of wave equations with power nonlinearity are investigated. The results were obtained in the period 2006-2018. The properties of a basic model for the propagation of nonlinear waves are considered. For the first time, it has been shown that positive solutions have a finite lifespan. The technique of appropriate averaging operators is used.

4. Characteristics and evaluation of the teaching activity of the candidate

The attached information shows that Dr. Borislav Yordanov has participated in national and international scientific and educational projects. He has been most active in teaching in the United States and Japan.

5. Participation in projects

The attached report shows that Dr. B. Yordanov has participated in three projects.

6. Critical remarks and recommendations

I have no critical remarks. I have known Dr. Borislav Yordanov since he joined IMI, I have attended his reports at seminars. My impressions are that he is hardworking and actively working in a current field of PDEs.

7. Conclusion

I believe that Assistant Professor Dr. Borislav Yordanov fully satisfies the requirements of ZRASRB for the competition position, also in the articles submitted for the competition there is no plagiarism. I recommend to the scientific jury to propose to the Scientific Council of the Institute of Mathematics

and Informatics to choose Assistant Professor Dr. Borislav Yordanov as an associate professor in professional field 4.5 "Mathematics" in the scientific specialty "Differential Equations".

August 10th, 2021   Prepared by Prof. D.Sci. O. Kounchev

Sofia