


Tadeusz Burczyński - CV

	<p>Professor Tadeusz BURCZYŃSKI, D.Sc, Ph.D. Eng.</p> <p>Ordinary Member of the Polish Academy of Sciences Ordinary Member of the European Academy of Sciences and Arts</p> <p>Director Institute of Fundamental Technological Research, Polish Academy of Sciences (IPPT PAN) ul. Pawińskiego 5 B 02-106 Warsaw, Poland Tel: +48 22 826 69 11 Fax.: 48 22 826 73 80</p> <p>IPPT PAN has the highest scientific category A+ conferred by Ministry of Science and Higher Education</p> <p>e-mail: tburczynski@ippt.pan.pl http://www.ippt.pan.pl/en/staff/tburczynski</p>
---	--

Scientific discipline:

Information and Computational Science and Engineering, Computational Intelligence, Computational Mechanics, Computational Materials Science

Education:

MS, Eng. Silesian University of Technology (1974)

Qualifications:

Ph.D. Silesian University of Technology (1980)

D.Sc. (habilitation) Silesian University of Technology (1990)

Professor (scientific title) President of Poland (L.Wałęsa) (1993)

Professional Experience:

- **Assistant Professor**, Silesian University of Technology, Institute of Mechanics and Fundamentals of Machine Design (1980-1990)
- **Associate Professor**, Silesian University of Technology, Department of Engineering Mechanics (1990-1993)
- **Full Professor**, Silesian University of Technology, Institute of Computational Mechanics and Engineering (1993–2013)
- **Full Professor**, Cracow University of Technology, Institute of Computer Science (1997 – present)
- **Full Professor**, Institute of Fundamental Technological Research, Polish Academy of Sciences (2013 – present)

Current Positions:

- **Director**, Institute of Fundamental Technological Research, Polish Academy of Sciences (IPPT PAN), Warsaw, Poland, since 2013
- **Full Professor**, Institute of Fundamental Technological Research, Polish Academy of Sciences, (IPPT PAN), Warsaw, Poland, since 2013
- **Full Professor** (part time), Cracow University of Technology, Cracow, Poland, since 2013

Professional Positions:

- Head of Department for Strength of Materials and Computational Mechanics, Silesian University of Technology (1997 – 2012)
- Head of Institute of Computational Mechanics and Engineering (since 2012-2013)
- Head of Institute of Computer Science, Cracow University of Technology (2008 – 2013)
- Director of Institute of Fundamental Technological Research, Polish Academy of Sciences (since 2013)
- President of Polish Association for Computational Mechanics (1999-2009)
- President of Committee of Mechanics of the Polish Academy of Sciences (PAS) (2011 – 2019)
- Member of Committee on Informatics of the Polish Academy of Sciences (2008 – present)
- Head of Section of Computational Science, Committee on Informatics (2008 – present)
- Corresponding Member of the Polish Academy of Sciences (2007 - 2019)
- Ordinary Member of the Polish Academy of Sciences (since 2020)
- Ordinary Member of European Academy of Sciences and Arts (since 2018)
- Member of Central Council for Degrees and Titles (CK) (2010-2012)
- Member of National Science Centre (NCN) (2012-2013)

Editorial Boards:

- *Computer Assisted Methods in Engineering and Sciences*, Co-Editor-in-Chief, Polish Academy of Sciences
- *Computational Methods in Science and Technology*, Polish Academy of Sciences
- International Journal *Immune Computation*, Advanced Institute of Convergence Information Technology
- *Computer Methods in Material Science*, AGH Kraków
- *Acta Mechanica et Automatica*, Białystok University of Technology
- *Computer Science Journal*, AGH Kraków
- *Journal of Smart Environments and Green Computing*, OAE Publishing Inc.

Fellowships and Awards:

- Posdoct at Politecnico di Milano, Italy, 1989/1990
- Distinguished Visiting Scholar at Clarkson University, USA, 1993
- Visiting Professor at Delaware University, USA, 1993
- Visiting Professor at Erlangen-Nurnberg University, Germany, 1997
- Visiting Professor at Braunschweig University, Germany, 1998
- Visiting Professor at Minnesota University, USA, 2005
- Member of General Council of International Association for Computational Mechanics (IACM)
- Fellow IACM
- Former member of Managing Board of European Community on Computational Methods in Applied Sciences (ECCOMAS)
- Chairman of ECCOMA Committee on Computational Solids and Structural Mechanics
- Member of General Assembly of International Union of Theoretical and Applied Mechanics (IUTAM)
- Awards of Ministry of Education for two scientific books
- Prizewinner of Academic Grant for Professors MAESTRO of Foundation for Polish Science on „*Intelligent computing in optimization and identification of structures and materials*” (2005-2008)
- Award winner of O.C. Zienkiewicz Medal.
- Doctor Honoris Causa of Silesian University of Technology

Chair of Conferences:

- Chairman of Organizing and Scientific Committee of *IUTAM/IACM/IABEM Symposium on Advanced Mathematical and Computational Mechanics Aspects of the Boundary Element Method*, Kraków 1999,
- Chairman of Organizing and Scientific Committee of *IUTAM Symposium on Evolutionary Methods in Mechanics*, Kraków, 2002,
- Co-chairman of Organizing and Program Committee of Symposia on *Methods of Artificial Intelligence in Mechanics and Mechanical Engineering AI-MECH 2000, 2001*, and ECCOMAS Symposia on *Methods of Artificial Methods AI-METH 2002, 2003, 2004, 2005, 2007, 2009* Gliwice,
- Chairman of 16th International Conference on Computer Methods in Mechanics CMM-2003 Wisła (under Honorary auspices O.C.Zienkiewicz),
- Co-chairman of ECCOMAS International Conference on Inverse Problems in Mechanics of Structures and Materials (IPM), IPM 2009- Łańcut, IPM 2011 - Sieniawa, IPM 2013 - Baranów Sandomierski, IPM 2017 - Krasiczyn, IPM 2019 – Kombornia,
- Co-chairman of ECCOMAS International Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems EUROGEN 2009, Kraków 2009,

- General Conference Chair of 25th European Conference on Modelling and Simulation ECMS 2011, Kraków 2011,
- Chairman of the PCM-CMM-2015 Congress Scientific Committee, Gdańsk, 2015,
- Chairman of the PCM-CMM-2019 Congress Scientific Committee, Kraków, 2019.

Commissions of Trust:

- Member of ERC Panel of Advanced Grants PE8: Products and process engineering, (2008-2015)
- Expert-evaluator of FET-OPEN - NOVEL IDEAS FOR RADICALLY NEW TECHNOLOGIES (H2020-FETOPEN-01-2016-2017 RIA), which is part of the *Future and Emerging Technologies* (FET) programme, 2016, 2017
- Member of the Labex Jury of the French National Research Agency 2010/2011, important programme of “Investissements d’Avenir with the action “Laboratories of Excellence” (LABEX) designed to endow world-renowned laboratories from all academic disciplines with significant means to construct a high-level integrated policy concerning research, education and result exploitation, France
- Member and distinguished reviewer of proposals of the initiative of the Spanish Government, the Severo Ochoa programme, which identifies and supports excellent research centres in Spain, 2012/2013, 2017/2018
- Coordinator of the project TANGO Grants (counterpart of ERC Proof of Concept) prepared for the Council of the National Science Centre (NCN) and Head of the first Expert Panel for evaluation of TANGO Grants in the National Science Centre (NCN) and currently Head of Expert Panel for programme implementation the National Centre of Science and the National Centre for Research and Development (NCBR), Poland
- Head of the Expert Panel for evaluation of MAESTRO and OPUS Grants in the National Science Centre (NCN), Poland

Scientific profile:

Inter- and multidisciplinary scientific research on information and computational science and engineering, sensitivity analysis and optimization, inverse problems, stochastic dynamics and fuzzy systems, computational intelligence methods, soft computing, artificial immune systems in classification, analysis of biological data, fuzzy modelling and forecasting financial time series, a concept of stochastic ordered fuzzy numbers, multiscale modelling and design new 2D materials based on carbon and molybdenum.

Supervisor:

Supervisor of 18 Ph.D. Theses,

Main scientific achievements

1. Creation of the scientific school of the boundary element method application for sensitivity analysis and optimization. Original scientific works in this area were ones of the first in the world and they concerned the shape optimization of structures under static and dynamic loads. The author had lectures on this topic during CISM Advanced School on Boundary Element Advances in Solid Mechanics, Udine 2001 entitled „*Sensitivity analysis, optimization and inverse problems*” and he published many papers and books on this topic. He was co-editor of the special issue of *Engineering Analysis with Boundary Elements* (Vol. 19, No.2, 1997), Elsevier which was devoted to sensitivity analysis and optimization.
2. The first formulation of a concept of stochastic and fuzzy boundary element method used to an analysis of physical structures with uncertain in the boundary conditions, the material properties and the boundary shape. He is the author of many publications in this field in the form of articles and chapters in books (e.g. a chapter *Stochastic Boundary Element to Shape Design Sensitivity and Identification Problems in Computational Stochastic Mechanics* (Eds. A.H-D. Cheng and Y.Yang), Elsevier Science Publishers London 1993). He was a co-editor of the special issue of *Engineering Analysis with Boundary Elements* (Vol.19, No.3, 1997), Elsevier, devoted to stochastic problems [Burczyński T., Skrzypczyk J., Fuzzy aspects of the boundary element method, *Engineering Analysis with Boundary Element Methods*, 19 (1997), 209-216; Burczyński T., Skrzypczyk J., Theoretical and computational aspects of the stochastic boundary element method, *Computer Methods in Applied Mechanics and Engineering*, 168 (1999), 321-344].
3. An application of intelligent computational systems based on evolutionary algorithms, artificial neural networks, artificial immune systems, swarm algorithms and fuzzy sets in global scalar and vector optimization and identification of structures. The co-editor of the book „*Evolutionary Methods in Mechanics*”, Kluwer 2004, devoted to evolutionary computations, the author of a few chapters and the editor of the special issue of *Journal of Theoretical and Applied Mechanics* (Vol.42, No.3, 2004) devoted to *Computational Intelligence in Mechanics*. Lectures in this area during CISM Advanced School on Advances of Soft Computing in Engineering, Udine w 2007 entitled „*Evolutionary and immune computation in optimization and inverse problems*” which were published as Chapter 2 in *Advanced of Soft Computing in Engineering* (Ed. Z.Waszczyzyn), Springer 2010. An application of the computational grids for structure optimization with finite element method and evolutionary algorithms. Co-Chair of ECCOMAS Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control EUROGEN 2009, Kraków 2009. Recapitulation of the scientific research on this subject is presented in the book: T.Burczyński et al, *Intelligent Computing in Optimal Design*, Springer 2020.
4. The co-author of the original concept of coupling of artificial immune systems and the game theory [Jarosz P., Burczyński T., *Coupling of Immune Algorithms and Game Theory in Multiobjective Optimization*, Lecture Notes in Computer Science, 2010, Volume 6114/2010, pp. 500-507, Springer 2010; Jarosz P., Burczyński T. *Biologically-inspired methods and game theory in multi-criterion decision processes*. Chapter in: Bouvry et al., editor, *Intelligent Decision Systems in Large-Scale*

Distributed Environments, volume 362 of Studies in Computational Intelligence, Vol. 362, pp 101–124 Springer 2011; Jarosz P., Burczyński T. *Artificial immune system based on clonal selection and game theory principles for multiobjective optimization*, Lecture Notes in Computer Science, 2011, Volume 6825/2011, 321-333 Springer 2011]. Editor of International Journal Immune Computation, AICIT. Member of Scientific Committee of 11th and 12th International Conferences on Artificial Immune Systems, Cambridge 2011 and Toarmina 2012.

5. Original research on application of artificial immune systems to classification and clusterization of data problems and on the analysis of multidimensional biological data including the analysis of ECG pathogenic signals (medical IT) as well as the analysis of DNA micromatrices with gene expression measurements (bioinformatics). Guest Co-Editor: *Special Issue on Soft Computing Applications Engineering Applications of Artificial Intelligence*, Vol. 20, No. 5, 2007, Elsevier) [M.Bereta, T.Burczyński, *Comparing binary and real-valued coding in hybrid immune algorithm for feature selection and classification of ECG signals*, 571-586], Guest Editor: *Special Issue on Artificial Immune Systems (Information Science*, Vol. 179, Issue 10, 2009, Elsevier) [M.Bereta, T.Burczyński, *Immune K- means and negative selection algorithm for data analysis*, 1407-1425], Co-Editor book: *Evolutionary and Deterministic Methods for Design, Optimization and Control*, CIMNE, Barcelona 2011 [M.Bereta, T.Burczyński, *Artificial immune systems based classification of high-dimensional biological data*].
6. Dynamic scientific and organizational activities in the filed of computer modelling and simulation. Co-editor-in-chief of International Journal *Computer Assisted Methods in Engineering and Science* published under the auspices of ECCOMAS, Polish Academy of Sciences, General Conference Chair 25th Jubilee European Conference on Modelling and Simulation ECMS 2011, June 7-10, 2001, Kraków, co-author of the book: J.Kołodziej, S.U.Khan, T.Burczyński (eds.), *Advances in Intelligent Modelling and Simulation. Artificial Intelligence-Based Models and Techniques in Scalable Computing*, Studies in Computational Intelligence 422, Springer 2012.
7. Fuzzy modeling and forecasting financial time series [Marszałek, A., Burczyński, T.: Financial fuzzy time series models based on ordered fuzzy numbers. In: W. Pedrycz, S.-M. Chen (Eds.), *Time Series Analysis, Model & Applications*, ISRL 47, pp. 77–95, Springer-Verlag, Berlin Heidelberg (2013), Marszałek, A., Burczyński, T.: Modelling financial high frequency data using ordered fuzzy numbers. In: L. Rutkowski et al. (Eds.), *ICAISC 2013, LNAI 7894, Part I*, pp. 345–352, Springer-Verlag, Berlin Heidelberg (2013), Marszałek, A., Burczyński, T.: Modeling and forecasting financial time series with ordered fuzzy candlesticks. *Information Science*, Vol. 273, pp. 144–155 (2014)]. Co-author of the original concept of ordered stochastic random variables [A. Marszałek, T. Burczyński, *Ordered fuzzy random variables: Definition and the concept of normality. Information Sciences* 2020; doi.org/10.1016/j.ins.2020.08.120].
8. Development of a methodology and computer programs for multiscale materials modeling, especially in the field of optimization and identification problems with the use of intelligent systems. Recently he has elaborated an intelligent computational methodology for nano-scale optimization of new 2D materials based on carbon (new

graphene-like materials X and Y as metallic-like) [Mrozek A., Kuś W., Burczyński T., Nano level optimization of graphene allotropes by means of a hybrid parallel evolutionary algorithm, *Computational Materials Science*, Vol.106, pp.161-169, 2015] and anisotropic-cyclicgraphene as semiconducting [Maździarz M., Mrozek A., Kuś W., Burczyński T., Anisotropic-cyclicgraphene: a new two-dimensional semiconducting carbon allotrope, *Materials* 2018, 11, 432]. Recently new 2D materials based on molybdenum are considered [M. J. Akhter, W. Kuś, A. Mrozek and T. Burczyński, Mechanical properties of monolayer MoS₂ with randomly distributed defects, *Materials* 2020, 13, 1307].

9. Creation of the research team in the field of a development of computer methods and promotion of 18 doctors of technical sciences. The author of the first Polish monograph devoted to the boundary element method "*The boundary element method in mechanics*", WNT, Warszawa 1995, the editor of the book "*Advanced Mathematical and Computational Mechanics Aspects of the Boundary Element Method*", Kluwer 2001, co-author of 4 books in the field of computer methods: Computer methods in solid mechanics, Warszawa 1995, "*Handbook of Computational Solid Mechanics*", Springer 1998, "*Boundary Element Advances in Solid Mechanics*", Springer 2003 and "*Strength of materials with elements of computer approach*", WNT, Warszawa 2001 (1st edition) and Warszawa 2009 (2nd edition).
10. Co-editor of the book editions of papers devoted to artificial intelligence and co-editor of special issues of: *Computer Assisted Mechanics and Engineering Sciences*: Vol.9, No1, 2002; Vol. 12 No.1-3, 2005; Vol. 13 No. 1, 2006, *Journal of Engineering Applications of Artificial Intelligence* Vol.17, 2004 and Vol. 20, No.5, 2007, Elsevier, Information Science: Vol. 179, Issue 10, 2009 (Elsevier).
11. Advanced research work and scientific expert opinions in the field of computer strength analysis and optimization of different devices and industrial installations including metallurgy installations (e.g. blast furnace in Katowice Steelworks, electro-filters), railway systems (railway wheel sets) and other objects and industrial structures.

Publications:

Published over 500 papers; 65 of them were published in ISI Web of Science journals. The author or editor of 14 books, 9 chapters in books and he is also the editor of 10 special issues of scientific journals and the author on many invited lectures at national and international conferences.

Activity in the promotion of European Projects including ERC grants:

- Director of IPPT PAN which plays the role of National Contact Point (NCP) for European Grants in Poland for H2020,
- He was organizer of two meetings devoted to ERC grants:

- (i) Seminar on diagnosis of weak interest in ERC grants in Poland, 2014 r., with presence of representative Ministry of Science and Higher Education, National Centre of Science and Polish ERC experts and laureates ERC grants,
- (ii) ERC Workshop: How to get the ERC grant? with presence of representative Ministry of Science and Higher Education, National Centre of Science and Polish ERC experts and laureates ERC grants, and experts from University of Cambridge and Imperial College, London, and UK Ambassador in Poland, 2014
- He is author of the expertise and recommendations for Polish Ministry of Science and Higher Education in the field of gaining of ERC grants, 2015
- He is author of the paper: ERC grants – is it a chance of change, Academic Forum, 7-8, 2015 (<http://www.ippt.pan.pl/Repository/o3098.pdf>)
- Presentations on ERC grants in several meetings, including Warsaw University, Wrocław University of Technology, Cracow University of Technology and Silesian University of Technology.

Warszawa, September, 2020



Tadeusz Burczyński