

CURRICULUM VITAE

Education and academic/scientific degrees:

- 11.12.2013 Slovak University of Technology in Bratislava (Slovak Republic)
*Degree: Advanced (higher) doctorate in Process Control – **DrSc.***
- 26.11.2013 Slovak University of Technology in Bratislava (Slovak Republic)
*Degree: Full Professor in Automation – **Prof.***
- 01.07.2004 Technical University of Košice (Slovak Republic), Faculty of BERG,
*Degree: Associate Professor (docent) – **Doc.***
Thesis: Fractional – Order Controllers
- 10/1997 – 03/2000 Technical University of Košice (Slovak Republic), Faculty of BERG,
Department of Applied Informatics and Process Control,
*Field of study: Process Control, Degree: Philosophiae Doctor – **PhD.***
Thesis: Fractional Calculus in Control Theory
- 09/1992 – 06/1997 Technical University of Košice (Slovak Republic), Faculty of BERG,
Department of Management and Control Engineering,
Field of study: Process control (raw material extraction and processing),
*Branch: Technological management, Degree: Master – Engineer – **Ing.***

Professional work experiences:

- 08/2019 – present **Vice-Rector for Science, Research and Doctoral Study,**
Technical University of Košice (Slovak Republic).
- 02/2019 – 07/2019 **Vice-Dean for Science and Research and Education in Third Level
of University Education (Designated),**
Technical University of Košice (Slovak Republic), Faculty of BERG.
- 02/2014 – present **Full Professor, Institute Director,**
Technical University of Košice (Slovak Republic), Faculty of BERG,
Institute of Control and Informatization of Production Processes,
Head of laboratory of industrial control systems.
- 10/2007 – 01/2014 **Associate Professor, Institute Director,**
Technical University of Košice (Slovak Republic), Faculty of BERG,
Institute of Control and Informatization of Production Processes,
Head of laboratory of industrial control systems.
- 02/2005 – 09/2007 **Associate Professor,**
Technical University of Košice (Slovak Republic), Faculty of BERG,
Head of laboratory of industrial control systems.
- 02/2004 – 01/2005 **Assistant Professor,**
Technical University of Košice (Slovak Republic), Faculty of BERG,
Head of laboratory of industrial control systems.
- 06/2002 – 07/2003 **Programmer, Steve's Electronic Services, Abbotsford, B.C. (Canada),**
*Duties and responsibilities: web site design and programming,
PIC microcontrollers devices programming (PIC BASIC).*
- 04/2000 – 05/2002 **Assistant Professor,**
Technical University of Košice (Slovak Republic), Faculty of BERG,
Department of Applied Informatics and Process Control.

Professional interests:

- Scientific research in:
 - Control systems (process and optimal/robust control, stabilization, industrial automation),
 - Applied mathematics (fractional calculus, numerical methods, modeling, chaos theory),
 - Electronic/electrical systems (special circuits, devices, elements, microcontrollers, PLCs).
- Solving granted projects:
 - Grants from Slovak Grant Agency for Science: 3 projects leader, 15 projects participant,
 - Grants from Slovak Research and Development Agency: 3 projects leader, 4 as participant,
 - Other scientific-technical and industrial projects: 7 projects,
 - International projects: 7 bilateral projects and 3 scientific research projects, etc.
- Programming languages and other software/hardware/devices abilities:
 - PASCAL, C/C++, BASIC, HTML, XML, CSS, PHP3, JavaScript, Delphi, MySQL,
 - MS Office (Word, Excel, Project, PowerPoint, Outlook, Visio, Front Page), LaTeX/TeX,
 - Matlab + Simulink, Maple, Automation Studio, PIC Basic, Adobe Software, etc.,
 - PLC, PIC, dSPACE, Arduino, Raspberry Pi, AD/DA converters, sensors, actuators, etc.

Professional memberships:

- Institute of Electrical and Electronics Engineers (IEEE) – USA – *senior member*: (since 2008),
- Slovak Society for Applied Cybernetics and Informatics (SSAKI) – Slovak Republic – *member*: (since 1997),
- International Federation of Automatic Control (IFAC), TC 2.2 – Austria – *member*: (since 2012).

Awards (selected):

- Academician of the Learned Society of Slovakia (<https://www.learned.sk/>) – elected in 2019,
- Included in “Top 2% scientists in the World” list (<https://www.doi.org/10.17632/btchxktzyw.5>) – 2022,
- Award of Ministry of Education of Slovak Republic for science and research – 2020,
- Golden Medal of The Association of Slovak Scientific and Technological Societies (ZSVTS) – 2020,
- Prize of the Literary Fund of the Slovak Republic for the for the three-year citation impact (2014 – 2016),
- Silver Medal of The Association of Slovak Scientific and Technological Societies (ZSVTS) – 2016,
- Golden Medal of the Faculty BERG of the Technical University of Kosice (2012),
- Prize of the Literary Fund of the Slovak Republic for the third most frequently cited article (2010),
- Prize of the Literary Fund of the Slovak Republic for the book (2010): Fractional Order Systems: Modelling and Control Applications, World Scientific, (co-authored with R. Caponetto et al.),
- Award of Ministry of Education of Slovak republic for science and research – SOFIA 2005,
- Honor award in competition “Scientist of the year 2003 in Slovak Republic”.

Language abilities:

- Slovak (native), English (active), Russian (passive).

Research visits:

- Montanuniversität Leoben, Institute of Automation, Austria (1999, 2000, 2002, 2004, 2005),
- Steves Electronic Services, Abbotsford, BC, Canada (2002 – 2003, 2006, 2016),
- Johns Electronics, Ltd., Chilliwack, BC, Canada (2002 – 2003),
- Warsaw University of Technology, Poland (2010, 2011, 2013, 2017),
- University of Extremadura, Badajoz, Spain (2010),
- Utah State University, Logan, USA (2011),
- ISMANS, Le Mans, France (2011).

Selected publications (journal papers and books/chapters) of Prof. Ivo Petrás

Journal papers indexed in Web of Science:

- [1] D. Baleanu, J. H. Asad, and **I. Petrás**. Fractional-order two-electric pendulum. ROMANIAN REPORTS IN PHYSICS, 64(4):907–914, 2012.
- [2] D. Baleanu, J. H. Asad, and **I. Petrás**. Fractional Bateman-Feshbach Tikochinsky oscillator. COMMUNICATIONS IN THEORETICAL PHYSICS, 61(2):221–225, FEB 2014.
- [3] D. Baleanu, J. H. Asad, and **I. Petrás**. Numerical solution of the fractional Euler-Lagrange's equations of a thin elastica model. NONLINEAR DYNAMICS, 81(1-2):97–102, JUL 2015.
- [4] D. Baleanu, J. H. Asad, **I. Petrás**, S. Elagan, and A. Bilgen. Fractional Euler-Lagrange equation of Caldirola-Kanai oscillator. ROMANIAN REPORTS IN PHYSICS, 64(S):1171–1177, 2012.
- [5] D. Baleanu, R. Garra, and **I. Petrás**. A fractional variational approach to the fractional Basset-type equation. REPORTS ON MATHEMATICAL PHYSICS, 72(1):57–64, AUG 2013.
- [6] D. Baleanu, **I. Petrás**, J. H. Asad, and M. Pilar Velasco. Fractional Pais-Uhlenbeck oscillator. INTERNATIONAL JOURNAL OF THEORETICAL PHYSICS, 51(4):1253–1258, APR 2012.
- [7] I. Dimeas, **I. Petrás**, and C. Psychalinos. New analog implementation technique for fractional-order controller: A DC motor control. AEU-INTERNATIONAL JOURNAL OF ELECTRONICS AND COMMUNICATIONS, 78:192–200, 2017.
- [8] L. Dorcak, J. Terpak, **I. Petrás**, and F. Dorcakova. Electronic realization of the fractional-order systems. ACTA MONTANISTICA SLOVACA, 12(3):231–237, 2007.
- [9] L. Dorcak, J. Valsa, E. Gonzalez, J. Terpak, **I. Petrás**, and L. Pivka. Analogue realization of fractional- order dynamical systems. ENTROPY, 15(10):4199–4214, OCT 2013.
- [10] A. Dzielinski, D. Sierociuk, G. Sarwas, **I. Petrás**, I. Podlubny, and T. Skovranek. Identification of the fractional-order systems: A frequency domain approach. ACTA MONTANISTICA SLOVACA, 16(1):26–33, 2011.
- [11] S. F. Zaman, D. Baleanu, and **I. Petrás**. Measurement of para-xylene diffusivity in zeolites and analyzing desorption curves using the Mittag-Leffler function. FRACTIONAL CALCULUS AND APPLIED ANALYSIS, 19(2):551–560, MAR 2016.
- [12] E. A. Gonzalez, L. Dorcak, C. A. Monje, J. Valsa, F. S. Caluyo, and **I. Petrás**. Conceptual design of a selectable fractional-order differentiator for industrial applications. FRACTIONAL CALCULUS AND APPLIED ANALYSIS, 17(3):697–716, SEP 2014.
- [13] E. A. Gonzalez, J. Y. Hung, L. Dorcak, J. Terpak, and **I. Petrás**. Posicast control of a class of fractional- order processes. CENTRAL EUROPEAN JOURNAL OF PHYSICS, 11(6):868–880, JUN 2013.
- [14] E. A. Gonzalez, **I. Petrás**, and M. D. Ortigueira. Novel polarization index evaluation formula and fractional-order dynamics in electric motor insulation resistance. FRACTIONAL CALCULUS AND APPLIED ANALYSIS, 21(3):613–627, JUN 2018.
- [15] S. Kapoulea, V. Bizonis, P. Bertias, C. Psychalinos, A. Elwakil, and **I. Petrás**. Reduced active components count electronically adjustable fractional-order controllers: Two design examples. ELECTRONICS, 9(1), JAN 2020.
- [16] I. Kostial, P. Nemcovsky, L. Dorcak, J. Terpak, **I. Petrás**, M. Rogal, and M. Halmo. Real time blast furnace modelling. METALURGIJA, 40(3):147–150, JUL-SEP 2001.
- [17] **I. Petrás**. A note on the fractional-order Chua's system. CHAOS SOLITONS & FRACTALS, 38(1):140– 147, OCT 2008.
- [18] **I. Petrás**. Chaos in the fractional-order Volta's system: modeling and simulation. NONLINEAR DYNAMICS, 57(1-2):157–170, JUL 2009.
- [19] **I. Petrás**. Fractional – order feedback control of a DC motor. JOURNAL OF ELECTRICAL ENGINEERING, 60(3):117–128, MAY-JUN 2009.
- [20] **I. Petrás**. Discussion on: "Simple fractional order model structures and their applications in control system design". EUROPEAN JOURNAL OF CONTROL, 16(6, SI):697–698, NOV-DEC 2010.
- [21] **I. Petrás**. Fractional-order memristor-based Chua's circuit. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS II- EXPRESS BRIEFS, 57(12):975–979, DEC 2010.
- [22] **I. Petrás**. A note on the fractional-order Volta's system. COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION, 15(2):384–393, FEB 2010.
- [23] **I. Petrás**. An effective numerical method and its utilization to solution of fractional models used in bioengineering applications. ADVANCES IN DIFFERENCE EQUATIONS, 2011.

- [24] **I. Petras**. Modeling and numerical analysis of fractional-order Bloch equations. *COMPUTERS & MATHEMATICS WITH APPLICATIONS*, 61(2):341–356, JAN 2011.
- [25] **I. Petras**. Chaos in fractional-order population model. *INTERNATIONAL JOURNAL OF BIFURCATION AND CHAOS*, 22(4), APR 2012.
- [26] **I. Petras**. Tuning and implementation methods for fractional-order controllers. *FRACTIONAL CALCULUS AND APPLIED ANALYSIS*, 15(2):282–303, JUN 2012.
- [27] **I. Petras**. Comments on “Coexistence of hidden chaotic attractors in a novel no-equilibrium system” (nonlinear dyn, doi:10.1007/s11071-016-3170-x). *NONLINEAR DYNAMICS*, 90(1):749–754, OCT 2017.
- [28] **I. Petras**. Comments and corrections to “Design and implementation of novel fractional-order controllers for stabilized platforms”. *IEEE ACCESS*, 8:132413–132414, 2020.
- [29] **I. Petras**. Comments on “Chaotic oscillator based on memcapacitor and meminductor” (nonlinear dyn, doi: 10.1007/s11071-019-04781-5). *NONLINEAR DYNAMICS*, 102(4):2945–2950, DEC 2020.
- [30] **I. Petras**. Novel fractional-order model predictive control: State-space approach. *IEEE ACCESS*, 9:92769–92775, 2021.
- [31] **I. Petras**. The fractional-order Lorenz-type systems: A review. *FRACTIONAL CALCULUS AND APPLIED ANALYSIS*, 25(2):362–377, APR 2022.
- [32] **I. Petras**. Oscillators based on fractional-order memory elements. *FRACTAL AND FRACTIONAL*, 6(6), JUN 2022.
- [33] **I. Petras**. Novel Generalized Low-Pass Filter with Adjustable Parameters of Exponential-Type Forgetting and Its Application to ECG Signal. *SENSORS*, 22(22):8740, NOV 2022.
- [34] **I. Petras** and D. Bednarova. Total least squares approach to modeling: A Matlab toolbox. *ACTA MONTANISTICA SLOVACA*, 15(2):158–170, 2010.
- [35] **I. Petras**, D. Bednarova, and I. Podlubny. Description of behavior of national economies in state space. *ACTA MONTANISTICA SLOVACA*, 13(1):183–186, 2008.
- [36] **I. Petras** and R. L. Magin. Simulation of drug uptake in a two compartmental fractional model for a biological system. *COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION*, 16(12, SI):4588–4595, DEC 2011.
- [37] **I. Petras** and I. Podlubny. State space description of national economies: The V4 countries. *COMPUTATIONAL STATISTICS & DATA ANALYSIS*, 52(2):1223–1233, OCT 15 2007.
- [38] **I. Petras**, D. Sierociuk, and I. Podlubny. Identification of parameters of a half-order system. *IEEE TRANSACTIONS ON SIGNAL PROCESSING*, 60(10):5561–5566, OCT 2012.
- [39] **I. Petras** and J. Terpak. Fractional calculus as a simple tool for modeling and analysis of long memory process in industry. *MATHEMATICS*, 7(6), JUN 2019.
- [40] I. Podlubny, **I. Petras**, B. Vinagre, P. O’Leary, and L. Dorcak. Analogue realizations of fractional-order controllers. *NONLINEAR DYNAMICS*, 29(1-4):281–296, JUL-SEP 2002.
- [41] I. Podlubny, T. Skovranek, B. M. Vinagre Jara, **I. Petras**, V. Verbitsky, and Y. Chen. Matrix approach to discrete fractional calculus iii: non-equidistant grids, variable step length and distributed orders. *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*, 371(1990, SI), MAY 13 2013.
- [42] D. Sierociuk, A. Dzielinski, G. Sarwas, **I. Petras**, I. Podlubny, and T. Skovranek. Modelling heat transfer in heterogeneous media using fractional calculus. *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A – MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*, 371(1990, SI), MAY 13 2013.
- [43] D. Sierociuk, I. Podlubny, and **I. Petras**. Experimental evidence of variable-order behavior of ladders and nested ladders. *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*, 21(2):459–466, MAR 2013.
- [44] D. Sierociuk, T. Skovranek, M. Macias, I. Podlubny, **I. Petras**, A. Dzielinski, and P. Ziubinski. Diffusion process modeling by using fractional-order models. *APPLIED MATHEMATICS AND COMPUTATION*, 257:2–11, APR 15 2015.
- [45] T. Skovranek, M. Macias, D. Sierociuk, W. Malesza, A. Dzielinski, I. Podlubny, J. Pocsova, and **I. Petras**. Anomalous diffusion modeling using ultracapacitors in domino ladder circuit. *MICROELECTRONICS JOURNAL*, 84:136–141, FEB 2019.
- [46] T. Skovranek, I. Podlubny, and **I. Petras**. Modeling of the national economies in state-space: A fractional calculus approach. *ECONOMIC MODELLING*, 29(4):1322–1327, JUL 2012.
- [47] M. Takac and **I. Petras**. Cross-platform GPU-based implementation of lattice Boltzmann method solver using arrayfire library. *MATHEMATICS*, 9(15), AUG 2021.

- [48] A. Tepljakov, E. A. Gonzalez, E. Petlenkov, J. Belikov, C. A. Monje, and **I. Petras**. Incorporation of fractional-order dynamics into an existing PI/PID DC motor control loop. *ISA TRANSACTIONS*, 60:262–273, JAN 2016.
- [49] B. Vinagre, Y. Chen, and **I. Petras**. Two direct Tustin discretization methods for fractional-order differentiator/integrator. *JOURNAL OF THE FRANKLIN INSTITUTE-ENGINEERING AND APPLIED MATHEMATICS*, 340(5):349–362, AUG 2003.
- [50] B. Vinagre, **I. Petras**, I. Podlubny, and Y. Chen. Using fractional order adjustment rules and fractional order reference models in model-reference adaptive control. *NONLINEAR DYNAMICS*, 29(1-4):269–279, JUL-SEP 2002.

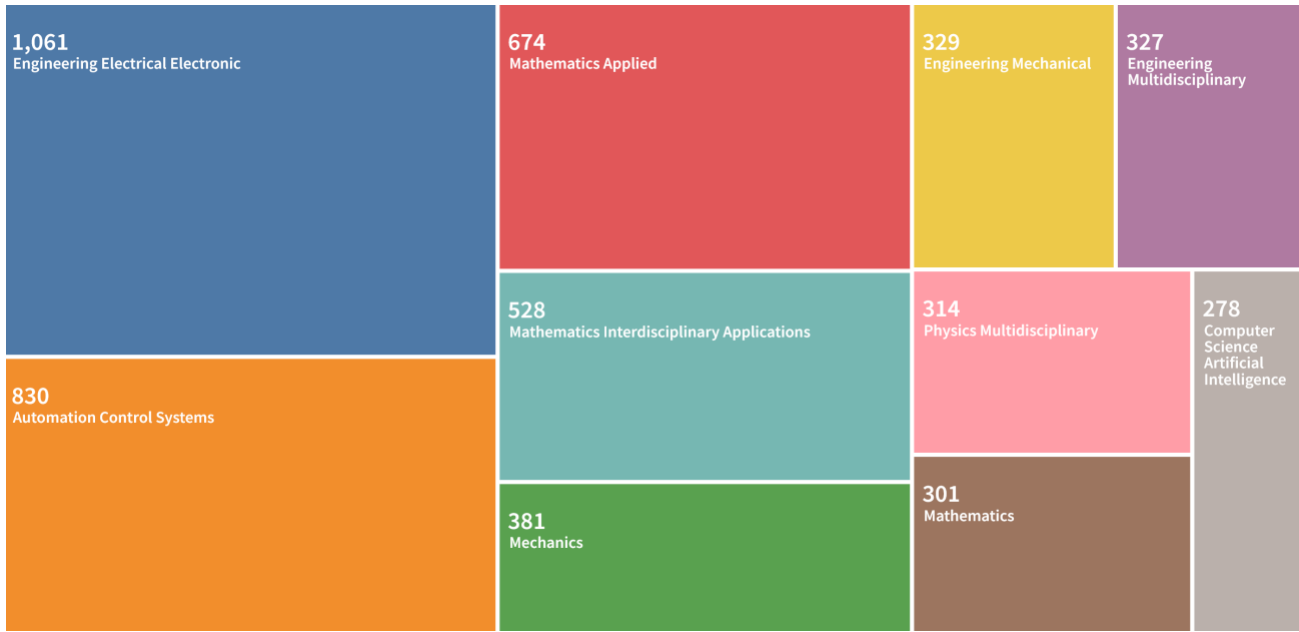
Books and book chapters:

- [1] **I. Petras**. Fractional-order control: New control techniques, In: *Fractional Order Systems: An Overview of Mathematics, Design, and Applications for Engineers*, Academic Press, Elsevier, 2021, pp. 71–106, (chap. 3), ISBN 978-0-12-824334-3.
- [2] **I. Petras** (Ed.). *Fractional Order Systems*. Multidisciplinary Digital Publishing Institute, 2019, ISBN 978-3-03921-608-6.
- [3] **I. Petras** (Ed.). *Handbook of Fractional Calculus with Applications: Vol.6 Applications in Control*, De Gruyter, 2019, ISBN 978-3-11-057174-5.
- [4] **I. Petras**. Fractional calculus and its applications, In: *Mathematical modeling with multidisciplinary applications*, John Wiley & Sons, 2013, pp. 357-398 (chap. 15), ISBN 978-1-1182-9441-3.
- [5] **I. Petras**. *Fractional-Order Nonlinear Systems: Modeling, Analysis and Simulation*, Springer, Series: Nonlinear Physical Science, 2011, ISBN 978-3-642-18100-9.
- [6] **I. Petras**. *Fractional Order Systems: Modeling and Control Applications*, World Scientific, Series on Nonlinear Science, 2010, ISBN 978-9-814-30419-1.
- [7] **I. Petras**. Fractional derivatives, fractional integrals, and fractional differential equations in Matlab, In: A. Assi Ed. *Engineering Education and Research Using MATLAB*, InTech, 2011, (chap. 10), ISBN 978-953-307-656-0.
- [8] **I. Petras**, Y. Q. Chen, B. M. Vinagre. Robust stability test for interval fractional order linear systems. In: V. Blondel and A. Megretski Eds. *Unsolved problems in mathematics and control systems*, Princeton University Press, 2004, (chap. 6.5) ISBN 0-691-11748-9.
- [9] **I. Petras**, I. Podlubny, P. O’Leary, L. Dorcak, B. M. Vinagre. *Analog Realizations of Fractional Order Controllers*, TU Kosice, 2002, p. 84, ISBN 80-7099-627-7.

Web of Science categories of Prof. Ivo Petráš publications

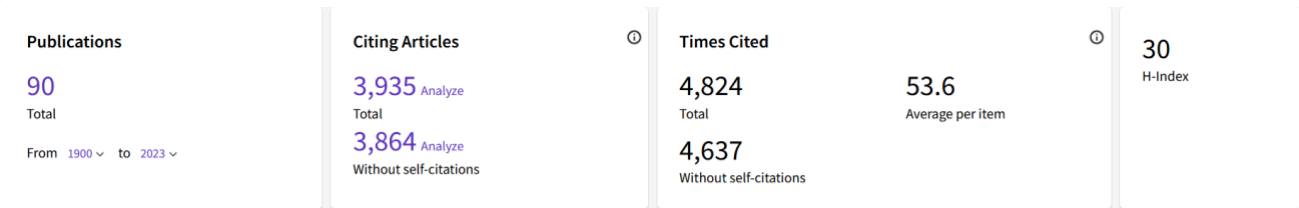


Web of Science categories of CITATIONS to Prof. Ivo Petráš publications



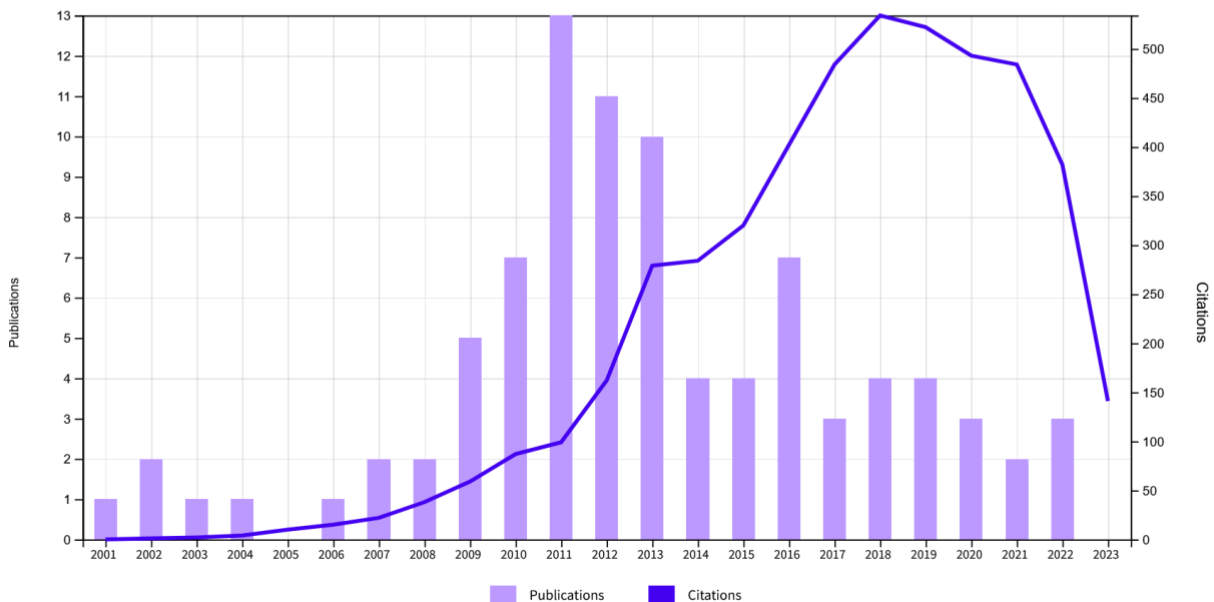
Web of Science statistics of publications and citations:

<https://publons.com/wos-op/researcher/B-1393-2009/>



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Selected professional services of Prof. Ivo Petráš

Journals:

o Editorial Board Member or Associate Editor or Guest Editor:

- [International Journal of Mathematical Modelling and Numerical Optimisation](#), ISSN (Online): 2040-3615, ISSN (Print): 2040-3607, Inderscience Publishers, USA – (since 2008),
- [Fractional Calculus and Applied Analysis](#), Springer, ISSN: 1314-2224 (Online) – (since 2010),
- [International Journal of General Systems](#), Taylor & Francis, ISSN: 0308-1079 (Print), 1563-5104 (Online) – (since 2016),
- [ISA Transactions](#), Elsevier, ISSN: 0019-0578 – (since 2019),
- [Mathematics](#), MDPI, ISSN: 2227-7390, (also Special Issue Editor "[Fractional Order Systems](#)", 2019), (since 2020),
- [Elektronika ir Elektrotechnika](#), Kaunas University of Technology, ISSN: 1392-1215 – (since 2019),
- [International Journal of Applied and Computational Mathematics](#), Springer, ISSN: 2349-5103 (Print), 2199-5796 (Online) – (since 2020).

o Reviewer for:

Nonlinear Dynamics; Signal Processing; Journal of Vibration and Control; European Journal of Control; Automatica; Journal of Process Control; IEEE Transaction on Automatic Control; Nonlinear Analysis; International Journal of Bifurcation and Chaos; Advance in Difference Equations; IEEE Transactions on Control Systems Technology; Applied Mathematical Modelling; Chaos, Solitons & Fractals; International Journal of Systems Science; Transactions of the Institute of Measurement and Control; ISA Transactions; Mechatronics; IET Signal Processing; Journal of Franklin Institute; Journal of Mechatronics and Applications; Signal Image and Video Processing; Nonlinear Analysis Real World Applications; Journal of Dynamic Systems, Measurement and Control; World Applied Science Journal; IEEE Transactions on Signal Processing; ASME Journal of Computational and Nonlinear Dynamics, etc.

Conferences:

- Organizing committee, The 4th IFAC Workshop on Fractional Differentiation and Its Applications (FDA) – 2010,
- Member of IPC, The 5th IFAC Symposium on Fractional Differentiation and Its Applications (FDA) – 2012,
- Member of Technical Program Committee, ASME/IEEE Int. Conf. on Mechatronics and Embedded Systems and Applications: (2007 – 2011),
- Member of Technical Program Committee and Associate Editor of IEEE, Chinese Control and Decision Conference CCDC: (2009 – 2011),
- Chair of Technical Committee, The Fifth Symposium on Fractional Derivatives and Their Applications FDTA under ASME/MESA2011,
- Member of Program Committee, Process Control (PC) – 2012, 2017, 2019, 2021, 2023,
- The International Symposium on Fractional Signals and Systems (ISFSS) – 2015, 2017,
- Member of Program Committee, The Conference on Non-integer Order Calculus and its Applications – 2016, 2018
- Chairman of Program Committee, IEEE International Carpathian Control Conference (ICCC) – 2016, 2020,
- Member of Program Committee, The International Conference on Control, Decision and Information Technologies (CoDIT): (2017 – 2023),
- Member of Program Committee, IEEE International Carpathian Control Conference (ICCC): (2017 – 2023),
- Member of Program Committee, International Symposium on Mathematical Methods in Engineering (MME) – 2017,
- Member of Program Committee, The International Conference ELECTRONICS: (2019 – 2023),
- Member of Program Committee, The International Conference on Fractional Differentiation and its Applications (ICFDA) – 2018, 2023,
- Member of Program Committee, International Conference on Informatics in Control, Automation and Robotics (ICINCO) – 2023.