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MODELING AND ANALYSIS OF CONTINUOUS DYNAMICAL SYSTEMS

The 11th International Conference devoted to "Dynamical Systems – Theory and Applications" hold in December 5-8, 2011 in Łódź, Poland, and it was organized by the staff of Department of Automation and Biomechanics of the Łódź University of Technology. It was financially supported by the Rector of the Łódź University of Technology and Department of Education and Physical Culture of the Łódź City Hall.

There were present nearly 120 researchers in significant disciplines of mechanical engineering from over 20 courtiers all over the world, who shared results of their research and experience of their theoretical and practical work.

Following researches were invited to the Scientific Committee of the conference: Marcilio Alves - São Paulo (Brazil), Igor V. Andrianov - Dnepropetrovsk (Ukraine), José M. Balthazar - Rio Claro (Brazil), Wojciech Blajer - Radom (Poland), Tadeusz Burczyński - Gliwice (Poland), Czesław Cempel - Poznań (Poland), Simona-Mariana Cretu - Craiova (Romania), Virgil-Florin Duma - Arad (Romania), Michal Fečkan - Bratislava (Slovakia), David Y. Gao - Blacksburg (USA), Józef Giergiel - Cracow (Poland), Peter Hagedorn - Darmstadt (Germany), Katica Hedrih - Niš (Serbia), Jan Kozanek - Prague (Czech Republic), Vadim A. Krysko - Saratov (Russia), Lidiya V. Kurpa - Kharkov (Ukraine), Claude-Henri Lamarque - Lyon (France), Gennady A. Leonov - St. Petersburg (Russia), Nuno M.M. Maia - Lisbon (Portugal), Leonid I. Manevitch - Moscow (Russia), Bogdan Maruszewski - Poznań (Poland), Yuriy Mikhlin - Kharkov (Ukraine), Gerard Olivar - Manizales (Colombia), Bogdan Posiadała - Częstochowa (Poland), Bogusław Radziszewski - Kielce (Poland), Giuseppe Rega - Rome (Italy), Gábor Stépán - Budapest (Hungary), Jerzy Świder - Gliwice (Poland), Hans True - Lyngby (Denmark), Andrzej Tylikowski - Warsaw (Poland), Tadeusz Uhl - Cracow (Poland), Ferdinand Verhulst - Utrecht (The Netherlands), Jerzy Warmiński - Lublin (Poland), Edmund Wittbrodt - Gdańsk (Poland), Józef Wojnarowski - Gliwice (Poland), Ludmila V. Yakushevich - Pushchino (Russia), Hamad M. Yehia - Mansoura (Egypt), Mikhail V. Zakrzhevsky - Riga (Latvia), Klaus Zimmermann - Ilmenau (Germany).

The Scientific Committee of the conference recommended the some papers to be presented in this special issue from which the following seventeen have been chosen.

R.F. Sultan et al. examine a resemblance of the diverse scenery of banded structural features occurring in Nature in macro- and micro-scale to the Liesegang banding in the display of parallel bands of precipitate. Also investigated is the viability of the development of geochemical patterns, in relation with the various requirements for the growth of Liesegang structures.

N.V. Maksimova and R.G. Akhmetov deals with a boundary value problem for a quasilinear elliptical equation describing a stationary process of convective diffusion near a cylinder. This asymptotic expansion is constructed taking into account the value of chemical reaction for large Peclet numbers and large constant of chemical reaction.

H. Kaminski and P. Fritzkowski compare the Rigid Finite Element Method with the classical Finite Element Method in two-dimensional motion of the rope fixed at one end, while including its elastic and dissipative properties.

A. Nowak describes numerical verification and experimental validation of the Finite Element Method for analysis vibrations of the collecting electrodes. Obtained compatibility of results is acceptable to prove that the proposed model can be applied to analysis in design practice

V.-F. Duma discuss and compare the modulation functions produced by two types of chopper wheels: *the classical device*, with windows with linear edges, and *the eclipse chopper* (with windows with circular edges) as well as the mechanical setup designed and manufactured for testing choppers with rotating wheels.

P. Fritzkowski and H. Kaminski show results of the analysis of the mathematical model based on the Lagrange formalism for two dimensional motion of a hanging rope considered as a mulitibody system with elastic-dissipative joints.

S.-M. Cretu focuses on the analysis and comparison of memorization process with references to its early known beginning. The study first analyses this topic in Plato's work and continues with opinions of other scientists/philosophers.

J. Skocilas et al. focus on the new methodology of determining the material parameters directly from investigated plate basing on analysis of the transient vibrations of rectangular viscoelastic orthotropic thin 2D plate and its deformation models.

J. Awrejcewicz, L. Kurpa and T. Shmatko propose the non-linear strain- displacement relations at the Shell midsurface based on Donell's nonlinear shallow shell theory and Kirchoff's hypothesis, where shear deformations and rotary inertia of shell are neglected.

A. Urbas considers dynamic behavior of the model of the grab crane with flexibly supported base. Using Lagrange's equations of the second order and integrated Newmark's method with iterative procedure for the model of grab c rane with the structure of the open-loop kinematic chain with rigid links, analyzed are influence of different values of vertical stiffness coefficients in the support and means of fixing of the load on its motion.

A. Pielorz and D. Sado present results of studies of the irregular vibrations of discrete-continuous systems consisting of an arbitrary number rigid bodies connected by shafts torsionally deformed. On the basis of the Poincare maps, bifurcations diagrams and the exponents of Lyapunow they discuss possibility of the occurrence of the irregular vibrations.

S. Zolkiewski focuses on the problem of vibrating beams with a variable cross-section fixed on rotational rigid disk. He introduces the Coriolis forces and centrifugal forces and mathematical model of the transportation effect for constructed beam system.

J. Awrejcewicz et al. present examples of the chaotic synchronizations for mathematical model of a mechanical system consisting of a plate and either one or two beams.

G. Litak et al. consider cutting force response in milling process of Inconel. Vibration amplitudes occurrence in time scale is identified via the wavelet and Hilbert-Huang transforms.

A. Balyakin et al. present study of cluster formation in a model of nanotechnology development in Russia proposing the mathematical model in a form of coupled maps and system graphs with special attention paid to the connection between qualitative and quantitative characteristics of the system.

L. Kurpa et al. consider problem of nonlinear vibrations and stability analysis for the symmetric laminated plates with complex shape, loaded by static or periodic load in-plane applying approach based on the R-functions theory and variational methods (RFM).

I. V. Andrianov et al. propose modified three-phase composite model yielding reliable characteristics of composite structure with special attention to the problem of effective heat transfer coefficient of the composite structure with periodically located inclusions of circular cross-sections on a square net.

I do hope that many of the readers of LAJSS will be attracted by topics included in this special issue.

I greatly appreciate both help and encouragement of the LAJSS Editor Professor Marcilio Alves to publish some of the recommended by Scientific Committee papers in this special issue after the standard review procedure.

Finally, I would like also to thank referees and Dr. P. Olejnik for his help in gathering of all manuscripts.

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