Artur Dąbrowski, Ph.D.
Technical University of Lodz
Division of Dynamics

ABSTRACT OF SCIENTIFIC ACHIEVEMENTS

LODZ 2014

LIST OF CONTENTS

1. CURRICULUM VITAE

Artur Dąbrowski, Ph.D.

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Employment

2002-2014 Technical University of Lodz, Department of Mechanics, Division of Dynamics,

- adjunct.

2008-2009 AHE - Humanistic-Economic Academy of Lodz – Lecturer:

1998-2002 Technical University of Lodz, Department of Mechanics, Division of Dynamics,

- assistant.

Education and scientific degrees:

02.1998 MSc	Technical University of Lodz, Department of Mechanics, Institute of Vehicles Title of thesis: "Dynamics of the diesel engine pump injector"
06.2002 PhD	Technical University of Lodz, Department of Mechanics, Division of Dynamics Title of thesis: "Dynamics of the vibro-impact oscillations absorber with the motion limiting stops"
2001-2003	University of Lodz, Department of Mathematics, disrupted by the brain cancer surgeries.

2. SCIENTIFIC ACHIEVEMENT

"Vector method of the Lyapunov exponents estimation"

Series of publications constituting scientific achievement

[1] A.Dąbrowski:"Estimation of the largest Lyapunov exponent from the perturbation vector and its derivative dot product.", Nonlinear Dynamics. (2012) 67: 283–291.
(Impact Factor 3,009).

Citations

Web Of Science	4
Scopus	4
Google scholar:	9

[2] A.Dąbrowski, The largest transversal Lyapunov exponent and Master Stability Function from the perturbation vector and its derivative dot product (TLEVDP), Nonlinear Dynamics (2012) 69:1225–1235.
(Impact Factor 3,009)

[3] A.Dąbrowski: Estimation of the the Largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment simulation.", Nonlinear Dynamics. NODY-D-13-01203R3.
(Impact Factor 2,419)

[4] M. Balcerzak, A.Dąbrowski, T.Kapitaniak, A Jach: Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation, Mechanics and Mechanical Engineering 17 (4) (2013), 325-339, percentage 40%.

Description of the results constituting scientific achievement

The aim of research in above mentioned papers was elaboration of the simple and effective method of the Lyapunov exponents estimation. Those exponents are one of the most important tools used in the nonlinear systems dynamics research.

Main motivation for starting that research was lack of the universal and simple methods of the Lyapunov exponents estimation, and as a consequence existing need of elaboration of the new simple and effective method.

For this purpose I decided to refer to the basic properties of the linear spaces and transformations. I intended to find a way for elimination of the effect of convergence of the perturbation vectors to the eigenvector with the largest eigenvalue for subspaces ordered by the value of the Lyapunov exponent. The above mentioned effect of the vectors convergence forces to vectors orthonormalization to avoid problems connected with the numerical accuracy. Moreover that effect does not allow to analyze transformation properties in directions of the eigenvectors, which are more natural directions of dynamical systems evolution.

At first I decided to analyze behavior of the disturbance derivative instead of the disturbance ratios. It allows for the calculation of the actual Lyapunov exponent value before the numerical integration step without need of logarithmic functions usage. It allows to lower the influence of the numerical errors. Moreover proposed method gives one the information on the system dynamics in explicitly chosen direction. In the particular case analysis made in

directions of the main orthogonal axes of the perturbation ellipsoid allows for estimation of the whole Lyapunov exponents spectrum.

Presented publications constitute the first stage of the research showing consistency of the results for the largest Lyapunov exponent values estimation.

In publication [1] I have introduced the main idea of the method and basic properties of the eigen - vectors and values that allow to use perturbation vector derivative to calculate Lyapunov exponent in explicitly chosen direction. Following the reviewers suggestions, that description was introduced in more detailed versions in the articles [2,3].

In the next part of the publication [1] I have presented results of my research for one and three coupled Duffing oscillators. On the bifurcation diagrams I have showed qualitative and quantitative convergence of obtained results to the ones obtained with use of the Stefański method. On the time diagrams I have shown convergence and stability of the method and its efficiency for different dynamical states of the analyzed systems.

In the article [2] I have used my method to reproduce the results presented in publication:

Stefanski, A., Perlikowski, P., Kapitaniak, T.: Ragged synchronizability of coupled oscillators. Phys. Rev. E 75,016210 (2007).

I have introduced an overview of the use of the transversal Lyapunov exponent and Master Stability Function in investigations of the coupled dynamical systems synchronization. On the example of four coupled Duffing oscillators, and then four coupled Van der Pol oscillators I have shown the effectiveness and consistency of results obtained with use of the developed method.

Publication [3], generally, constitutes preparation to the implementation of the method into obtaining the Lyapunov exponents from the time series and delayed signal analysis. Perturbation analysis was performed on the basis of two identical dynamical systems. One of them represents the reference system, and the second - disturbed one (delayed).

The article presents the results for the Dufing and Van der Pol oscillators, and comparison to ones obtained using the first version of the method presented in [1].

In the article [4] implementation of the method introduced in [3] was presented. Method was used to control the dynamical system and determine the quality of regulation. Presented approach became the basis of the new method of the regulation parameters optimization.

In the article comparison of the commonly used methods of the regulation quality determination with the new proposed one was presented. Moreover efficiency of the method in the implementation to the problem of the control system parameters optimization was shown.

This research is continued under the project nr DI2013 019743 "Application a new method of calculating the Lyapunov exponent in the optimization of the parameters of the control system". - Diamond Gant, participation 40%, fourty percent.

3. PROFESSIONAL CAREER

In 1992, I passed with very good results exams for Technical University of Lodz. Achieved result allowed me to choose any of the department and direction. I chose the Faculty of Electrical Engineering, Electronics direction.

After the first semester, discouraged by way of teaching, I moved to the Department of Mechanical Engineering, which was my first choice, amended by the influence of friends and family arguments. Self-learning of the objects from the first semester at the Faculty of Mechanical Engineering took me about half a year. In that time I had also been studying current subjects and working to have money for the living.

After the fourth semester with an average of about 4.8 I got the elitist direction on Faculty of Mechanical Engineering, Vehicles Mechanics. Unfortunately, the level and methods of teaching once again disappointed me.

I submitted the documents and was admitted to the direction of Aviation at the Technical University of Warsaw. At the same time, the Faculty of Mechanical Engineering Technical University of Lodz opened the first studies taught in English with the possibility of receiving a diploma of European Engineer. Encouraged by this I returned to the Technical University of Lodz. Unfortunately, after a year, due to the insufficient number of volunteers, direction has been resolved. I decided to finish college with minimum effort, engaging more in my professional career, than studying.

In 1997 during the semester diploma study on modeling the dynamics of the diesel engine injector reminded me of my passions. I decided to continue to study the dynamics of systems within the doctoral studies as anti-stress entertainment after a long day at work. I began the study of systems with impacts in collaboration with prof. Czołczyński. During the first semester, I was offered a assistant position in the Department of Dynamics TUL. Unfortunately my financial situation did not allow me to devote all my time only on things that interest me. I decided to reject the offer of work at the university and continue the study without sacrificing my well-paid job in the industry. Pretty soon, however, a study that I performed dragged me so much that eventually at the beginning of 1998 I started to work on assistant position in the Department of Dynamics TUL. I was continuing collaboration with prof. Czołczyńskim. Since 2000. my research was performed within the PhD project No. 7T07A02318. and published in [13] and [14].

I defended my PHD thesis " Dynamics of the impact-type vibrations absorber" on June 2002.

In the meantime, in 2001. I started another study at the Faculty of Mathematics and Computer Science, University of Lodz.. These studies resulted in the development of transformation that allows the analysis of the of energy flow in dynamical systems in a modified phase space, which is I called the energy space. Unfortunately, these research and studies, which began on U.Ł. were interrupted by two brain tumor operations and the subsequent long-term rehabilitation.

I returned to the dynamical systems research in 2005. I continued and I developed the idea of the energy space. I Investigated aspects of energy flow, synchronization in, energy systems. I described results of my research in [5-11]. Unfortunately, due to the discontinuity of the transformation in the critical points I could not accomplish many research ideas that were supposed to be my contribution to the dissertation research. Niche topics and the associated lack of interest in the proposed solutions, forced me to suspend my research in the energy space.

From 2011. I started a new study. I chose issues within stability of dynamical systems. which I dealt with in 2003. In collaboration with profs. T. Kapitaniak. and A. Stefanski. Results of that research were presented in publication [10] and conference proceedings [1].
In my new research I developed the method of the estimation of Lyapunov exponents which is based on the fundamental properties of space and linear transformations. Results of this research were presented in the papers [1-4] They constitute thematically linked series of publications discussed in the section "Description of scientific achievement."

4. LIST OF THE SCIENTIFIC ACHIEVEMENTS

Publications and participation:

[1] A.Dąbrowski: Estimation of the the Largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment simulation.", Nonlinear Dynamics. (2014) 78:1601–1608, (I.F. 2,419),

[2] M. Balcerzak, A.Dąbrowski, T.Kapitaniak, A Jach: Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation, Mechanics and Mechanical Engineering 17 (4) (2013), 325-339, participation 40%, fourty percent, associated with elaboration of the main idea, consultation, interpretation of results and preparation of the manuscript text,

[3] A.Dąbrowski, The largest transversal Lyapunov exponent and Master Stability Function from the perturbation vector and its derivative dot product (TLEVDP), Nonlinear Dynamics (2012) 69:1225–1235,(I.F. 3,009),

[4] A.Dąbrowski:"Estimation of the largest Lyapunov exponent from the perturbation vector and its derivative dot product.", Nonlinear Dynamics. (2012) 67: 283–291, (I.F. 3,009)

[5] A.Dąbrowski, A. Jach, T.Kapitaniak: Application of Artificial Neural Networks in parametrical investigations of the energy flow and synchronization, Journal of Theoretical and Applied Mechanics 48 (2010), 4, 871-896, (I.F. 0,264), participation 80%, eighty percent, associated with elaboration of the main idea, writing program code, numerical investigations, interpretation of results and preparation of the manuscript text,

[6] A.Dąbrowski: Energy-vector method In mechanical oscillations, Chaos, Solitons and Fractals 39 (2009) 1684-1697(I.F. 3,315),

[7] A.Dąbrowski and T.Kapitaniak: Using chaos to reduce oscillations : Experimental results, Chaos, Solitons and Fractals 39 (2009),1677-1683, (I.F. 3,315), participation 80%, eighty percent, associated with elaboration of the main idea, writing program code, numerical investigations, interpretation of results and preparation of the manuscript text,

[8] A.Dąbrowski, Anna Jach: Impact maps in recognizing the change of energy flow direction and synchronization of coupled oscillators, Mechanics and Mechanical Engineering 13 (1) (2009), 5-15, participation 90%, ninety percent, associated with elaboration of the main idea, writing program code, numerical investigations, interpretation of results and preparation of the manuscript text,

[9] A.Dąbrowski: Application of the Energy Dot Product (EDP) in recognizing the energy flow synchronization, Mechanics and Mechanical Engineering 12 (1) (2008), 17-30,

[10] . Stefanski, A.Dąbrowski, T.Kapitaniak: Evaluation of the largest Lyapunov exponent in dynamical systems with time delay, Chaos, Solitons and Fractals (2005), 1651-1659, (I.F. 1,938), participation 40%, fourty percent, associated with elaboration of the main idea, writing program code, numerical investigations, interpretation of results and preparation of the manuscript text,

[11] A.Dabrovski: The construction of the energy space, Chaos, Solitons and Fractals 26 (2005) 1277-1292. , (I.F. 1,938),

[12] A.Dąbrowski: The energy space, energy flow and synchronization, Mechanics and Mechanical Engineering 8 (1) (2005), 200-218,

[13] .Dąbrowski and T.Kapitaniak: Using chaos to reduce oscillations. Nonlinear Phenomena in Complex Systems, 4 (2) (2001), p 206-211, participation 80%, eighty percent, associated with

elaboration of the main idea, writing program code, numerical investigations, interpretation of results and preparation of the manuscript text,

[14] A.Dąbrowski: New design of the impact damper. Mechanics and Mechanical Engineering 4 (2) (2000), p. 191-196,

Conference publications:

[1] A. Stefanski, A.Dąbrowski, T.Kapitaniak: Evaluation of the largest Lyapunov exponent of dynamical systems with time delay, IUTAM Symposium on Chaotic Dynamics and Control of Systems and Processes in Mechanics (2003), 493-500, participation 40%, fourty percent,

[2] Energy flow and synchronization in the energy space APM Petersburg 2005, ,

[3] The construction of the energy space, The 5-th International Conference on Vibration Problems Moscow 2001,

[4] The geometrical view on energy changes in vibrating systems,Euroattractor 2001-European Interdisciplinary School on Nonlinear Dynamics for System and Signal Analysis.

Research projects:

Nr/Execution time	Topic	Position
DI2013 019743 07.2014 - 07.2017	Application a new method of calculating the Lyapunov exponent in the optimization of the parameters of the control system	Develop the main idea and project preparation. scientific consultation
2011/01/B/ST8/07527 09.2011r. – 03.2015r.	New methods of the Lyapunov exponents estimation	Investigator
7T07A02318 01.2000r. – 06.2002r	Dynamics of the impact-type vibrations absorber.	Main investigator

CITATIONS OF ALL THE ARTICLES

Web Of Science 27; without autocitations 21; h-index 3
Scopus 43; without autocitations 30; h-index 3
Google scholar: 65; without autocitations 52; h-index 4

Due to the large differences in the number of citations for various databases I enclose:

The list of articles that cited my publications.

1. **Evaluation of the largest Lyapunov exponent in dynamical systems with time delay**
A Stefanski, A Dabrowski, T Kapitaniak
Chaos, Solitons & Fractals, 2005,23 (5), 1651-1659
I.F. 1,938

Citations
Web Of Science 18
Scopus 26
Google scholar: 29

Cited in:
1. Delay and periodicity S Yanchuk, P Perlikowski - Physical Review E, 2009 - APS

2. Robust dynamic compensator for a class of time delay systems containing saturating control input, JJ Yan, JS Lin, TL Liao - Chaos, Solitons & Fractals, 2007 - Elsevier
3. Lyapunov exponents of systems with noise and fluctuating parameters, A Stefański - Journal of Theoretical and Applied Mechanics, 2008 - yadda.icm.edu.pl
4. Estimation of Lyapunov exponents for a system with sensitive friction model, J Wojewoda, A Stefański, M Wiercigroch… - Archive of Applied …, 2009 - Springer
5. Estimation of the largest Lyapunov exponent from the perturbation vector and its derivative dot product, A Dabrowski - Nonlinear Dynamics, 2012 - Springer
6. Application of the energy space in chaotic systems research, A Dąbrowski - Mechanics and Mechanical Engineering, 2007 - yadda.icm.edu.pl
7. Chaos, self organized criticality, intermittent turbulence and nonextensivity revealed from seismogenesis in north Aegean area
8. AC Iliopoulos, GP Pavlos, EE Papadimitriou… - … Journal of Bifurcation …, 2012 - World Scientific,
9. Energy–vector method in mechanical oscillations, A Dabrowski - Chaos, Solitons & Fractals, 2009 - Elsevier
10. Nonautonomous delay differential equations in Hilbert spaces and Lyapunov exponents, D Breda - Differential and Integral Equations, 2010 - projecteuclid.org
11. Quantifying the synchronizability of externally driven oscillators, A Stefański - Chaos: An Interdisciplinary Journal of Nonlinear …, 2008 - scitation.aip.org
12. Adaptive fuzzy control of a class of nonlinear time-delay systems with input nonlinearity, S Pourdehi, D Karimipour, N Noroozi… - … and Integration (IRI), …, 2010 - ieeexplore.ieee.org
13. The largest transversal Lyapunov exponent and master stability function from the perturbation vector and its derivative dot product (TLEVDP), A Dabrowski - Nonlinear Dynamics, 2012 - Springer
14. Effects of built-up edge-induced oscillations on chip formation during turning, Z Pálmai, G Csernák - Journal of Sound and Vibration, 2013 - Elsevier
15. Application of the largest Lyapunov exponent and non-linear fractal extrapolation algorithm to short-term load forecasting, J Wang, R Jia, W Zhao, J Wu, Y Dong - Chaos, Solitons & Fractals, 2012 - Elsevier
16. Approximating Lyapunov exponents and Sacker–Sell spectrum for retarded functional differential equations, D Breda, E Van Vleck - Numerische Mathematik, 2014 - Springer
17. Experzimental chaos in a two-degree of freedom vibration system with time delay feedback, QC Yang, S. Zhu, J. Lou, H. Wu - Journal of Theoretical & Applied …, 2013
18. Chaotic feature of Martin process imposed on the cosine function, C Gao, Z Zhou, J Zeng, J Chen - Fractals, 2009 - World Scientific
19. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl
20. An improved method of detecting chaotic motion for rotor-bearing systems, M Shi, D Wang, J Zhang - Journal of Shanghai Jiaotong University (…, 2013 - Springer
21. Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation, M Balcerzak, A Dabrowski, T Kapitaniak… - Mechanics and …, 2013 - kdm.p.lodz.pl
22. Estimation of the largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment …, A Dabrowski - Nonlinear Dynamics, 2014 - Springer
23. Diffusion as a result of transition in behavior of deterministic maps, P Borys, ZJ Grzywna - Chaos, Solitons & Fractals, 2006 - Elsevier
24. Investigation of a Unified Chaotic System and Its Synchronization by Simulations, W Qing-Chu, F Xin-Chu, M Small - Chinese Physics Letters, 2010 - iopscience.iop.org

25. Development of a Lyapunov Exponent Based Chaos Diagram in the Parameter Plane of Logistic Map., TAO Salau, OO Ajide - British Journal of Applied Science & Technology, 2014
26. Time delay Duffing's systems: chaos and chatter control, R Rusinek, A Mitura, J Warminski - Meccanica, 2014 - Springer

2. **Estimation of the largest Lyapunov exponent from the perturbation vector and its derivative dot product**
A. Dabrowski
Nonlinear Dynamics, 2012, 67 (1), 283-291
I.F. 3,009

Citations
Web Of Science 4
Scopus 4
Google scholar: 9

Cited in:
1. Detection of changes in cracked aluminium plate determinism by recurrence analysis, J Iwaniec, T Uhl, WJ Staszewski, A Klepka - Nonlinear Dynamics, 2012 - Springer
2. Estimation of Lyapunov exponents from a time series for n-dimensional state space using nonlinear mapping C Yang, CQ Wu, P Zhang - Nonlinear Dynamics, 2012 - Springer
4. Power system transient stability analysis via the concept of Lyapunov Exponents, DP Wadduwage, CQ Wu, UD Annakkage - Electric Power Systems …, 2013 - Elsevier
5. Lyapunov Exponents of Impact Oscillators with Hertz's and Newton's Contact Models, W Serweta, A Okolewski… - International Journal of …, 2014 - Elsevier
6. The application of fast searching nearest points method to chaos identification, S Liu, Q Yang, X Wei, H Wu - Huazhong …, 2012 - … 430074 hgxbsail. hust. edu. cn xb. …
7. Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation, M Balcerzak, A Dabrowski, T Kapitaniak… - Mechanics and …, 2013 - kdm.p.lodz.pl
8. Estimation of the largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment …, A. Dabrowski - Nonlinear Dynamics, 2014 - Springer

3. **Using chaos to reduce oscillations**
A Dabrowski, T Kapitaniak
NONLINEAR PHENOMENA IN COMPLEX SYSTEMS-MINSK- 4 (2), 206-211

Citations
Web Of Science brak w bazie danych
Scopus brak w bazie danych
Google scholar: 6

Cited in:
1. Using chaos to reduce oscillations: experimental results, A Dąbrowski, T Kapitaniak - Chaos, Solitons & Fractals, 2009 - Elsevier
2. The construction of the energy space, A Dabrovski - Chaos, Solitons & Fractals, 2005 - Elsevier, Application of the energy space in chaotic systems research
3. A Dąbrowski - Mechanics and Mechanical Engineering, 2007 - yadda.icm.edu.pl

4. Energy–vector method in mechanical oscillations, A Dabrowski - Chaos, Solitons & Fractals, 2009 - Elsevier
5. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl
6. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl

4. Using chaos to reduce oscillations: experimental results
A Dąbrowski, T Kapitaniak
Chaos, Solitons & Fractals, 2009, 39 (4), 1677-1683
I.F. 3,315

Citations
Web Of Science 3
Scopus 3
Google scholar: 4

Cited in:
1. Non-desired transitions and sliding-mode control of a multi-DOF mechanical system with stick-slip oscillations, EM Navarro-López, E Licéaga-Castro - Chaos, Solitons & Fractals, 2009 - Elsevier
2. A method to determine structural patterns of mechanical systems with impacts, B Blazejczyk-Okolewska, W Serweta - Mathematical Problems in …, 2013 - hindawi.com
3. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl
4. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl

5. **The construction of the energy space**
A Dabrovski
Chaos, Solitons & Fractals, 2005, 26 (5), 1277-1292
I.F. 1,938
Citations
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Scopus 5
Google scholar: 4

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1. Application of the energy space in chaotic systems research, A Dąbrowski - Mechanics and Mechanical Engineering, 2007 - yadda.icm.edu.pl,
2. Energy–vector method in mechanical oscillations, A Dabrowski - Chaos, Solitons & Fractals, 2009 - Elsevier,
3. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl,
4. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl**.**

6. **Energy–vector method in mechanical oscillations**
A Dabrowski
Chaos, Solitons & Fractals,2009, 39 (4), 1684-1697
I.F. 3,315

Citations
Web Of Science 2
Scopus 2
Google scholar: 3

Cited in:
1. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl
2. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl
3. An Damping Analysis on Local Vibration in Foundation of 'four in one'Nitric Acid Plant, SH Huang, GJ Wei, JC Feng - Advanced Materials Research, 2012 - Trans Tech Publ
4. Songhe Huang 1,a , Gaojun Wei 2,b , Jinchun Feng 3,c 1 Mechanical Engineering Department
of Southwest Jiaotong University, Sichuan Chengdu, 610031; China ...

7. **The energy space, energy flow and synchronization**
A Dąbrowski
Mechanics and Mechanical Engineering 9 (2), 187-205

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Web Of Science
Scopus 1
Google scholar: 3

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1. Application of the energy space in chaotic systems research, A Dąbrowski - Mechanics and Mechanical Engineering, 2007 - yadda.icm.edu.pl
2. Energy–vector method in mechanical oscillations, A Dabrowski - Chaos, Solitons & Fractals, 2009 - Elsevier

3. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl

8. **The largest transversal Lyapunov exponent and master stability function from the perturbation vector and its derivative dot product (TLEVDP)**
A Dabrowski
Nonlinear Dynamics,2012, 69 (3), 1225-1235
I.F. 3,009

Citations
Web Of Science 0
Scopus 0
Google scholar: 2

Cited in:
1. Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation, M Balcerzak, A Dabrowski, T Kapitaniak… - Mechanics and …, 2013 - kdm.p.lodz.pl
2. Estimation of the largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment …

9. **Application of the energy space in chaotic systems research**
A Dąbrowski
Mechanics and Mechanical Engineering 11 (1), 21-35

Citations
Web Of Science 0
Scopus 2
Google scholar: 2

Cited in:
1. Application of the Energy Dot Product (EDP) in Recognizing the Energy Flow Synchronization, A Dąbrowski - Mechanics and Mechanical Engineering, 2008 - yadda.icm.edu.pl

2. Application of artificial neural networks in parametrical investigations of the energy flow and synchronization, A Dąbrowski, A Jach, T Kapitaniak - Journal of Theoretical and Applied …, 2010 - ptmts.org.pl

10. **The largest Lyapunov exponent of dynamical systems with time delay**
A Stefański, T Kapitaniak, A Dąbrowski
IUTAM Symposium on Chaotic Dynamics and Control of Systems and Processes in ...

Citations
Web Of Science 0
Scopus 0
Google scholar: 2

Cited in:

Chaotic vibrations in high-speed milling, M Banihasan, F Bakhtiari-Nejad - Nonlinear Dynamics, 2011 - Springer

11. **Optimization of the Control System Parameters with Use of the New Simple Method of the Largest Lyapunov Exponent Estimation**
M Balcerzak, A Dabrowski, T Kapitaniak, A Jach
Mechanics and Mechanical Engineering 17 (3), 225-239

Citations

Web Of Science brak w bazie danych
Scopus brak w bazie danych
Google scholar: 1

Cited in:

1. Estimation of the largest Lyapunov exponent-like (LLEL) stability measure parameter from the perturbation vector and its derivative dot product (part 2) experiment …, A Dabrowski - Nonlinear Dynamics, 2014 - Springer

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5. TEACHING ACHIEVEMENTS

Technical University of Lodz:	**Theory of Manipulators**, course manager, **Theoretical Mechanics** (in Polish and English), course manager **Technical Mechanics**, (in Polish and English), course manager **Robot Dynamics**, course manager **Automatics and Robotics** (in English), **Robotics**(in Polish and English), **Oscillating Systems Dynamics**, **Informatics Basics**,,
Technical University of Lodz: Postgraduate studies: **Project:** Raising the academic competence and skills of graduates in terms of modern methods of analysis, simulation and optimization in the design and operation " UDA-POKL.04.01.01-00-468/08-00	**Artificial Neural Networks**, course manager,
Humanistic-Economic Academy of Lodz:	**Theoretical Mechanics**, course manager, **Technical Mechanics**, course manager, **Solid Body Mechanics**, course manager, **Oscillating Systems Dynamics**, course manager, **Control Systems Basics**, course manager, **Machines Construction Basics**, course manager, **Materials Basics**. course manager,
Technical University of Lodz: **Project**: **Automatic and robotic - key profession of twenty-first century**. 1/POKL/4.1.2/2012	**Supervisor of projects**: Control System for IRB60 robot Construction and control of the quadruped Insect-like robot
Technical University of Lodz:	**Supervisor of PH.D. students** Auxiliary supervisor of Ph.D. Mgr Wioletta Serweta, "Dynamics of the mechanical system with one and two side Hertz-type impacts". Work has been completed with positive defense 20.10.2014. Auxiliary supervisor of Ph.D. Mgr Janusz Kokociński, " Vibroacoustic investigations of the cycloidal gear ".

Technical University of Lodz:	**Supervisor of engineering theses** (2014) NM7 and NM13 robots cooperation - construction of the laboratory stand and the integration of microprocessor and PLC control systems, (2014) Microprocessor control system of an inverted pendulum, (2014) Mobile robot controlled by a microprocessor system, (2013) Application of the Atmega 32 and 16 microcontrollers in control system of the NM7 robot, (2012) Analytical and numerical methods in machine dynamic, (2012) Programming of the mobile robot control system, (2011) Implementation of the dynamics of chaotic systems in the control of mobile robots, (2011) Analysis of the dynamics of two coupled nonlinear systems, (2011) Modeling the structure and dynamics of the component of the diesel engine injector.
Technical University of Lodz:	Guardian of Scientific Circle Dynamics and Control of Machines and Devices "ARTUDITU"
Technical University of Lodz:	Training for university TUL staff "Investigations of the nonlinear systems dynamics with use of Matlab"

6. LIST OF COMPLETED TRAININGS

OPERATORIO (2014):	Matlab Simulink	- Basics - Modelling the Dynamical Systems - Designing of the Control Systems
ONT (2010):	MLBE SLBE SLCT MLOP MLGU	- Basics - Modelling the Dynamical Systems - Designing of the Control Systems - Optimization - Graphical interfaces
STATSOFT (2009):	Statistica Statistica	- Basics - Artificial Neural Networks
4SYSTEM- ART OF E LEARNING (2009)	WBTExpress EIS	- Designing of the e-learning Training with use of the WBTExpress. - Handling e-learning platform EIS
ATNEL (2011)	C – AVR, ARM	- Programming AVR and ARM microcontrollers