

Juri Belikov

Curriculum Vitae

September 2020

📍 Department of Software Science, Tallinn University of Technology, Akadeemia tee 15a, 12618 Tallinn, Estonia

✉ juri.belikov@taltech.ee

Education and Defended Theses

2012 *Polynomial methods for nonlinear control systems*, **PhD**, Department of Computer Control, Tallinn University of Technology

2008 *Synthesis and identification of nonlinear discrete-time models for model based control*, **MSc**, Department of Computer Control, Tallinn University of Technology

2006 *Maximization of Profit in Case of Cobb-Douglas Production Function*, **BSc** (cum laude), Department of Mathematics, Tallinn University

Researcher Unique Identifiers

- ✓ ORCID: <http://orcid.org/0000-0002-8243-7374>
- ✓ ResearcherID: <http://www.researcherid.com/rid/I-5813-2015>
- ✓ Google Scholar: <http://scholar.google.com/citations?user=wiY9Gz8AAAAJ&hl=en&oi=ao>

Professional Employment

Current positions:

Oct. 2018– **Assistant Professor** (tenure track), Department of Software Science, Tallinn University of Technology

Previous positions:

Sep. 2015 to Sep. 2017 **Postdoctoral fellow**, Faculty of Mechanical Engineering & Faculty of Electrical Engineering, Technion—Israel Institute of Technology, Israel

Sep. 2012 to Sep. 2018 **Associate Professor** (docent), Tallinn University of Technology

Aug. 2012 to Dec. 2015 **Researcher**, Institute of Cybernetics at Tallinn University of Technology

Nov. 2006 to Jul. 2012, **Engineer**, Tallinn University of Technology

Fellowships and Awards

2020, Best-of-the-best conference paper award from IEEE PES General Meeting: “Control of energy storage devices under uncertainty using nonlinear feedback systems” by Y. Levron, J. Belikov

2019 Estonian Cultural foundation of the President, Young IT-scientist award

2014 Academician Boris Tamm’s honorary scholarship

2010 Jaan Poska honorary scholarship

2008 III prize at the competition of master students’ scientific research, Ministry of Education

2008 I prize at the contest of master students’ research, Tallinn University of Technology

Institutional Responsibilities

2018– Member of the Council, Department of Software Science

2013–2015 Member of a curriculum council, Department of Mathematics, Institute of Mathematics and Natural Sciences, Tallinn University

2012–2015 BSc thesis defence committee; member, Department of Computer Control, Tallinn University of Technology

2009–2015 Popularization of ICT doctoral studies in Estonia

Member of Scientific Societies

- 2019– IEEE Senior Member
- 2008–2018 Member, Estonian Society of System Engineers
- 2008–2012 Student Member, IEEE Control System Society
- 2009–2015 Member, European Embedded Control Institute

Recent Scientific Projects

- ✓ LITEE20016: “Applied research on connecting power market demand response service platforms to advanced electric power consumables and intelligent system planning and management”, 2020
- ✓ LEP18083: “Alexela Energy AS applied research for development of electricity consumption prediction model,” 2018–2019
- ✓ MOBTP36 (PI): “Modeling and low-complexity analysis of large scale power networks,” 2017–2018
- ✓ TAR16013: “Estonian Centre of Excellence in ICT Research,” 2016–2023
- ✓ Fractional-order Modeling and Control, <http://fomcon.net/>
- ✓ Research and education in power systems, <https://a-lab.ee/projects/dq0-dynamics>

Students

Dissertations under supervision:

1. A. E. Onile, PhD candidate, 2019, (sup) Juri Belikov, Eduard Petlenkov, Consumer-oriented framework for recommendation of innovative energy services, Tallinn University of Technology
2. V. Škiparev, PhD candidate, 2019, (sup) Juri Belikov, Eduard Petlenkov, Control of low-inertia grids by energy storage battery using deep reinforcement learning, Tallinn University of Technology
3. T. Uudeberg, PhD candidate, 2019, (sup) Maie Bachmann, Juri Belikov, Electroencephalography-based individual brain state markers, Tallinn University of Technology

Dissertations supervised:

- ✓ PhD students:
 1. Igor Artemchuk, PhD, 2019, (sup) Eduard Petlenkov, Juri Belikov, and Ülo Nurges, Robust PID controller design for continuous-time systems via reduced Routh parameters, Tallinn University of Technology
 2. Aleksei Tepljakov, PhD, 2015, (sup) Eduard Petlenkov, Juri Belikov, Fractional-Order calculus based identification and control of complex dynamic systems, Tallinn University of Technology
- ✓ MSc students:
 1. Maria Sinimaa, MSc, 2020, (sup) Juri Belikov, Modeling and short-Term electricity demand forecasting: Estonia case study, Tallinn University of Technology
 2. Karl Taivo Kama, MSc, 2020, (sup) Juri Belikov, Analysis and development of Nordpool electricity price prediction model, Tallinn University of Technology
 3. V. Škiparev, MSc, 2018, (sup) Eduard Petlenkov, Juri Belikov, Control of water tank by NN-ANARX based controller implemented on Arduino–MATLAB/Simulink platform, Tallinn University of Technology

4. Mohammed A.A. Kullab, MSc, 2015, (sup) Juri Belikov, The application of game theory to control of water level in a multitank system, Tallinn University of Technology
5. Aleksei Tepljakov, MSc, 2011, (sup) Eduard Petlenkov, Juri Belikov, Fractional-order calculus based identification and control of linear dynamic systems, Tallinn University of Technology

Other Relevant Information

- ✓ 2020– Guest editor for *Energies*, special issue “Power System Dynamics and Renewable Energy Integration”
- ✓ 2014–... Mediterranean Conference on Control & Automation, member of International Program Committee
- ✓ “Modeling and analysis of power networks based on dq0 quantities,” XVI Estonian Mathematical Seminar, June 28, 2018, invited talk
- ✓ “Polynomial methods for Nonlinear Control Systems,” FinEst Math, Helsinki, Finland, January 08–10, 2014, invited talk

Scientific Work

Accepted papers

- [1] N. R. Chowdhury, R. Ofir, N. Zargari, D. Baimel, J. Belikov, and Y. Levron, Optimal control of lossy storage devices based on Pontryagin’s Minimum Principle, *IEEE Transactions on Energy Conversion*, 2020.
- [2] Y. Levron and J. Belikov, Control of energy storage devices under uncertainty using nonlinear feedback systems, in *PES General Meeting*, 2020.
- [3] A. E. Onile, J. Belikov, and Y. Levron, Innovative energy services for behavioral-reflective attributes and intelligent recommender system, in *IEEE PES Innovative Smart Grid Technologies Europe*, 2020.
- [4] V. Skiparev, J. Belikov, and E. Petlenkov, Reinforcement learning based approach for virtual inertia control in microgrids with renewable energy sources, in *IEEE PES Innovative Smart Grid Technologies Europe*, 2020.
- [5] N. Zargari, R. Ofir, Y. Levron, and J. Belikov, Using dq0 signals based on the central angle reference frame to model the dynamics of large-scale power systems, in *IEEE PES Innovative Smart Grid Technologies Europe*, 2020.

Journal papers

- [1] A. Aabloo, J. Belikov, V. Kaparin, and Ü. Kotta, Challenges and perspectives in control of ionic polymer-metal composite (IPMC) actuators: A survey, *IEEE Access*, 8, pp. 121059–121073, 2020.
- [2] D. Carmon, A. Navon, R. Machlev, J. Belikov, and Y. Levron, Readiness of small energy markets and electric power grids to global health crises: Lessons from the COVID-19 pandemic, *IEEE Access*, 8, pp. 127234–127243, 2020.
- [3] N. R. Chowdhury, J. Belikov, D. Baimel, and Y. Levron, Observer-based detection and identification of sensor attacks in networked CPSs, *Automatica*, 121, pp. 109166, 2020.
- [4] R. Machlev, Z. Batushansky, S. Soni, V. Chadliev, J. Belikov, and Y. Levron, Verification of utility-scale solar photovoltaic plant models for dynamic studies of transmission networks, *Energies*, 13, pp. 3191, 12 2020.
- [5] R. Machlev, N. Zargari, N. R. Chowdhury, J. Belikov, and Y. Levron, A review of optimal control methods for energy storage systems - energy trading, energy balancing and electric vehicles, *Journal of Energy Storage*, 32, pp. 101787, 2020.
- [6] A. Navon, G. Ben Yosef, R. Machlev, S. Shapira, N. R. Chowdhury, J. Belikov, A. Orda, and Y. Levron, Applications of game theory to design and operation of modern power systems - a comprehensive review, *Energies*, 13, pp. 3982, 15 2020.
- [7] D. Baimel, S. Tapuchi, Y. Levron, and J. Belikov, Improved fractional open circuit voltage MPPT methods for PV systems, *Electronics*, 8, 3, pp. 1–20, 2019.

- [8] Z. Bartosiewicz, J. Belikov, Ü. Kotta, and M. Wyrwas, State feedback linearization of nonlinear control systems on homogeneous time scales, *Nonlinear Analysis: Hybrid Systems*, 31, pp. 69–85, 2019.
- [9] N. HariPriya, K. Paneerselvam, S. Srinivasan, and J. Belikov, Evolutionary optimization based fractional order controller for web transport systems in process industries, *International Journal of Advanced Intelligence Paradigms*, 12, 3/4, 2019.
- [10] Ü. Kotta, J. Belikov, M. Halás, and A. Leibak, Degree of Dieudonné determinant defines the order of nonlinear system, *International Journal of Control*, 92, 3, pp. 518–527, 2019.
- [11] R. Machlev, J. Belikov, Y. Beck, and Y. Levron, MO-NILM: A multi-objective evolutionary algorithm for NILM classification, *Energy & Building*, 199, pp. 134–144, 2019.
- [12] A. Tepljakov, V. Vunder, E. Petlenkov, S. S. Nakshatharan, A. Punning, V. Kaparin, J. Belikov, and A. Aabloo, Fractional-order modeling and control of ionic polymer-metal composite actuator, *Smart Materials and Structures*, 28, pp. 1–12, 2019.
- [13] D. Akinyele, J. Belikov, and Y. Levron, Challenges of microgrids in remote communities: A STEEP model application, *Energies*, 11, 2, pp. 1–35, 2018.
- [14] J. Belikov and Y. Levron, A sparse minimal-order dynamic model of power networks based on dq0 signals, *IEEE Transactions on Power Systems*, 33, 1, pp. 1059–1067, 2018.
- [15] J. Belikov and Y. Levron, Dynamic modeling and stability analysis of power networks using dq0 transformations with a unified reference frame, *Proceedings of the Estonian Academy of Sciences*, 67, 4, pp. 368–377, 2018.
- [16] J. Belikov and Y. Levron, Integration of long transmission lines in large-scale dq0 dynamic models, *Electrical Engineering*, 100, 2, pp. 1219–1228, 2018.
- [17] J. Belikov and Y. Levron, Uses and misuses of quasi-static models in modern power systems, *IEEE Transactions on Power Delivery*, 33, 6, pp. 3263–3266, 2018.
- [18] Y. Levron, J. Belikov, and D. Baimel, A tutorial on dynamics and control of power systems with distributed and renewable energy sources based on the DQ0 transformation, *Applied Sciences*, 8, 9, pp. 1–48, 2018.
- [19] D. Akinyele, J. Belikov, and Y. Levron, Battery storage technologies for electrical applications: Impact in stand-alone photovoltaic systems, *Energies*, 10, pp. 1–39, 11 2017.
- [20] D. Baimel, J. Belikov, J. M. Guerrero, and Y. Levron, Dynamic modeling of networks, microgrids, and renewable sources in the dq0 reference frame: A survey, *IEEE Access*, 5, pp. 21323–21335, 2017.
- [21] J. Belikov and Z. Bartosiewicz, Stability and stabilizability of linear time-delay systems on homogeneous time scales, *Proceedings of the Estonian Academy of Sciences*, 66, 2, pp. 124–136, 2017.
- [22] J. Belikov, A. Kaldmäe, V. Kaparin, Ü. Kotta, A. Shumsky, M. Tönso, and A. Zhirabok, Functions’ algebra in nonlinear control: Computational aspects and software, *Proceedings of the Estonian Academy of Sciences*, 66, 1, pp. 89–107, 2017.
- [23] J. Belikov, A. Kaldmäe, and Ü. Kotta, Global linearization approach for nonlinear control systems: A brief tutorial overview, *Proceedings of the Estonian Academy of Sciences*, 66, 2, pp. 243–263, 2017.
- [24] J. Belikov and V. Kaparin, Regions of exponential stability in coefficient space for linear systems on nonuniform discrete domains, *Journal of Difference Equations and Applications*, 23, 5, pp. 878–892, 2017.
- [25] J. Belikov and Y. Levron, Comparison of time-varying phasor and dq0 dynamic models for large transmission networks, *International Journal of Electrical Power & Energy Systems*, 93, pp. 65–74, Dec. 2017.
- [26] Y. Levron and J. Belikov, Modeling power networks using dynamic phasors in the dq0 reference frame, *Electric Power Systems Research*, 144, pp. 233–242, Mar. 2017.
- [27] Y. Levron and J. Belikov, Reduction of power system dynamic models using sparse representations, *IEEE Transactions on Power Systems*, 32, 5, pp. 3893–3900, 2017.
- [28] A. Tepljakov, E. Petlenkov, E. A. Gonzalez, and J. Belikov, Digital realization of retuning fractional-order controllers for an existing closed-loop control system, *Journal of Circuits, Systems, and Computers*, 26, 10, pp. 1–26, Oct. 2017.
- [29] Z. Bartosiewicz, J. Belikov, Ü. Kotta, M. Tönso, and M. Wyrwas, On the transformation of nonlinear discrete-time input-output system to the strong row-reduced form, *Proceedings of the Estonian Academy of Sciences*, 65, 3, pp. 220–236, 2016.

- [30] J. Belikov, M. Halás, Ü. Kotta, and C. H. Moog, A polynomial approach to nonlinear model matching problem, *Proceedings of the Estonian Academy of Sciences*, 65, 4, pp. 330–344, 2016.
- [31] J. Belikov, Ü. Kotta, and A. Tepljakov, Algebraic approach for analysis and control of a water tank system, *Information Technology And Control*, 45, 2, pp. 175–183, 2016.
- [32] Ü. Nurges, I. Artemchuk, and J. Belikov, On stable cones of polynomials via reduced Routh parameters, *Kybernetika*, 52, 3, pp. 461–477, 2016.
- [33] A. Tepljakov, E. A. Gonzalez, E. Petlenkov, J. Belikov, C. A. Monje, and I. Petráš, Incorporation of fractional-order dynamics into an existing PI/PID DC motor control loop, *ISA Transactions*, 60, pp. 262–273, 2016.
- [34] J. Belikov, M. Halás, Ü. Kotta, and C. H. Moog, Model matching problem for discrete-time nonlinear systems, *Proceedings of the Estonian Academy of Sciences*, 64, 4, pp. 457–472, 2015.
- [35] J. Belikov, Ü. Kotta, and M. Tõnso, Realization of nonlinear MIMO system on homogeneous time scales, *European Journal of Control*, 23, pp. 48–54, 2015.
- [36] J. Belikov and E. Petlenkov, NN-SANARX model based control of a multi tank liquid-level systems, *International Journal of Computational Intelligence Systems*, 8, 2, pp. 265–277, 2015.
- [37] J. Belikov, Ü. Kotta, and M. Tõnso, Adjoint polynomial formulas for nonlinear state-space realization, *IEEE Transactions on Automatic Control*, 59, 1, pp. 256–261, 2014.
- [38] J. Belikov, Ü. Kotta, and M. Tõnso, Comparison of LPV and nonlinear system theory: A realization problem, *Systems & Control Letters*, 64, pp. 72–78, 2014.
- [39] A. Tepljakov, E. Petlenkov, and J. Belikov, Fractional-order digital filter approximation method for embedded control applications, *International Journal of Microelectronics and Computer Science*, 5, 2, pp. 54–60, 2014.
- [40] A. Tepljakov, E. Petlenkov, J. Belikov, and S. Astapov, Tuning and digital implementation of a fractional-order PD controller for a position servo, *International Journal of Microelectronics and Computer Science*, 4, 3, pp. 116–123, 2013.
- [41] J. Belikov, Ü. Kotta, and M. Tõnso, State-space realization of nonlinear control systems: Unification and extension via pseudo-linear algebra, *Kybernetika*, 48, 6, pp. 1100–1113, 2012.
- [42] A. Tepljakov, E. Petlenkov, and J. Belikov, Application of Newton’s method to analog and digital realization of fractional-order controllers, *International Journal of Microelectronics and Computer Science*, 3, 2, pp. 45–52, 2012.
- [43] J. Belikov, P. Kotta, Ü. Kotta, and A. Zinober, Minimal realization of bilinear and quadratic input-output difference equations in state-space form, *International Journal of Control*, 84, 12, pp. 2024–2034, 2011.
- [44] J. Belikov, Ü. Kotta, and A. Leibak, Transfer matrix and its Jacobson form for nonlinear control systems on time scales: CAS implementation, *AT&P journal PLUS*, 2, pp. 6–13, 2011.
- [45] A. Tepljakov, E. Petlenkov, and J. Belikov, FOMCON: A MATLAB toolbox for fractional-order system identification and control, *International Journal of Microelectronics and Computer Science*, 2, 2, pp. 51–62, 2011.

Papers in conference proceedings

- [1] J. Belikov, A. Kaldmäe, and Y. Levron, An extended flatness-based controller for permanent magnet synchronous machines incorporating an event-based mechanism, in *Mediterranean Conference on Control and Automation*, 2019, pp. 416–421.
- [2] Y. Levron and J. Belikov, Performance limits of low inertia systems based on minimum energy control, in *European Control Conference*, 2019.
- [3] Y. Levron, V. Kaparin, and J. Belikov, Analyzing the dynamics and stability of dq0 systems based on a port-Hamiltonian approach, in *Mediterranean Conference on Control and Automation*, 2019, pp. 410–415.
- [4] V. Skiparev, J. Belikov, and E. Petlenkov, NN-SANARX model based control of a water tank system using embedded microcontroller Arduino, in *Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications*, 2019, pp. 372–377.
- [5] M. Spichakova, J. Belikov, K. Nõu, and E. Petlenkov, Feature engineering for short-term forecast of energy consumption, in *IEEE PES Innovative Smart Grid Technologies Europe*, 2019, pp. 1–5.

- [6] N. Zargari, Y. Levron, and J. Belikov, Optimal control of energy storage devices based on Pontryagin's minimum principle and the shortest path method, in *IEEE PES Innovative Smart Grid Technologies Europe*, 2019, pp. 1–5.
- [7] A. Fahima, R. Ofir, J. Belikov, and Y. Levron, Minimal energy storage required for stability of low inertia distributed sources, in *International Energy Conference*, Limassol, Cyprus, 2018, pp. 1–5.
- [8] A. Tepljakov, E. Petlenkov, and J. Belikov, Grey box identification of fractional-order system models from frequency domain data, in *The 41st International Conference on Telecommunications and Signal Processing*, Athens, Greece, 2018, pp. 319–322.
- [9] Y. Levron and J. Belikov, Open-source software for modeling and analysis of power networks in the dq0 reference frame, in *The 12th IEEE PES PowerTech Conference*, Manchester, UK, Jun. 2017, pp. 1–6.
- [10] I. Artemchuk, Ü. Nurges, and J. Belikov, Robust pole assignment via Routh rays of polynomials, in *The 55th American Control Conference*, Boston, MA, USA, Jul. 2016, pp. 7031–7036.
- [11] Y. Levron and J. Belikov, Observable canonical forms of multi-machine power systems using dq0 signals, in *IEEE International Conference on the Science of Electrical Engineering*, Eilat, Israel, Nov. 2016, pp. 1–6.
- [12] A. Tepljakov, E. Petlenkov, and J. Belikov, Digital implementation of retuning fractional controllers for an existing closed-loop magnetic levitation control system, in *The 39th International Conference on Telecommunications and Signal Processing*, Vienna, Austria, Jun. 2016, pp. 630–633.
- [13] I. Artemchuk, Ü. Nurges, J. Belikov, and V. Kaparin, Stable cones of polynomials via Routh rays, in *The 20th International Conference on Process Control*, Štrbské Pleso, High Tatras, Slovak Republic, Jun. 2015, pp. 255–260.
- [14] J. Belikov and A. Tepljakov, On controllability of switched linear systems on time scales, in *The 14th European Control Conference*, Linz, Austria, Jul. 2015, pp. 1736–1741.
- [15] A. Tepljakov, E. Petlenkov, and J. Belikov, FOPID controller tuning for fractional FOPDT plants subject to design specifications in the frequency domain, in *The 14th European Control Conference*, Linz, Austria, Jul. 2015, pp. 3502–3507.
- [16] A. Tepljakov, E. Petlenkov, and J. Belikov, Robust FOPI and FOPID controller design for FFOPDT plants in embedded control applications using frequency-domain analysis, in *The 54rd American Control Conference*, Chicago, IL, USA, Jul. 2015, pp. 3868–3873.
- [17] J. Belikov, Ü. Kotta, M. Tönso, Z. Bartosiewicz, and M. Wyrwas, Dynamic feedback linearization of non-linear control systems on homogenous time scale, in *The Multi-Conference on Systems and Control*, Antibes, France, Oct. 2014, pp. 947–952.
- [18] J. Belikov and E. Petlenkov, Model based control of a water tank system, in *The 19th IFAC World Congress*, Cape Town, South Africa, Aug. 2014, pp. 10838–10843.
- [19] Ü. Nurges, I. Artemchuk, and J. Belikov, Generation of stable polytopes of Hurwitz polynomials via Routh parameters, in *The 53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, Dec. 2014, pp. 2390–2395.
- [20] A. Tepljakov, E. Petlenkov, and J. Belikov, Closed-loop identification of fractional-order models using FOMCON toolbox for MATLAB, in *The 14th Biennial Baltic Electronic Conference*, Tallinn, Estonia, Oct. 2014, pp. 213–216.
- [21] A. Tepljakov, E. Petlenkov, and J. Belikov, Embedded system implementation of digital fractional filter approximations for control applications, in *The 21th International Conference Mixed Design of Integrated Circuits and Systems*, Lublin, Poland, Jun. 2014, pp. 441–445.
- [22] A. Tepljakov, E. Petlenkov, and J. Belikov, Gain and order scheduled fractional-order PID control of fluid level in a multi-tank system, in *International Conference on Fractional Differentiation and its Application*, Catania, Italy, Jun. 2014, pp. 1–6.
- [23] A. Tepljakov, E. Petlenkov, J. Belikov, and E. A. Gonzalez, Design of retuning fractional PID controllers for a closed-loop magnetic levitation control system, in *The 13th International Conference on Control, Automation, Robotics and Vision*, Singapore, Dec. 2014, pp. 1345–1350.
- [24] V. Vansovits, E. Petlenkov, J. Belikov, K. Vassiljeva, and A. Tepljakov, Application of MPC to water boiler control system in district heat plant, in *The 13th International Conference on Control, Automation, Robotics and Vision*, Singapore, Dec. 2014, pp. 1609–1614.

- [25] K. Vassiljeva, J. Belikov, and E. Petlenkov, Application of genetic algorithms to neural networks based control of a liquid level tank system, in *The IEEE World Congress on Computational Intelligence*, Beijing, China, Jul. 2014, pp. 2525–2530.
- [26] J. Belikov, Ü. Kotta, S. Srinivasan, A. Kaldmäe, and K. Halturina, On exact feedback linearization of HVAC systems, in *The 19th International Conference on Process Control*, Štrbské Pleso, High Tatras, Slovak Republic, Jun. 2013, pp. 353–358.
- [27] J. Belikov, Ü. Kotta, and M. Tönso, NLControl: Symbolic package for study of nonlinear control systems, in *The Multi-Conference on Systems and Control*, Hyderabad, India, Aug. 2013, pp. 322–327.
- [28] J. Belikov, S. Nömm, E. Petlenkov, and K. Vassiljeva, Application of neural networks based SANARX model for identification and control liquid level tank system, in *The 12th International Conference on Machine Learning and Applications*, Miami, FL, USA, Dec. 2013, pp. 246–251.
- [29] J. Belikov, E. Petlenkov, K. Vassiljeva, and S. Nömm, Computational intelligence methods based design of closed-loop system, in *Neural Information Processing*, ser. Lecture Notes in Computer Science, Springer-Verlag Berlin Heidelberg, 2013, pp. 215–224.
- [30] Ü. Kotta, M. Tönso, J. Belikov, A. Kaldmäe, V. Kaparin, A. Y. Shumsky, and A. N. Zhirabok, A symbolic software package for nonlinear control systems, in *The 19th International Conference on Process Control*, Štrbské Pleso, High Tatras, Slovak Republic, Jun. 2013, pp. 101–106.
- [31] A. Tepljakov, E. Petlenkov, and J. Belikov, Digital fractional-order control of a position servo, in *The 20th International Conference Mixed Design of Integrated Circuits and Systems*, Gdynia, Poland, Jun. 2013, pp. 462–467.
- [32] A. Tepljakov, E. Petlenkov, and J. Belikov, Efficient analog implementations of fractional-order controllers, in *The 14th International Carpathian Control Conference*, Rytro, Poland, May 2013, pp. 377–382.
- [33] A. Tepljakov, E. Petlenkov, J. Belikov, and J. Finaev, Fractional-order controller design and digital implementation using FOMCON toolbox for MATLAB, in *The Multi-Conference on Systems and Control*, Hyderabad, India, Aug. 2013, pp. 340–345.
- [34] A. Tepljakov, E. Petlenkov, J. Belikov, and M. Halás, Design and implementation of fractional-order PID controllers for a fluid tank system, in *The 32nd American Control Conference*, Washington, USA, Jun. 2013, pp. 1777–1782.
- [35] J. Belikov, P. Kotta, Ü. Kotta, and M. Tönso, Practical polynomial formulas in MIMO nonlinear realization problem, in *The 51st IEEE Conference on Decision and Control*, Maui, HI, USA, Dec. 2012, pp. 1253–1258.
- [36] J. Belikov, Ü. Kotta, and M. Tönso, Explicit formulas for the state coordinates in nonlinear MIMO realization problem on homogeneous time scales, in *The Multi-Conference on Systems and Control*, Dubrovnik, Croatia, Oct. 2012, pp. 1388–1393.
- [37] J. Belikov, Ü. Kotta, and M. Tönso, Symbolic polynomial tools for nonlinear control systems, in *The 7th Vienna International Conference on Mathematical Modelling*, Vienna, Austria, Feb. 2012, pp. 1–6.
- [38] A. Tepljakov, E. Petlenkov, and J. Belikov, A flexible MATLAB tool for optimal fractional-order PID controller design subject to specifications, in *The 31st Chinese Control Conference*, Hefei, China, Jul. 2012, pp. 4698–4703.
- [39] A. Tepljakov, E. Petlenkov, and J. Belikov, Application of the Newton method to first-order implicit fractional transfer function approximation, in *The 19th International Conference Mixed Design of Integrated Circuits and Systems*, Warsaw, Poland, May 2012, pp. 473–477.
- [40] A. Tepljakov, E. Petlenkov, and J. Belikov, Implementation and real-time simulation of a fractional-order controller using a MATLAB based prototyping platform, in *The 13th Biennial Baltic Electronics Conference*, Tallinn, Estonia, Oct. 2012, pp. 145–148.
- [41] K. Vassiljeva, E. Petlenkov, and J. Belikov, GA based optimization of NN-SANARX model for adaptive control of nonlinear systems, in *The World Congress on Computational Intelligence*, Brisbane, Australia, Jun. 2012, pp. 1674–1681.
- [42] J. Belikov, M. Halás, Ü. Kotta, and C. H. Moog, Model matching problem for discrete-time nonlinear systems: Transfer function approach, in *The 9th International Conference on Control and Automation*, Santiago, Chile, Dec. 2011, pp. 360–365.
- [43] J. Belikov, Ü. Kotta, and A. Leibak, Transfer matrix and its Jacobson form for nonlinear systems on time scales: Mathematica implementation, in *The 18th International Conference on Process Control*, Tatranská Lomnica, Slovak Republic, Dec. 2011, pp. 141–146.

- [44] J. Belikov, Ü. Kotta, and M. Tönso, An explicit formula for computation of the state coordinates for nonlinear i/o equation, in *The 18th IFAC World Congress*, Milan, Italy, Aug. 2011, pp. 7221–7226.
- [45] J. Belikov, Ü. Kotta, and M. Tönso, Minimal realization of nonlinear MIMO equations in state-space form: Polynomial approach, in *The 50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, USA, Dec. 2011, pp. 7735–7740.
- [46] J. Belikov, Ü. Kotta, and M. Tönso, On applicability of LPV tools for bilinear systems, in *The 9th International Conference on Control and Automation*, Santiago, Chile, Dec. 2011, pp. 366–371.
- [47] J. Belikov and E. Petlenkov, Neuro-fuzzy dynamic pole placement control of nonlinear discrete-time systems, in *The International Joint Conference on Neural Networks*, San Jose, CA, USA, Jul. 2011, pp. 1577–1582.
- [48] J. Belikov and E. Petlenkov, Region of admissible values for discrete-time nonlinear control system linearized by output feedback, in *The 18th IFAC World Congress*, Milan, Italy, Aug. 2011, pp. 209–214.
- [49] S. Nõmm and J. Belikov, Online identification of the system order with ANARX structure, in *The International Conference on Adaptive and Intelligent Systems*, Klagenfurt, Austria, Sep. 2011, pp. 5–15.
- [50] S. Nõmm, K. Vassiljeva, E. Petlenkov, and J. Belikov, Structure identification of NN-ANARX model by genetic algorithm with combined cross-correlation-test based evaluation function, in *The 9th International Conference on Control and Automation*, Santiago, Chile, Dec. 2011, pp. 65–70.
- [51] A. Tepljakov, E. Petlenkov, and J. Belikov, FOMCON: Fractional order modeling and control toolbox for MATLAB, in *The 18th International Conference Mixed Design of Integrated Circuits and Systems*, Gliwice, Poland, Jun. 2011, pp. 684–689.
- [52] K. Vassiljeva, J. Belikov, and E. Petlenkov, Genetic algorithm based structure identification for feedback control of nonlinear MIMO systems, in *The International Conference on Adaptive and Intelligent Systems*, Klagenfurt, Austria, Sep. 2011, pp. 215–226.
- [53] K. Vassiljeva, J. Belikov, and E. Petlenkov, Neural networks based minimal or reduced model representation for control of nonlinear MIMO systems, in *The International Joint Conference on Neural Networks*, San Jose, CA, USA, Jul. 2011, pp. 1706–1713.
- [54] J. Belikov, P. Kotta, and Ü. Kotta, Realizability of bilinear input/output difference equations: Corrections and extensions, in *UKACC International Conference on CONTROL*, Coventry, UK, Sep. 2010, pp. 138–143.
- [55] J. Belikov, Ü. Kotta, and A. Leibak, Transformation of the transfer matrix of the nonlinear system into the Jacobson form, in *The International Congress on Computer Applications and Computational Science*, Singapore, Dec. 2010, pp. 495–498.
- [56] K. Vassiljeva, E. Petlenkov, and J. Belikov, Automated neural network model selection algorithm for feedback linearization based control, in *The 12th Biennial Baltic Electronics Conference*, Tallinn, Estonia, Oct. 2010, pp. 235–238.
- [57] K. Vassiljeva, E. Petlenkov, and J. Belikov, Neural network based minimal state-space representation of nonlinear MIMO systems for feedback control, in *The 11th International Conference on Control, Automation, Robotics and Vision*, Singapore, Dec. 2010, pp. 2191–2196.
- [58] K. Vassiljeva, E. Petlenkov, and J. Belikov, State-space control of nonlinear systems identified by ANARX and neural network based SANARX models, in *The World Congress on Computational Intelligence*, Barcelona, Spain, Jul. 2010, pp. 3816–3823.
- [59] J. Belikov and E. Petlenkov, Dynamic pole placement based control of nonlinear discrete-time systems with input delay, in *The 3rd IEEE Multi-conference on Systems and Control*, St. Petersburg, Russia, Jul. 2009, pp. 394–399.
- [60] J. Belikov and E. Petlenkov, Model reference control of nonlinear MIMO systems by dynamic output feedback linearization of ANARX models, in *The 7th IEEE International Conference on Control and Automation*, Christchurch, New Zealand, Dec. 2009, pp. 536–541.
- [61] J. Belikov and E. Petlenkov, Model reference control of nonlinear TITO systems by dynamic output feedback linearization of neural network based ANARX models, in *The 3rd IEEE Multi-conference on Systems and Control*, St. Petersburg, Russia, Jul. 2009, pp. 1820–1825.
- [62] J. Belikov and E. Petlenkov, NN-ANARX model based control of nonlinear discrete-time systems with input delays, in *The 3rd IEEE Multi-conference on Systems and Control*, St. Petersburg, Russia, Jul. 2009, pp. 1039–1044.

- [63] E. Petlenkov and J. Belikov, Neural network based dynamic pole placement control of nonlinear systems, in *The 7th IEEE International Conference on Control and Automation*, Christchurch, New Zealand, Dec. 2009, pp. 410–415.
- [64] M. Tönso, H. Rennik, J. Belikov, and Ü. Kotta, WebMathematica based tools for continuous-time nonlinear control systems, in *The 17th International Conference on Process Control*, Štrbské Pleso, Slovak Republic, Jun. 2009, pp. 625–633.
- [65] J. Belikov, Ü. Kotta, T. Mullari, S. Nõmm, and M. Tönso, Discretization of continuous-time systems with Computer Algebra System Mathematica, in *The International Conference Cybernetics and Informatics*, Ždiar, Slovak Republic, Dec. 2008, pp. 1–10.
- [66] J. Belikov and E. Petlenkov, Calculation of the control signal in MIMO NN-based ANARX models: Analytical approach, in *The 10th International Conference of Control, Automation, Robotics and Vision*, Hanoi, Vietnam, Dec. 2008, pp. 2196–2201.
- [67] J. Belikov, K. Vassiljeva, E. Petlenkov, and S. Nõmm, A novel Taylor series based approach for control computation in NN-ANARX structure based control of nonlinear systems, in *The 27th Chinese Control Conference*, Kunming, China, Jul. 2008, pp. 474–478.
- [68] S. Nõmm, E. Petlenkov, J. Vain, J. Belikov, F. Miyawaki, and K. Yoshimitsu, Recognition of the surgeon's motions during endoscopic operation by statistics based algorithm and neural networks based ANARX models, in *The 17th IFAC World Congress*, Seoul, South Korea, Jul. 2008, pp. 14773–14778.
- [69] E. Petlenkov, J. Belikov, S. Nõmm, and M. Wyrwas, Dynamic output feedback linearization based adaptive control of nonlinear MIMO systems, in *The 27th American Control Conference*, Seattle, WA, USA, Jun. 2008, pp. 3446–3451.
- [70] J. Belikov, E. Petlenkov, and S. Nõmm, Application of neural networks based ANARX structure to backing up control of a truck-trailer, in *The 6th IFAC Symposium on Intelligent Autonomous Vehicles*, Toulouse, France, Sep. 2007, pp. 1–6.
- [71] E. Petlenkov and J. Belikov, NN-ANARX structure for dynamic output feedback linearization of nonlinear SISO and MIMO systems: Neural networks based approach, in *The 26th Chinese Control Conference*, Zhangjiajie, China, Jul. 2007, pp. 138–145.

Patents

- [1] A. Tepljakov, E. Petlenkov, and J. Belikov, “Virtual coupled tanks system,” IPC EE05787B1, Jan. 2017. http://www.epa.ee/sites/www.epa.ee/files/elfinder/dokumendid/patendileht2016_07.pdf.

Scientific software

- [1] Y. Levron and J. Belikov. (2016). “Toolbox for modeling and analysis of power networks in the dq0 reference frame.” Retrieved August 15, 2016, <https://www.mathworks.com/matlabcentral/fileexchange/58702>.
- [2] Institute of Cybernetics at Tallinn University of Technology. (2015). “NLControl website,” <http://www.nlcontrol.ioc.ee>.

Main areas of scientific work/Current research topics

Nonlinear control systems, Power systems, Time scales calculus, Fractional-order modeling and control, Symbolic computations, Computational intelligence.

AMS 2010 classification #34, 39, 68, 93