

PREFACE

The Fifth Yugoslav Symposium on Nonlinear Mechanics - NONLINEAR SCIENCES AT THE THRESHOLD OF THE THIRD MILLENNIUM (YUSNM NIŠ '2000) held in Niš, Yugoslavia on October 2-5, 2000. at the Faculty of Mechanical Engineering, was dedicated to the 40th Anniversary of the Faculty of Mechanical Engineering and Faculty of Civil Engineering and Architecture, as well as to the 35th Anniversary of the University of Niš. The Symposium was organized under the patronage of the Department of Technical Sciences, Serbian Academy of Sciences and Arts.

The Proceedings of Abstracts contain 11 abstracts of *Invited Plenary Lectures*, 14 *Abstracts of Invited Lectures* and 81 abstracts of *Short lectures* accepted for presentation at the *Fifth Yugoslav Symposium on Nonlinear Mechanics* (YUSNM NIŠ '2000) held in Niš, Yugoslavia October 2-5, 2000.

Invited Plenary Lectures were published as invited papers in the last issues of University scientific journal *Facta Universitatis*, Series *Mechanics, Automatic Control and Robotics*, Vol. 2, No. 1 of 3, 2000, Vol. 2, No. 2 of 3, 2000, and Vol. 2, No. 3 of 3, 2000.

Some of the short communications and contributed lectures presented at YUSNM NIŠ '2000 were accepted for publication and included in this issue of Series *Mechanics, Automatic Control and Robotics* as papers.

The Fifth YUSNM NIŠ '2000 was a continuation of the following symposiums and conferences: *The First Symposium on Nonlinear Dynamics 1983.*, Arandjelovac, 23-25 November 1983; *First Yugoslav Conference on Nonlinear Deterministic and Stochastic Processes in Dynamical Systems with Applications* YCNP Niš '91, August 27-30, 1991 at the Faculty of Mechanical Engineering University of Niš, as well as of two *Minisymposiums on Nonlinear mechanics under the patronage od Yugoslav Society of Mechanics*, XXII and XIII Yugoslav Congress on Theoretical and Applied Mechanics Niš '95 and Vrnjačka Banja '97.

Academician *Yuri Alekseevich Mitropolski*, a prominent scientist, who is well known all over the world and who gave outstanding contribution to the nonlinear mechanics, gave a General Lecture entitled "*Adiabatic Processes in Nonlinear Oscillatory Systems*". Academician Mitropolski was a distinguished guest of the Faculty of Mechanical Engineering University of Niš at that Symposium and was the only participant from abroad.

The Chairman of the Organizing Committee of this first Symposium was K. (Stevanović) Hedrih, and she gave a Contributed Lecture entitled "Asymptotic Solution of the equations of nonlinear oscillations of thin elastic shells with positive Gauss's curvature in two-frequency regime".

Among 32 contributed lectures at the *First Symposium on Nonlinear Dynamics Arandjelovac '83* nine were given by the scientist working at the Faculty of Mechanical Engineering University of Niš.

The *First Yugoslav Conference on Nonlinear Deterministic and Stochastic Processes in Dynamical Systems with Applications* YCNP Niš '91, was held on August 27-30, 1991 at the Faculty of Mechanical Engineering University of Niš. Proceedings - Abstracts of

Lecture contain the abstracts of Invited Lectures written by prominent Scientists: **Vladan Đorđević** (YU), **William Nash** (USA, Editor in Chief, at present Editor Emeritus, of a famous and well known international Journal Nonlinear Mechanics, published by Pergamon Press), who took part in Conference, **Kazuyuki Yagasaki** (Japan, young scientist with significant scientific results) and others.

Academician **Yu. A. Mitropolski** was the invited participant with Plenary Lecture at the XXII Yugoslav Congress on Theoretical and Applied Mechanics Niš '95 as well as at the Minisymposium on Nonlinear Mechanics Niš '95. Academician **Felix Chernousko**, academician **Valentin Rumyantsev** and professor **A. M. Martinyuk** gave the invited Plenary Lectures at Yugoslav Minisymposiums on Nonlinear Mechanics as well.

It is time to remember those who have initiated the research on nonlinear mechanics at the Chair for mechanics and at the Faculty of Mechanical Engineering in Niš. **Professor Danilo P. Rašković** organized, at the Faculty of Mechanical Engineering first postgraduate studies in the area of Applied Mechanics. *He directed his postgraduate students towards the study of nonlinear mechanics and nonlinear oscillations.* He sent his student to specialize in the fields of *mathematical physics, nonlinear differential equations and nonlinear mechanics* at the Institute of Mathematics of the Ukrainian Academy of Sciences, under the mentorship of distinguished Yuri Alekseevich Mitropolski.

Professor Danilo Rašković, the first Head of the Chair for mechanics and academician Yuri Mitropolski, with their work have had a permanent influence on the members of the Chair of Mechanics at the Faculty of Mechanical Engineering in Niš; it is, therefore logical that the Fifth Symposium on Nonlinear Mechanics will again be held in Niš, in 2000., at the threshold of the Third Millennium. Academician Mitropolski is a Chairman of the Symposium.

During the last two decades, academician of ANS, **Veljko A. Vujičić** gave scientific support in the organizations of the Symposia on Nonlinear Mechanics at the Faculty of Mechanical Engineering in Niš.

For the last five years, academician of RAN **Vladimir Matrosov** and academician of RAN **V. Rumyantsev**, have also supported our symposia with Lectures in the area of nonlinear mechanics. Professor **Giuseppe Rega** from Italy, and academician **Anthony Kounadis** from Technical University Athens gave their contribution too. Professor **B. Vujanović**, a corresponding member of SASA, helped to organize the symposia.

Nonlinear Mechanics is a subject of great importance in the development of science and technology. The aim of the Symposium was to provide a forum to exhibit the progress in this field during the past three years and a place to further the interaction of modern mathematics and modern mechanics, as well as modern engineering sciences. The Symposium provided an extraordinary opportunity for scholars to meet and discuss recent advances in Nonlinear Mechanics. The participants represented a wide range of expertise, from pure theoreticians to people primarily oriented toward applications. A significant achievement of the Symposium was the very extensive discussions taking place over the whole range from highly theoretical questions to practical engineering applications.

A main conclusion, from a total of 105 abstracts of lectures presented in this proceedings, that can be drawn is that nonlinear mechanics as a subject has gained in extent as far as both methodology and applicability are concerned.

Professor **W. Schieler** from University of Stuttgart, president of IUTAM, wrote: "*So what is new in nonlinear dynamics and Mechanics today?* First scope of applications in solid mechanics has broadened to cover material processing, inelasticity and fracture me-

chanics. In rigid body dynamics, more complex systems such as vehicles, robotics and controlled machines have come into the puview of nonlinear dynamics. On the mathematics side of nonlinear dynamics, it is now recognized that spatio-temporal problems, hysteretic and time delay problems are the new frontiers in this field. Also the term "complexity" has been added to the lexicon of chaos theory to describe the dynamics of many interacting sub systems which can exhibit self organization and evolution. Complexity analysis has gained a foothold in biological and some social sciences as well as in fluid and chemical physics. It remains to be seen what implicit it will have in applied mechanics and engineering".

A sequence of Symposiums has been supported by scholars, dealing with Nonlinear sciences, from Ukraina, Russia, Italy, Greece, USA, Poland, Chaina, Israel, England,..., who did not agree with injustice Yugoslavia was suffering for the last decade.

Here I would like to express my heartfelt thanks to all member of the scientific Committee and also to the participants for their engagement in organizing of the Symposium, including the preparation of the manuscripts for publishing in the University Journal Facta Universitatis, Series Mechanics, Automatic Control and Robotics, Series Mechanical Engineering and Series Civil Engineering.

I would like to welcome new papers in interdisciplinary areas of nonlinear sciences hoping that creative efforts and achievements will prevail over preemption.

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