

## STATEMENT REPORT

by

Prof. DSc Angel Borisov Dishliev

University of Chemical Technology and Metallurgy – Sofia

of the materials submitted for the participation on the competition for the academic position of “Associate Professor” for the needs of Institute of Mathematics and Informatics (IMI) at Bulgarian Academy of Sciences (BAS),

**Scientific field:** 4. Natural Sciences, Mathematics and Informatics;

**Professional field:** 4.5. Mathematics;

**Scientific specialty:** Differential Equations

The competition for “Associate Professor” was announced in the State Gazette (SG) , № 30/13.04.2021) and on the website of IMI - BAS. The academic position is for the needs of the section Differential Equations and Mathematical Physics of the same institute. The only candidate for participation in the competition is Assistant Professor Dr. Borislav Tsonev Yordanov from IMI - BAS.

### 1. GENERAL PRESENTATION OF THE PROCEDURE AND THE APPLICANT

I have been appointed as a regular member of the scientific jury of the competition for the above academic position "Associate Professor" of the Scientific Council of IMI - BAS (Protokol № 11 (10/06/2021). On this occasion, an order was issued to the Director of IMI № 105/15.06.2021. At the first meeting of the scientific jury, I was appointed to prepare a statement on this competition.

The set of electronic materials presented by Dr. B. Yordanov is in accordance with the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions at the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences. The set includes the following documents:

**1.1. European CV:** The candidate for the academic position "Associate Professor" graduated from the Faculty of Mathematics and Informatics (FMI) of Sofia University "St. Kliment Ohridski" in 1990. From 1998 to 2002 he completed a doctoral program and defended his PhD thesis at the University of Wisconsin - Milwaukee, USA.

The professional realization of the candidate is as follows:

- IMI - BAS (research associate),
- Technical University - Sofia (Assistant Professor),
- University of California-Riverside, California, USA (Assistant Professor),
- University of Tennessee-Knoxville, Tennessee, USA (Assistant Professor),
- Hokkaido University, Sapporo, Japan (Assistant Professor).

His teaching activities include courses in bachelor's programs in the following disciplines: linear algebra, mathematical analysis, vector analysis, ordinary differential equations, partial differential equations, numerical methods, etc.;

**1.2. Diploma for completed higher education:** The diploma was issued by FMI at Sofia University in 1990. Dr. Yordanov graduated with excellent results and excellent success in the specialty Differential Equations;

**1.3. Diploma for educational and scientific degree "Doctor":** The topic of B. Yordanov's dissertation is: "Global solutions of nonlinear wave equations with damping". The Doctor's degree was awarded in 2002 at the University of Wisconsin, USA. The diploma is recognized in Bulgaria;

**1.4. Publications:** The list of publications of Dr B. Yordanov consists of 21 publications with impact factor, which are referenced in Web of Science and Scopus and 2 publications in other editions. The Scopus h index is 14;

**1.5. List of publications for participation in the competition:** The list includes 18 publications with impact factor, which are referenced in Web of Science and Scopus. The quality of the publications can be judged from the high level of the journals in which they are published:

number of publications	Level of the journals in which they are published
12	Q1
3	Q2
2	Q3
1	Q4

**1.6. Copies of the publications for participation in the competition:** I accept the presented scientific papers (without exception) for preparing the opinion on this competition, because:

- They have not been used in the PhD thesis,
  - They correspond to the scientific field and professional field, and scientific specialty of the competition under discussion,
  - The results obtained in the submitted scientific papers do not match,
  - I have no doubt that the results have been misappropriated by other authors (plagiarism).
- According to the number of authors, the publications can be divided as follows: 10 with two co-authors, 7 with three co-authors, 1 with five co-authors;

**1.7. General list with all citations of the articles:** According to Scopus, the citations of the scientific works of the candidate are 766 (some auto-citations are not excluded). The cited works are a total of 21. The citations are made in 503 publications.

**1.8. List of citations of the articles, included in this competition:** 197 citations of 16 scientific papers of the candidate for associate professor are presented. The citations are according to Scopus and are without auto-citations. The cited citations are less than the actual ones, as for the majority of the cited publications of only their last citations are given.

**1.9. Implementation of the minimum national requirements of LDASRB - art. 2b, par 2 and 3, and art. 2b, par. 5, as well as the minimum requirements of IMI-BAS:**

The implementation of the minimum requirements is shown in the following table:

Indicator	Minimum number of points	Presented	Points available
A. Dissertation	50	Dissertation	50
B. Habilitation - scientific publications	100	4 publications in the scientific journals from Q1 in WoS and Scopus: 4x50=200 points	200
C. Scientific publications (out of	220	14 publications in the scientific journals, as	660

Habilitation work)		follows: Q1 – 11, 11x50=550 points; Q2 – 2, 2x40=80 points; Q3 – 1; 1x30=30 points	
D. Citations in scientific journals	70	There are 24 citations in the articles published in journals referenced in WoS and Scopus 24x6 = 144 points	144
E. Participation in a national project; Participation in an international project	20	2 national projects: 2x10=20 points 1 international project: 1x20=20 points	40

The table above shows that the minimum indicators are exceeded at least twice, moreover not all the achievements of the candidate are taken into account.

In additional, six documents are attached to the documents for participation in the competition, which are required by the respective regulations:

**1.10. Information for the scientific contributions in the papers on the competition;**

**1.11. Summaries of the publications for participation in the competition;**

**1.12. State Gazette with the announcement of this competition;**

**1.13. Certificate of internship in the specialty;**

**1.14. Declaration for non-use of the scientific results of this competition for associate professor in the PhD theses of the candidate for acquiring scientific degrees;**

**1.15. Declaration of consent for storage and processing of personal data.**

## **2. GENERAL CHARACTERISTICS OF THE ACTIVITY OF THE CANDIDATE**

**2.1. Assessment of the candidate's educational and pedagogical activity:** The candidate has many years of teaching experience gained in the universities in Bulgaria (Technical University of Sofia) and abroad (University of Tennessee-Knoxville, University of California-Riverside, Hokkaido University). He has taught basic subjects in the Bachelor's degree. He has been a supervisor of a student who has defended successively his master degree. The candidate has not his own textbooks and teaching programs.

**2.2. Assessment of the scientific activity:** In general, the scientific results of the candidate for associate professor are concluded in filling, enriching and generalizing the scientific knowledge on certain topics from the theory of hyperbolic partial differential equations. In essence, his results represent the formulation and proof of new scientific facts, as well as the confirmation of hypotheses. The research is mainly theoretical in nature, but is provoked by the study of real dynamic processes. The results obtained exceed significantly the requirements (as well as my expectations) for the quantity and quality of the presented research for the academic position of "associate professor" in a prestigious scientific institute.

The scientific work of Dr. B. Yordanov (although reduced for participation in this competition) is diverse and largely original in terms of the studied specific tasks. As I said above, the main object of study are hyperbolic partial differential equations of the second order (wave equations). Dr. Yordanov's results can be divided into three main groups:

- **Approximations of the solutions of wave equations with linear attenuation:**

Several questions related to the behavior of the solution  $u(.,t)$  of the corresponding initial Cauchy problem for the wave equation have been studied. The research is performed: in space  $L^2$  with an unlimited increase in time ( $t \rightarrow \infty$ ) and with special

right sides ( $f = 0$ ;  $f = \pm |u|^{p-1} u$ ,  $p > 1$ ). An analogue is introduced in the appropriate Hilbert space  $H$  for the considered problem

The investigation of this problem is reduced to the behavior assessment of the solution of the analogous problem. The main difficulties stem from the lack of a common formula for the solution. The most serious result is finding an estimate between two complicate expressions, in one of which the solution of the considered problem participates, and in the other - the initial data of the problem. In specific relatively simple assumptions, estimates of the rate of decrease of the solution with increasing time have been found.

- **Asymptotic behavior and smoothness of the solutions of wave equations with nonlinear attenuation:** The interaction between nonlinear attenuation and nonlinear source in some classes of wave equations is investigated. In these classes, energy decreases over time. In some special cases (which are obtained under certain constraints of the parameters in the equation) the smoothness of the solutions of the equations depending on the qualities of the initial data is investigated. Under certain limitations of the parameters, the interesting implicit estimate is obtained for reduction of the energy of the considered equation.
- **Absence of the global solutions (solution burst) of some classes of nonlinear wave equations:** The candidate studies a typical right-side wave equation of the type  $|u|^p$  where  $u$  is the unknown solution. The degree  $p$  has a decisive role in the explosion of the solution for a limited time. Specifically, for "small values" of the degree, the solution has a limited existence in time, and for "large values" of the degree, the solution is global.
  - The candidate's contributions refer to the case where the degree  $p < p_0(n)$  where  $p_0(n)$  is the positive root of equation  $2 + (n+1)p - (n-1)p^2 = 0$  and dimension is  $n \geq 4$ . In this case, it was found that the solution has a finite lifetime.

**2.3. Evaluation of the personal contribution of the candidate:** All the articles with which the candidate participates in the competition are co-authored with other specialists. I am not informed about the existence of a declaration for internal distribution of the authors' participation in the preparation and publication of the research attached to the competition under discussion. Therefore, I believe that the participation of Dr. B. Yordanov is equivalent to the other co-authors. I do not think that the authors' "arrangement" in the common scientific works reflects with the degree of their participation in the creation of the articles.

**2.4. Critical remarks and recommendations:** I have no critical remarks. The documents are prepared precisely. In places, the author demonstrates professional ethics and modesty, which evokes respect in the reader. It seems to me that the obtained scientific results of the candidate should be systematized in a monograph, which will undoubtedly arouse interest among the scientific community.

## CONCLUSION

The documents and materials submitted by Dr. B. Yordanov meet all the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for implementation of LDASRB and the respective Rules of IMI - BAS.

The candidate for the academic position has submitted a sufficient number of scientific papers published after the materials used in the defense of the educational and scientific degree "Doctor". The candidate's works are original scientific contributions that have received international recognition, all of which have been published in journals with IF, are reflected in WoS and Scopus database and have been cited many times by other authors in prestigious journals.

The results achieved by the candidate in the research activity significantly exceed the specific minimum requirements of IMI - BAS, adopted in connection with LDASRB, the Regulations for application of LDASRB and the Regulations for the terms and conditions for acquiring scientific degrees and for holding academic positions in the Bulgarian Academy of Sciences.

After getting acquainted with the materials and scientific papers presented in the competition, analyzing their significance, I find it is reasonable to give my positive assessment and recommend to the Scientific Jury to prepare a report-proposal to the Scientific Council of IMI for the election of Borislav Tsonev Yordanov to the academic position " Associate Professor "at IMI - BAS in professional field: 4.5. Mathematics and scientific specialty: Differential equations.

Date: August 05

Member of the Scientific Jury: .....

(Prof. DSc Angel Dishliev)