

PREFACE

The Eighteenth International Workshop on Nano-Design, Technology and Computer Simulations (NDTCS-2019) took place on September 24-26, 2017 in Brest, Belarus. The workshop NDTCS-2019 was organized jointly by Brest State A.S. Pushkin University (Belarus) and the St. Petersburg Academy of Sciences on Strength Problems (Russia). More than 80 participants including scientists, teachers, graduate students and undergraduates from Belarus, Germany, Mexico, Poland, Romania and Russian Federation prepared and delivered more than 60 reports. The Eighteenth Workshop was focused on nanomaterials, computational methods of mechanics, geometry in physics and physical-mathematical methods of investigation.

EPAM systems and the Belarusian Republican Foundation for Fundamental Research acted as the partners and supporters of the Workshop.

Workshop NDTCS-2019 is a continuation of the previous workshops, which were held in:

- Russia (9), *St. Petersburg* 1997-2005
- Poland, *Olsztyn* 2006
- Germany, *Bayreuth* 2007
- Belarus (4), *Minsk* 2008, 2013, 2017, *Grodno* 2015
- Lithuania, *Vilnius* 2009
- Finland, *Espoo* 2011

The first nine workshops, which took place in Russia, had the name “Nondestructive Testing and Computer Simulations in Science and Engineering.” In due course, the focus of the meetings gradually moved towards Nanoscience and Nanotechnology, so the following workshops (2007-2017) had the new name “International Workshop on New Approaches to High-Tech: Nano-Design, Technology and Computer Simulations” what reflects better their profile.

All the contributions to the Workshops were published in English:

- Modelling and Computer Simulation in Materials Science and Engineering, **6** (4) 1998
- Proceedings of St. Petersburg Academy of Sciences on Strength Problems (SPAS), vols. **2-11**, 1998–2007
- Proceedings of the International Society for Optical Engineering (SPIE), vols. 3345, 3687, 4064, 4348, 4627, 5127, 5400, 5831, 6253, 6597, 7377; 1998–2008
- Proceedings of NDTCS, vols. **12-17**, 2008, 2009, 2011, 2013, 2015, 2017
- Reviews on Advanced Materials Science, **20** (1, 2) 2009
- Materials Physics and Mechanics, **9** (1-3) 2010; **13** (1-2) 2012; **20** (1-2) 2014; **34** (1) 2017, **39** (1) 2018, **41** (1) 2019
- St. Petersburg State Polytechnical Journal. Physics and Mathematics, **2** (242), **3** (248), **4** (253) 2016; **10** (1) 2017

This issue of Materials Physics and Mechanics Journal contains some selected papers presented at the Workshop. All the papers have been peer-reviewed prior to publication. The issue will be of interest to researchers and graduate students in the field of nanotechnology, physics, chemistry, and mechanics.

The workshop is dedicated to the memory of Vladimir Alexandrovich Palmov. He was for a long time the Dean of the Physics-Mechanics Faculty of St. Petersburg State Polytechnic University and the Vice-President of St. Petersburg Academy of Sciences on Strength Problems. The issue reflects also different sides of the activity of both Institutions.

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Vladimir Alexandrovich PALMOV
(1934-2018)

The outstanding scientist in the field of mechanics, Doctor of Physical-Mathematical Sciences, Professor Palmov V.A. was born in 1934, July 7, in Batumi. After finishing a secondary school, he went to Leningrad Polytechnical Institute (now Peter the Great St. Petersburg Polytechnic University) in 1952 and graduated from the Physics-Mechanics Faculty with summa cum laude in 1958; his specialty having been Dynamics and Strength of Machines. From 1958 to 2018 V.A. Palmov worked at the Department Dynamics and Strength of Machines (now Mechanics and Control Processes) of the same University, at first as a senior laboratory-assistant (1958-59), then as an engineer (1959-60), as an Assistant Professor (1960-64), as an Associated Professor (Dozent, 1964-75), as a Full Professor (1974-78), and since 1978 as the Head of the Department. He was elected the Dean of Physics-Mechanics Faculty (1985-2001). Since 1994 V.A. Palmov was the Vice-President of St. Petersburg Academy of Sciences on Strength Problems.

His outstanding academic career is tightly connected with his scientific achievements. V.A. Palmov has defended Ph.D. thesis (Physics & Mathematics) in 1963 and Dr.Sc. thesis (Physics & Mathematics) in 1972. Under his direction, there is done a great deal of scientific research works in the field of aircraft building, rocket production, shipbuilding, power machine building, thermonuclear plants, etc. The works are connected with the vibrations of complex dynamical systems, their strength and plasticity, energy dissipation and so on. Among them there are forecasting the high-frequency vibration of aircrafts, mathematical treatment and calculation of the unloading-system parameters for the 6-meter telescope of AN USSR and many other theoretical and applied investigations.

V.A. Palmov has an infallible memory and exceptional intellectual faculties. That helped him to win scientific discussions even when he was a student. His teacher, the corresponding member of the Academy of Sciences of USSR, Anatoly Isakovich Lurie said: "Palmov's peculiarity consists in his ability to see five meters underground."

In addition to intensive research activity, teaching was an important part of Palmov's life. Being an excellent lecturer, he lectured classical courses on Analytical mechanics, Elasticity theory, Theory of shells. Moreover he developed and lectured original courses: Mathematical foundations of the theory of strength and plasticity, Mechanics of deformed solid bodies, Modern problems of nonlinear mechanics of deformed medium. On the base of these courses V.A. Palmov has written several monographs which were published in Russian and English, e.g. *Vibration of Elasto-Plastic Bodies*, Springer-Verlag, Berlin, 1998. As a result of his great activity both in scientific and educational field, a lot of his disciples have become PhD, Doctors of Sciences, Professors; now they are working with success in science, industry and education in our country and abroad.

V.A. Palmov was widely known as an outstanding scientist not only in our country but also among the international community of mechanic-scientists. In the USSR and Russia, he was many years the member of the National Committee on Theoretical and Applied Mechanics, Scientific Council on Strength and Plasticity of Russian Academy of Sciences (RAN), he entered into the Editorial Board of the Journal "Proceedings of RAN. Mechanics of Solids". He was twice the Laureate of the State Stipend for outstanding scientists of Russia (1996-2000).

V.A. Palmov was in close collaboration with the leading mechanic-scientists of Austria, Belgium, Germany, Italy, Portugal, UK, USA, etc. He was the member of the International Society of Mechanics-Mathematics Interaction (ISIMM), European Society of Mechanics (EUROMECH) and the International Association of Applied Mathematics and Mechanics (GAMM). He frequently traveled and visited many countries being an Inviting Lecturer and Visiting Professor.

It should be emphasized that in spite of his great achievements, V.A. Palmov was a very modest person. Contrary to the wide-spread manner, he never tried to get registered to the activities where his role was decisive at the early stage but later was becoming only administrative. Being the Dean of the Physics-Mechanics Faculty and the Vice-President of the St. Petersburg Academy of Sciences on Strength Problems (SPAS), V.A. Palmov wasted a great deal of energy for authorizing the International Workshop Nondestructive Testing and Computer Simulations in Science and Engineering, but he refused to be the Chair leaving for himself only the role of the member of International Scientific Advisory Committee. He explained his position to the University's administration in the following way: "I gave them only support, they made everything else".

V.A. Palmov was a cheerful person. He liked mountain skiing and water skiing. Frequently with his wife he took sightseeing of the uninhabited islands of numerous lakes and rivers in the North-West region of Russia. It's interesting that he used for that purpose a small motor-driven boat, which was built by him.

There is no doubt that V.A. Palmov was a splendid, sincere, decent, and noble person with a great sense of responsibility for any problem he dealt with. He was a very hard-working person with high standards for himself as well as for his colleagues.

We will hold Vladimir Alexandrovich Palmov as an eminent person, scientist, and teacher in our hearts forever.



Colleagues and Friends