

# CURRICULUM VITAE

Prof. **Sergiy A. Vorobyov**

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## PERSONAL DATA

Data and place of birth: May 24, 1972; Ukraine

Citizenship: Canada

## ACADEMIC POSITIONS

Full Professor	01/13 – present	Aalto University (former HUT), Espoo, Helsinki	Finland
Full Professor	07/12 – 2014	University of Alberta, Edmonton, Alberta	Canada
Associate Professor	07/10 – 06/12	University of Alberta, Edmonton, Alberta	Canada
Reader (Associate Professor)	09/07 – 07/08	Joint Research Institute: Heriot-Watt and Edinburgh Universities, Edinburgh	UK
Assistant Professor	09/06 – 06/10	University of Alberta, Edmonton, Alberta	Canada
Senior Researcher	04/05 – 09/06	Darmstadt University of Technology, Darmstadt	Germany
Senior Researcher	04/03 – 12/04	Duisburg-Essen University, Duisburg	Germany
PDF & Researcher	04/01 – 03/05	McMaster University, Hamilton, Ontario	Canada
Research Scientist	04/99 – 03/01	Inst. Physical and Chemical Research, Wako-shi	Japan
Research Scientist	06/97 – 03/99	Kharkov National University of Radioelectronics	Ukraine

## EDUCATION

Ph.D. in Systems and Data Processing (with distinction)

Kharkiv National University of Radioelectronics, Kharkiv, Ukraine

10/94 – 05/97

*Thesis:* Adaptive multilayered estimation and fault detection in nonstationary stochastic sequences

M.Sc. in Optimal Control and Data Processing (top grade in the year – 5/5)

Kharkiv National University of Radioelectronics, Kharkiv, Ukraine

09/89 – 07/94

*Thesis:* Detection of fractal properties of neuronal activity signals

P.Eng. of Alberta, Canada

since 01/09

## RESEARCH AWARDS AND HONORS

Paper "Tensorized neural layer decomposition for 2D DOA estimation" is *Top 3% of all papers accepted at IEEE ICASSP 2023*

*IEEE Fellow* named in 2018 **for contributions to optimization in robust signal processing**

*IEEE Signal Processing Society's 2004 Best Paper Award* for the paper titled "Robust adaptive beamforming using worst-case performance optimization: A solution to the signal mismatch prob-

lem” (co-authored with A.B. Gershman and Z.-Q. Luo) that was published in the February 2003 issue of the *IEEE Transactions on Signal Processing*

*NSERC Discovery Accelerator Award, 2012, Canada*

*Carl Zeiss Award, 2011, Germany*

*Alberta Ingenuity New Faculty Award, 2007, Alberta, Canada*

*1st Price Best Student Paper Award, Matthew W. Morency at IEEE CAMSAP 2015, IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing for our paper on algebraic approach to rank-constrained beamforming.*

*Highly cited paper (ISI Web of Knowledge) status for my 2003 IEEE Trans. Signal Processing paper (coauthored by A.B. Gershman and Z.-Q. Luo) on robust adaptive beamforming.*

### ACADEMIC FELLOWSHIPS

1999 German Academic Exchange Service (DAAD) Young Scientist Fellowship, Germany

01/96 – 04/98 Outstanding Young Scientist (Cabinet of Ministers) Fellowship, Ukraine

04/95 – 03/96 and 04/96 – 03/97 Young Scientist grant (Ph.D. student), Soros Foundation (ISSEP)

### OTHER AWARDS AND HONORS

05/89 Rank 3 in Universities’ Physics Contest, Ukraine

03/88 Rank 1 in Projective Geometry Contest (Kharkov region), Ukraine

Appreciated Reviewer: Recognition granted by *IEEE Transactions on Signal Processing*, 2006 and 2007

### RESEARCH

*My interests are:* Applications of optimization, learning, and linear algebra methods in signal processing and communications; Statistical signal and array processing with applications to wireless communications, MIMO radar, data networks, and biomedical engineering; Resource allocation in communication networks; Cognitive and cooperative aspects of data processing, Estimation and detection theory; Sampling and compressive sampling of data.

### PUBLICATIONS

Papers: 127 (116 published/to appear, 11 preprints/under review)

Books and book chapters: 4

Conferences: 176 (174 published/accepted, 2 under review)

Conference Tutorials, Invited Talks and Presentations: 9

Editorials and technical reports: 10

#### Papers

Preprints / Papers under review

- [P1] T.T. Zhang, **S. A. Vorobyov**, and F. Xu, “Transmit energy focusing for parameter estimation in slow-time transmit beamspace L-shaped MIMO radar,” submitted Nov. 8, 2023.

- [P2] L. Zhu, **S. A. Vorobyov**, Y. Liu, D. He, K. Guan, and Z. Zhong, “Enhanced target parameter estimation based on tensor train decomposition in FMCW radar,” 2023.
- [P3] X. Wang, E. Ollila, and **S. A. Vorobyov**, “Graph convolutional neural networks sensitivity under probabilistic error model,” submitted July 24, 2023, revised Jan. 10, 2024, revised Apr. 5, 2024.
- [P4] M. Esfandiari, **S. A. Vorobyov**, and R. W. Heath Jr., “AdaBoost-based efficient channel estimation and data detection in one-bit massive MIMO,” submitted July 3, 2023. [arxiv.org/2403.00621](https://arxiv.org/2403.00621)
- [P5] Y. Jing, **S. A. Vorobyov**, J. Liang, X. Fan, and Z. Chen, “Joint space-(slow) time waveforms and adaptive filter design for MIMO radar in the presence of (un)correlated clutter sources,” 2023.
- [P6] H. Zheng, Z. Shi, C.-W. Zhou, **S. A. Vorobyov**, and Y. Gu, “Deep tensor 2D DOA estimation for URA,” submitted June 27, 2023, revised Jan. 5, 2024.
- [P7] M. Esfandiari and **S. A. Vorobyov**, “DOA estimation in nonuniform sensor noise,” Sept. 30, 2021. [arxiv.org/2109.15043](https://arxiv.org/2109.15043)
- [P8] E. Dosti, **S. A. Vorobyov**, and T. Charalambous, “Embedding a heavy-ball type of momentum into the estimating sequences,” Oct. 29, 2021. [arxiv.org/2008.07979](https://arxiv.org/2008.07979)
- [P9] M. Neinavaie, M. Derakhtian, N. Daryanavardan, and **S. A. Vorobyov**, “A complexity efficient DMT-optimal tree pruning based sphere decoding,” Oct. 21, 2019. [arxiv.org/1910.09177](https://arxiv.org/1910.09177)
- [P10] M. W. Morency and **S. A. Vorobyov**, “An algebraic approach to a class of rank-constrained semi-definite programs with applications,” Oct. 7, 2016. [arxiv.org/1610.02181](https://arxiv.org/1610.02181)
- [P11] M. F. A. Ahmed and **S. A. Vorobyov**, “Simple semi-distributed lifetime maximizing strategy via power allocation in collaborative beamforming for wireless sensor networks,” *unpublished*, Jan. 16, 2014. [arxiv.org/1401.4147](https://arxiv.org/1401.4147)

Papers published / to appear

- [J1] L. Zhu, Y.-S. Liu, **S. A. Vorobyov**, D. He, K. Guan, Z. Zhong, and L. Chang, “Noise reduction in automotive pulse radar using signal subspace and presumed ambiguity function,” *IEEE Trans. Vehicular Technology*, early access, 2024.
- [J2] F. Xu, H. Zheng, and **S. A. Vorobyov**, “Tensor-based 2D DOA estimation for L-shaped nested array,” *IEEE Trans. Aerospace and Electronic Systems*, vol. 60, no. 1, pp. 604–618, Feb. 2024.
- [J3] F. G. Veshki and **S. A. Vorobyov**, “Efficient approximate online convolutional dictionary learning,” *IEEE Trans. Computational Imaging*, vol. 9, pp. 1165–1175, Dec. 2023.
- [J4] H. Zheng, C. Zhou, **S. A. Vorobyov**, Q. Wang, and Z. Shi, “Decomposed CNN for sub-Nyquist tensor-based 2D DOA estimation,” *IEEE Signal Processing Letters*, vol. 30, pp. 708–712, June 2023.
- [J5] A. M. Elbir, K. V. Mishra, **S. A. Vorobyov**, and R. W. Heath Jr., “Twenty-five years of advances in beamforming: From convex and nonconvex optimization to learning techniques” *IEEE Signal Processing Magazine Special Issue on 75th Anniversary of Signal Processing Society*, vol. 40, no. 4, pp. 118–131, June 2023.

- [J6] E. Dosti, **S. A. Vorobyov**, and T. Charalambous, “A new class of composite objective multi-step estimating sequence techniques,” *Signal Processing*, vol. 206, 108889, pp. 1–14, May 2023.
- [J7] Y. Huang, H. Fu, **S. A. Vorobyov**, and L.-Q. Luo, “Robust adaptive beamforming via worst-case SINR maximization with nonconvex uncertainty sets,” *IEEE Trans. Signal Processing*, vol. 71, pp. 218–232, 2023. **The IEEE Signal Processing Society’s top 25 downloaded articles from Sept. 2022 - Sept. 2023 for IEEE Transactions on Signal Processing on IEEE Xplore.**
- [J8] Y. Tian, X. Han, **S. A. Vorobyov**, J. Yin, Q. Liu, and G. Qiao, “Wideband signal detection in multipath environment affected by impulsive noise,” *The Journal of the Acoustical Society of America*, vol. 152, no. 1, pp. 445–455, July 2022.
- [J9] F. G. Veshki, N. Ouzir, **S. A. Vorobyov**, and E. Ollila, “Multimodal image fusion via coupled feature learning,” *Signal Processing*, vol. 200, 108637, pp. 1–12, June 2022.
- [J10] F. Xu, M. W. Morency, and **S. A. Vorobyov**, “DOA estimation for transmit beamspace MIMO radar via tensor decomposition with Vandermonde factor matrix,” *IEEE Trans. Signal Processing*, vol. 70, pp. 2901–2917, June 2022.
- [J11] Y. Huang and **S. A. Vorobyov**, “Enhanced robust adaptive beamforming designs for general-rank signal model via an induced norm of matrix errors,” *Signal Processing*, vol. 194, 108439, pp. 1–9, May 2022.
- [J12] F. Xu, **S. A. Vorobyov**, and F. Yang, “Transmit beamspace DDMA based automotive MIMO radar,” *IEEE Trans. Vehicular Technology*, vol. 71, no. 2, pp. 1669–1684, Feb. 2022.
- [J13] F. G. Veshki and **S. A. Vorobyov**, “Efficient ADMM-based algorithms for convolutional sparse coding,” *IEEE Signal Processing Letters*, vol. 29, pp. 386–393, 2022.
- [J14] A. K. Kocharlakota, K. Upadhyay, and **S. A. Vorobyov**, “Impact of pilot overhead and channel estimation on the performance of massive MIMO,” *IEEE Trans. Communications*, vol. 69, no. 12, pp. 8242–8255, Dec. 2021.
- [J15] W. Shi, **S. A. Vorobyov**, and Y. Li, “ULA fitting for sparse array design,” *IEEE Trans. Signal Processing*, vol. 69, pp. 6431–6447, Dec. 2021.
- [J16] J. Miettinen, **S. A. Vorobyov**, and E. Ollila, “Modelling and studying the effect of graph errors in graph signal processing,” *Signal Processing*, vol. 189, 108256, pp. 1–8, Dec. 2021.
- [J17] Y. Jing, J. Liang, **S. A. Vorobyov**, X. Fan, and D. Zhou, “Efficient joint transmit waveform and receive filter design based on a general  $L_p$ -norm metric for sidelobe level of pulse compression,” *Signal Processing*, vol. 188, 108174, pp. 1–9, Nov. 2021.
- [J18] J. Miettinen, E. Nitzan, **S. A. Vorobyov**, and E. Ollila, “Graph signal processing meets blind source separation,” *IEEE Trans. Signal Processing*, vol. 69, pp. 2585–2599, May 2021.
- [J19] H. Chen, F. Ahmad, **S. A. Vorobyov**, and F. Porikli, “Tensor decompositions in wireless communications and MIMO radar,” *IEEE J. Selected Topics in Signal Processing*, **overview paper**, Special Issue: *Tensor Decomposition for Signal Processing and Machine Learning*, vol. 15, no. 3, pp. 438–453, Apr. 2021.
- [J20] M. Neinavaie, M. Derakhtian, and **S. A. Vorobyov**, “Lossless dimension reduction for integer least squares with application to sphere decoding,” *IEEE Trans. Signal Processing*, vol. 68, pp. 6547–6561, Dec. 2020.
- [J21] N. Ouzir, E. Ollila, and **S. A. Vorobyov**, “Data-adaptive similarity measures for B-mode ultrasound images using robust noise models,” *IEEE J. Selected Topics in Signal Processing*,

- invited paper**, Special Issue: *Domain Enriched Learning for Medical Imaging*, vol. 14, no. 6, pp. 1244–1254, Oct. 2020.
- [J22] F. Xu, **S. A. Vorobyov**, and X. Yang, “Joint DOD and DOA estimation in slow-time MIMO radar via tensor decomposition,” *IEEE Signal Processing Letters*, vol. 27, pp. 1495–1499, 2020.
  - [J23] M. I. Florea and **S. A. Vorobyov**, “A generalized accelerated composite gradient method: Uniting Nesterov’s fast gradient method and FISTA,” *IEEE Trans. Signal Processing*, vol. 68, pp. 3033–3048, 2020.
  - [J24] M. Esfandiari, **S. A. Vorobyov**, and M. Karimi, “New estimation methods for autoregressive process in the presence of white observation noise,” *Signal Processing*, **invited paper**, Special Issue: *Statistical Signal Processing and Advances for Data Science: Complex, Dynamic and Large-Scale Settings*, vol. 171, 107480, pp. 1–11, June 2020.
  - [J25] Y. Huang, **S. A. Vorobyov**, and Z.-Q. Luo, “Quadratic matrix inequality approach to robust adaptive beamforming for general-rank signal model,” *IEEE Trans. Signal Processing*, vol. 68, pp. 2244–2255, 2020.
  - [J26] P. Kumari, **S. A. Vorobyov**, and R. W. Heath Jr., “Adaptive virtual waveform design for millimeter-wave joint communication-radar,” *IEEE Trans. Signal Processing*, vol. 68, pp. 715–730, 2020.
  - [J27] F. G. Veshki and **S. A. Vorobyov**, “An efficient coupled dictionary learning method,” *IEEE Signal Processing Letters*, vol. 26, no. 10, pp. 1441–1445, Oct. 2019.
  - [J28] K. V. Mishra, B. Shankar, V. Koivunen, B. Ottersten, **S. A. Vorobyov**, “Towards millimeter wave joint radar-communications: A signal processing perspective,” *IEEE Signal Processing Magazine*, vol. 36, no. 5, pp. 100–114, Sept. 2019.
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  - [J31] M. I. Florea and **S. A. Vorobyov**, “An accelerated composite gradient method for large-scale composite objective problems,” vol. 67, no. 2, pp. 444–459, *IEEE Trans. Signal Processing*, Jan. 2019.
  - [J32] Y. Huang and **S. A. Vorobyov**, “An inner SOCP approximate algorithm for robust adaptive beamforming for general-rank signal model,” *IEEE Signal Processing Letters*, vol. 25, no. 11, pp. 1735–1739, Nov. 2018.
  - [J33] K. Upadhyay, **S. A. Vorobyov**, and M. Vehkaperä, “Downlink performance of superimposed pilots in massive MIMO systems,” *IEEE Trans. Wireless Communications*, vol. 17, no. 10, pp. 6630–6644, Oct. 2018.
  - [J34] M. W. Morency, **S. A. Vorobyov**, and G. Leus, “Joint detection and localization of an unknown number of sources using algebraic structure of the noise subspace,” *IEEE Trans. Signal Processing*, vol. 66, no. 17, pp. 4685–4700, Sept. 2018.
  - [J35] M. I. Florea, A. Basarab, D. Kouamé, and **S. A. Vorobyov**, “An axially-variant kernel imaging model for ultrasound image reconstruction,” *IEEE Signal Processing Letters*, vol. 25, no. 7, pp. 961–965, July 2018.

- [J36] K. Upadhyaya and **S. A. Vorobyov**, “Covariance matrix estimation for massive MIMO,” *IEEE Signal Processing Letters*, vol. 25, no. 4, pp. 546–550, Apr. 2018.
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- [J38] M. Shaghaghi and **S. A. Vorobyov**, “Finite-length and asymptotic analysis of averaged correlogram for undersampled data,” *Applied and Computational Harmonic Analysis*, vol. 43, no. 3, pp. 404–423, Nov. 2017.
- [J39] M.-Y. Cao, **S. A. Vorobyov**, and A. Hassanien, “Transmit array interpolation for DOA estimation via tensor decomposition in 2D MIMO radar,” *IEEE Trans. Signal Processing*, vol. 65, no. 19, pp. 5225–5239, Oct. 2017.
- [J40] R. Gao, **S. A. Vorobyov**, and H. Zhao, “Image fusion with cospase analysis operator,” *IEEE Signal Processing Letters*, vol. 24, no. 7, pp. 943–947, July 2017.
- [J41] K. Upadhyaya, **S. A. Vorobyov**, and M. Vehkaperä, “Superimposed pilots are superior for mitigating pilot contamination in massive MIMO,” *IEEE Trans. Signal Processing*, vol. 65, no. 11, pp. 2917–2932, June 2017.
- [J42] L. Qin, **S. A. Vorobyov**, and J. Dong, “Joint cancellation of autocorrelation sidelobes and cross-correlation in MIMO-SAR,” *IEEE Geoscience and Remote Sensing Letters*, vol. 14, no. 6, pp. 931–935, June 2017.
- [J43] L. Yang, J. Chen, H. Jiang, **S. A. Vorobyov**, and H. Zhang, “Optimal relay selection for secure cooperative communications with an adaptive eavesdropper,” *IEEE Trans. Wireless Communications*, vol. 16, no. 1, pp. 26–42, Jan. 2017.
- [J44] L. Yang, J. Chen, H. Zhang, H. Jiang, **S. A. Vorobyov**, and D. T. Ngo, “Cooperative wireless multicast: Performance analysis and time allocation,” *IEEE Trans. Vehicular Technology*, vol. 65, no. 7, pp. 5810–5819, July 2016.
- [J45] L. Yang, H. Jiang, **S. A. Vorobyov**, J. Chen, and H. Zhang, “Secure communications in underlay cognitive radio networks: User scheduling and performance analysis,” *IEEE Communications Letters*, vol. 20, no. 6, pp. 1191–1194, June 2016.
- [J46] W. Zhang and **S. A. Vorobyov**, “Joint robust transmit/receive adaptive beamforming for MIMO radar using probability-constrained optimization,” *IEEE Signal Processing Letters*, vol. 23, no. 1, pp. 112–116, Jan. 2016.
- [J47] H. Fang, **S. A. Vorobyov**, and H. Jiang, “Performance limits of segmented compressive sampling: Correlated samples versus bits,” *IEEE Trans. Signal Processing*, vol. 63, no. 22, pp. 6061–6073, Nov. 2015.
- [J48] J. Gao, **S. A. Vorobyov**, H. Jiang, and H. V. Poor, “Worst-case jamming on MIMO Gaussian channels,” *IEEE Trans. Signal Processing*, vol. 63, no. 21, pp. 5821–5836, Nov. 2015.
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- [J50] Y. Li, **S. A. Vorobyov**, and V. Koivunen, “Ambiguity function of the transmit beamspace-based MIMO radar,” *IEEE Trans. Signal Processing*, vol. 63, no. 17, pp. 4445–4457, Sept. 2015.
- [J51] M. Shaghaghi and **S. A. Vorobyov**, “Cramér-Rao bound for sparse signals fitting the low-rank model with small number of parameters,” *IEEE Signal Processing Letters*, vol. 22, no. 9, pp. 1497–1501, Sept. 2015.

- [J52] A. E. Geyer, R. Nikjah, **S. A. Vorobyov**, and N. C. Beaulieu, "Euclidean and space-time block codes: Relationship, optimality, performance analysis revisited," *IEEE Trans. Communications*, vol. 63, no. 8, pp. 2912–2923, Aug. 2015.
- [J53] M. Shaghaghi and **S. A. Vorobyov**, "Subspace leakage analysis and improved DOA estimation with small sample size," *IEEE Trans. Signal Processing*, vol. 63, no. 12, pp. 3251–3265, June 2015.
- [J54] O. Taheri and **S. A. Vorobyov**, "Reweighted l1-norm penalized LMS for sparse channel estimation and its analysis," *Signal Processing*, vol. 104, pp. 70–79, May 2014.
- [J55] A. Khabbazi-basmenj, A. Hassanien, **S. A. Vorobyov**, and M. W. Morency, "Efficient transmit beamspace design for search-free based DOA estimation in MIMO radar," *IEEE Trans. Signal Processing*, vol. 62, no. 6, pp. 1490–1500, Mar. 2014.
- [J56] H. Fang, **S. A. Vorobyov**, H. Jiang, and O. Taheri, "Permutation meets parallel compressed sensing: How to relax restricted isometry property for 2D sparse signals," *IEEE Trans. Signal Processing*, vol. 62, no. 1, pp. 196–210, Jan. 2014.
- [J57] Z. Chen, C.-X. Wang, X. Hong, J. Thompson, **S. A. Vorobyov**, F. Zhao, and X. Ge, "Interference mitigation for cognitive radio MIMO systems based on practical precoding," *Physical Communication*, **invited paper**, Special Issue: *Wireless Networks Planning and Optimization*, vol. 9, pp. 308–315, Dec. 2013.
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- [J60] J. Gao, **S. A. Vorobyov**, H. Jiang, J. Zhang, and M. Haardt, "Sum-rate maximization with minimum power consumption for MIMO DF two-way relaying: Part II - Network optimization," *IEEE Trans. Signal Processing*, vol. 61, no. 14, pp. 3578–3591, July 2013.
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- [J62] Z. Chen, **S. A. Vorobyov**, C.-X. Wang, and J. Thompson, "Pareto region characterization for rate control in MIMO interference systems and Nash bargaining," *IEEE Trans. Automatic Control*, vol. 57, no. 12, pp. 3203–3208, Dec. 2012.
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- [J64] Y. Ko, M. Ardakani, and **S. A. Vorobyov**, "Power allocation strategies across  $N$  orthogonal channels at both source and relay," *IEEE Trans. Communications*, vol. 60, no. 6, pp. 1469–1473, June 2012.
- [J65] A. Khabbazi-basmenj, **S. A. Vorobyov**, and A. Hassanien, "Robust adaptive beamforming based on steering vector estimation with as little as possible prior information," *IEEE Trans. Signal Processing*, vol. 60, no. 6, pp. 2974–2987, June 2012.
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pp. 2354–2361, May 2012.

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- [J69] A. Hassanien and **S. A. Vorobyov**, “Transmit energy focusing for DOA estimation in MIMO radar with colocated antennas,” *IEEE Trans. Signal Processing*, vol. 59, no. 6, pp. 2669–2682, June 2011.
- [J70] X. Gong, **S. A. Vorobyov**, and C. Tellambura, “Optimal bandwidth and power allocation for sum ergodic capacity under fading channels in cognitive radio networks,” *IEEE Trans. Signal Processing*, vol. 59, no. 4, pp. 1814–1826, Apr. 2011.
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- [J77] X. Hong, Z. Chen, C.-X. Wang, **S. A. Vorobyov**, and J. Thompson, “Cognitive radio networks: Interference cancelation and management techniques,” *IEEE Vehicular Technology Magazine*, vol. 4, no. 4, pp. 76–84, Dec. 2009.
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- [C142] Y. Rong, **S. A. Vorobyov**, and A. B. Gershman, "On average one bit per subcarrier channel state information feedback in OFDM wireless communication systems," in *Proc. IEEE Global Telecommunications Conf., IEEE GLOBECOM'04*, Dallas, Texas, USA, Nov. 29–Dec. 3, 2004, vol. 6, pp. 4011–4015.
- [C143] Y. Rong, **S. A. Vorobyov**, and A. B. Gershman, "The impact of imperfect one bit per subcarrier channel state information feedback on adaptive OFDM wireless communication systems," in *Proc. 60th IEEE Vehicular Technology Conf., IEEE VTC'04 Fall*, Los Angeles, CA, USA, Sept. 26–29, 2004, vol. 1, pp. 626–630.
- [C144] Y. Rong, **S. A. Vorobyov**, and A. B. Gershman, "Linear OFDM precoder design for multiuser wireless communications using cutoff rate optimization," in *Proc. 12th European Signal Processing Conf., EUSIPCO'04*, Vienna, Austria, Sept. 7–10, 2004, pp. 2071–2074.
- [C145] Y. Rong, **S. A. Vorobyov**, and A. B. Gershman, "A robust linear receiver for uplink multi-user MIMO systems based on probability-constrained optimization and second-order cone programming," in *Proc. 3rd IEEE Workshop Signal Array and Multichannel Signal Processing, IEEE SAM'04*, Barcelona, Spain, July 18–21, 2004, pp. 153–157.
- [C146] **S. A. Vorobyov**, Y. Rong, N. D. Sidiropoulos, and A. B. Gershman, "Robust fitting of multilinear models with application to blind multiuser receivers: Iterative weighted median filtering approach," in *Proc. 5th IEEE Workshop Signal Processing Advances in Wireless Communications, IEEE SPAWC'04*, Lisboa, Portugal, July 11–14, 2004, pp. 478–482.
- [C147] **S. A. Vorobyov**, Y. Rong, N. D. Sidiropoulos, and A. B. Gershman, "Robust iterative fitting of multilinear models based on linear programming," in *Proc. 29th IEEE Int. Conf. Acoustics, Speech, and Signal Processing, IEEE ICASSP'04*, Montreal, Quebec, Canada, May 17–21, 2004, vol. 2, pp. 113–116.
- [C148] Y. Rong, **S. A. Vorobyov**, and A. B. Gershman, "A robust linear receiver for multi-access space-time block coded MIMO systems based on probability-constrained optimization," *Proc. IEEE 59th Vehicular Technology Conf., IEEE VTC'04 Spring*, Milan, Italy, May 17–19, 2004, vol. 1, pp. 118–122.
- [C149] Y. Rong, **S. A. Vorobyov**, A. B. Gershman, and N. D. Sidiropoulos, "Deterministic Cramer-Rao bound for symmetric PARAFAC model with application to blind spatial signature estimation," in *Proc. 3rd IEEE Int. Symposium Signal Processing and Information Technology, IEEE ISSPIT'03*, Darmstadt, Germany, Dec. 14–17, 2003, pp. 111–114.
- [C150] A. B. Gershman, Z.-Q. Luo, S. Shahbazpanahi, and **S. A. Vorobyov**, "Robust adaptive beamforming using worst-case performance optimization," **invited paper**, in *Proc. 37th Annual Asilomar Conf. Signals, Systems, and Computers*, Pacific Grove, California, USA, Nov. 9–12, 2003, vol. 2, pp. 1353–1357.
- [C151] Y. Rong, **S. A. Vorobyov**, A. B. Gershman, and N. D. Sidiropoulos, "Blind spatial signature estimation using time-varying user power loading and parallel factor analysis," in *Proc. IEEE 58th Vehicular Technology Conf., IEEE VTC'03 Fall*, Orlando, USA, Oct. 4–9,

2003, vol. 1, pp. 79–83.

- [C152] **S. A. Vorobyov**, A. B. Gershman, Z.-Q. Luo, and N. Ma, “Adaptive beamforming with joint robustness against signal steering vector errors and interference nonstationarity,” in *Proc. 28th IEEE Int. Conf. Acoustics, Speech, and Signal Processing, IEEE ICASSP’03*, Hong Kong, Apr. 6–10, 2003, vol. 5, pp. 345–348; (Presented in *12th IEEE Workshop Statistical Signal Processing, IEEE SSP’03*, St. Louis, Missouri, USA, Sept. 28–Oct. 1, 2003).
- [C153] **S. A. Vorobyov**, A. B. Gershman, and K. M. Wong, “Direction of arrival estimation in sparse arrays in the presence of unknown colored block-correlated noise field,” in *Proc. 2nd IEEE Workshop Sensor Array and Multichannel Signal Processing, IEEE SAM’02*, Washington DC, USA, Aug. 4–6, 2002, pp. 204–208.
- [C154] H. Tang, A. B. Gershman, K. M. Wong, and **S. A. Vorobyov**, “Blind adaptive beamforming for cyclostationary signals with robustness against cycle frequency mismatch,” in *Proc. 2nd IEEE Workshop Sensor Array and Multichannel Signal Processing, IEEE SAM’02*, Washington DC, USA, Aug. 4–6, 2002, pp. 18–22.
- [C155] **S. A. Vorobyov**, A. B. Gershman, and Z.-Q. Luo, “Robust adaptive beamforming using worst-case performance optimization via second-order cone programming,” in *Proc. 27th IEEE Int. Conf. Acoustics, Speech, and Signal Processing, IEEE ICASSP’02*, Orlando, Florida, USA, May 13–17, 2002, vol. 3, pp. 2901–2904.
- [C156] **S. A. Vorobyov**, A. B. Gershman, and Z.-Q. Luo, “An application of second-order cone programming to robust adaptive beamforming,” in *Proc. 5th Int. Conf. Optimization: Techniques and Applications, ICOTA’2001*, Hong Kong, Dec. 15–17, 2001, vol. 1, pp. 308–315.
- [C157] **S. A. Vorobyov** and A. Cichocki, “Self-excited oscillations and period doubling condition in Hopfield neural networks,” in *Proc. 2nd IEEE Int. Conf. Control of Oscillations and Chaos, IEEE COC’2000*, St. Petersburg, Russia, July 5–7, 2000, vol. 1, pp. 197–200.
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- [C159] A. Cichocki, **S. A. Vorobyov**, and T. Rutkowski, “Nonlinear interference cancellation using neural networks,” in *Proc. Int. Symposium Nonlinear Theory and its Applications, NOLTA’1999*, Hawaii, USA, Nov. 28–Dec. 2, 1999, vol. 2, pp. 875–878.
- [C160] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and A. Stephan, “Detection of NARMA-sequence order using recurrent artificial neural networks,” in *Proc. European Control Conf., ECC’1999*, Karlsruhe, Germany, Aug. 31–Sept. 4, 1999.
- [C161] Ye. V. Bodyanskiy and **S. A. Vorobyov**, “Artificial neural network for analysis of non-stationary sequences spectral decomposition,” in *Proc. 6th Saint Petersburg Symposium Adaptive Systems Theory, dedicated to the memory of Ya.Z. Tsypkin*, St. Petersburg, Russia, Sept. 7–9, 1999, vol. 1, p. 218 & vol. 2, pp. 33–37.
- [C162] **S. A. Vorobyov** and I. Skrypnik, “Atomic radial basis function network and its application in process fault diagnosis,” in *Proc. 7th Turkish Symposium Artificial Intelligence & Neural Networks*, Ankara, Turkey, June 24–26, 1998, pp. 252–259.
- [C163] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and N. S. Lamonova, “Artificial neural network for activation function nonlinearity parameter adjustment,” in *Proc. 7th Turkish Symposium Artificial Intelligence and Neural Networks*, Ankara, Turkey, June 24–26, 1998, pp. 244–251.



- [C164] K.-H. Kerntopf, N. S. Lamonova, **S. A. Vorobyov**, and J. Polyanska, "Simple adaptive controller for objects with constraints," in *Proc. 42nd Int. Symposium Informatics and Automation in the Age of the Information Society*, Ilmenau, Germany, Sept. 22–25, 1997, vol. 3, pp. 667–672.
- [C165] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and I. P. Pliss, "Artificial neural network and learning algorithms for analysis of nonstationary multiharmonic stochastic sequences," **invited talk**, in *Proc. Computer Modelling Conference*, Belgorod, Russia, Oct. 3–6, 1998, pp. 3–8 (in Russian).
- [C166] **S. A. Vorobyov**, T. Naumec, and T. Putyatina, "Application of neural networks for adaptive control of nonlinear objects," in *Proc. 4th Int. Conf. Theory and Technology of Information Broadcasting, Telecasting and Processing*, Kharkov, Ukraine, Sept. 28–30, 1998, p. 155 (in Russian).
- [C167] Ye. V. Bodyanskiy and **S. A. Vorobyov**, "Artificial neural network and learning algorithms for identification of nonlinear nonstationary stochastic objects," in *Proc. 5th Ukrainian Conf. Automatic Control, Avtomatika'1998*, vol. 3, Kyiv, Ukraine, May 15–18, 1998, pp. 351–355 (in Russian).
- [C168] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and N. S. Lamonova, "Mathematical modeling of fault detections in active systems using artificial neural networks," in *Proc. Conf. Ergonomics in Automobiles*, Kharkov, Ukraine, Nov. 18–20, 1997, pp. 17–19 (in Russian).
- [C169] **S. A. Vorobyov** and N. S. Lamonova, "Adaptive abrupt changes detection in stochastic sequences using artificial neural networks," in *Proc. 3rd Int. Conf. Theory and Technology of Information Broadcasting, Telecasting and Processing*, Tuapse, Russia, Sept. 16–18, 1997, p. 173 (in Russian).
- [C170] **S. A. Vorobyov** and N. S. Lamonova, "Application of neural networks for fault detection," in *Proc. Int. Conf. Electronics and Youth in XXI Century*, Kharkov, Ukraine, Apr. 22–24, 1997, p. 243 (in Russian).
- [C171] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and I. P. Pliss, "Adaptive fault detection in dynamical systems with periodic output signal," in *Proc. 3rd Ukrainian Conf. Automatic Control, Avtomatika'1996*, Sevastopol, Ukraine, Sept. 9–14, 1996, vol. 1, pp. 58–59 (in Russian).
- [C172] A. V. Belogurova, Ye. V. Bodyanskiy, **S. A. Vorobyov**, and I. P. Pliss, "A new method for ECG analysis based on fault detection in rhythm," in *Proc. Int. Conf. MicroCAD-Systems*, Kharkov, Ukraine, May 30–31, 1996, vol. 1, p. 29 (in Russian).
- [C173] **S. A. Vorobyov** and S. A. Suharev, "Adaptive algorithm for filter forgetting factor control with application to maneuvered plane tracking," in *Proc. 22th Conf. Gagarin's Lectures*, Moscow, Russia, Apr. 2–6, 1996, vol. 4, pp. 41–42 (in Russian).
- [C174] **S. A. Vorobyov**, "Generalized filtering of stochastic processes," in *Proc. 1st Int. Conf. Theory and Technology of Information Broadcasting, Telecasting and Processing*, Tuapse, Russia, Sept. 18–21, 1995, p. 57 (in Russian).
- [C175] **S. A. Vorobyov**, "Generalized adaptive prediction of one-dimensional stochastic processes," in *Proc. 2nd Ukrainian Conf. of Young Scientists. Mathematics*, Kyiv, Ukraine, May 16–18, 1995, vol. 1, pp. 33–40 (in Russian).
- [C176] Ye. V. Bodyanskiy and **S. A. Vorobyov**, "Adaptive forecasting of time series under structural uncertainty," in *Proc. 1st Ukrainian Conf. Automatic Control, Avtomatika'1994*, Kyiv, Ukraine, May 18–23, 1994, vol. 1, p.49 (in Russian).

## Conference Tutorials, Invited Talks and Presentations

- [P1] **S. A. Vorobyov** and M. I. Florea, “Accelerated majorization based optimization for large-scale signal processing: Some new theoretical concepts and applications,” in *6th Int. Conf. Continuous Optimization, ICCOPT’2019*, Berlin, Germany, Aug. 5–8, 2019.
- [P2] M. I. Florea, A. Basarab, D. Kouamé, and **S. A. Vorobyov**, “Computationally efficient spatially variant deconvolution in ultrasound imaging,” in *IEEE Intern. Ultrasonics Symposium, IUS’2018*, Kobe, Japan, Oct. 22–25, 2018.
- [P3] K. Upadhyay, **S. A. Vorobyov**, and M. Vehkaperä, “Improved channel estimation for massive MIMO systems using hybrid pilots with pilot anchoring ,” **invited talk**, in *21st Int. ITG Workshop on Smart Antennas, WSA’2017*, Berlin, Germany, Mar. 15–17, 2017.
- [P4] **S. A. Vorobyov** and M. Lops, “Tradeoffs in MIMO radar,” **tutorial**, in *8th IEEE Sensor Array and Multichannel Signal Processing Workshop, SAM’14*, A Coruna, Spain, June 22–25, 2014.
- [P5] **S.A. Vorobyov**, “Robust adaptive beamforming: Evolution of approaches, analysis and comparison,” **invited semi-plenary talk**, in *156th Meeting of the Acoustic Society of America*, Miami, FL, USA, Nov. 10–14, 2008; **Abstract** in *The Journal of the Acoustic Society of America*, vol. 124, no. 4, pt. 2, Oct. 2008, pp. 2522–2523.
- [P6] A. B. Gershman, Y. Rong, S. Shahbazpanahi, and **S. A. Vorobyov**, “From robust adaptive beamformers to robust multi-user MIMO receivers,” **invited talk**, in *Workshop Robust Signal Processing and Stochastic Eigen-Analysis*, MIT, USA, Oct. 14–15, 2005.
- [P7] **S. A. Vorobyov**, A. B. Gershman, and Z.-Q. Luo, “Robust MVDR beamforming using worst-case performance optimization,” **invited talk**, in *10th Workshop Adaptive Sensor Array Processing*, Lincoln Laboratory, MIT, Boston, Cambridge, Massachusetts, USA, Mar. 12–14, 2002.
- [P8] **S. A. Vorobyov** and Ye. V. Bodyanskiy, “Adaptive algorithm for state recognition of dynamical systems with periodic output signal,” in *1st Int. Conf. Control of Oscillations and Chaos, COC’1997*, St. Petersburg, Russia, Aug. 27–29, 1997.
- [P9] Ye.V. Bodyanskiy, **S. A. Vorobyov**, and A. Stephan, “Adaptive search of autoregression model order,” in *15th IMACS World Congress Scientific Computation, Modeling and Applied Mathematics*, Berlin, Germany, Aug. 24–29, 1997.

## Editorials and Technical Reports

- [R1] H. Chen, **S. A. Vorobyov**, H. C. So, F. Ahmad, F. Porikli, “Introduction to the special issue on tensor decomposition for signal processing and machine learning,” *IEEE J. Selected Topics in Signal Processing*, vol. 15, no. 3, pp. 433–437, Apr. 2021.
- [R2] E. Aboutanios, A. Hassanien, A. El-Keyi, Y. Nasser, and **S. A. Vorobyov**, “Editorial: Advances in DOA estimation and source localization,” *International Journal of Antennas and Propagation*, vol. 2017, Article ID 1352598, 3 pages.
- [R3] **S. A. Vorobyov**, S. Cui, Y. C. Eldar, W.-K. Ma, and W. Utschick, “Editorial: Optimization techniques in wireless communications,” *EURASIP Journal on Wireless Communications and Networking*, vol. 2009, Article ID 567416, 2 pages.
- [R4] Ye. V. Bodyanskiy, **S. A. Vorobyov**, and N. S. Lamonova, “Fault detection in nonlinear dynamic systems using neural networks,” Deposited with National Scientific Technical Library

of Ukraine, *Report No. 18*, Kyiv, Jan. 12, 1998, pp. 1–8 (in Russian).

- [R5] G. A. Matusovskiy, O. M. Gorodinskiy, Ye. V. Bodyanskiy, I. P. Pliss, and **S.A. Vorobyov**, “Operational approach for organizations of interaction between jurists,” *Ukrainian J. Jurisprudence Sciences*, No. 1(8), pp. 200–203, 1997 (in Ukrainian).
- [R6] **S. A. Vorobyov** and I. P. Pliss, “Adaptive diagnosis of dynamic objects with harmonic output signal,” Deposited with Ukrainian Institute of Scientific, Technical and Economic Information, *Report No. 130*, Kyiv, Nov. 18, 1996, pp. 1–14 (in Russian).
- [R7] Ye. V. Bodyanskiy and **S. A. Vorobyov**, “Adaptive algorithm for fault detection in stochastic sequences,” Deposited with National Scientific Technical Library of Ukraine, *Report No. 527*, Kyiv, Feb. 2, 1996, pp. 1–10 (in Russian).
- [R8] **S. A. Vorobyov** and Ye. V. Bodyanskiy, “On one adaptive filtering algorithm,” Deposited with National Scientific Technical Library of Ukraine, *Report No. 528*, Kyiv, Feb. 2, 1996, pp. 1–17 (in Russian).
- [R9] **S. A. Vorobyov**, “Multi-step multi-model forecasting of stochastic sequences,” Deposited with National Scientific Technical Library of Ukraine, *Report No. 1279*, Kyiv, May 26, 1995, pp. 1–10 (in Russian).
- [R10] Ye. V. Bodyanskiy and **S. A. Vorobyov**, “An approach to adaptive forecasting of time series,” Deposited with National Scientific Technical Library of Ukraine, *Report No. 1067*, Kyiv, June 3, 1994, pp. 1–17 (in Russian).

#### INVITED TALKS

- (1) “Accelerated majorization based optimization for large-scale signal processing: Some new theoretical concepts and applications,” 6th International Conference on Continuous Optimization, Mathematical Programming for Signal Processing, Berlin, Germany, Aug. 7, 2019.
- (2) “MmWave channel estimation and tracking, hybrid beamforming,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, Nov. 30, 2018.
- (3) “Channel estimation and pilot decontamination in massive MIMO,” University of Alberta, Canada, Seminar on ECE Dept. invited speaker, Apr. 9, 2018.
- (4) “An algebraic approach to rank-constrained semi-definite programs with sum-of-squares constraints,” Helsinki region, Algorithms Seminar, Finland, Mar. 29, 2018.
- (5) “Image compression via parallel compressed sensing with permutation and segmented compressed sampling,” University of Toulouse, Toulouse, France, IRIT Seminar, Mar. 13, 2018.
- (6) “mmWave communications: Channel estimation and tracking, hybrid beamforming,” invited talk in DELTA Winter School, Ruka, Finland, Feb. 14, 2018.
- (7) “Channel estimation and pilot decontamination in massive MIMO,” invited talk in DELTA Winter School, Ruka, Finland, Feb. 14, 2018.
- (8) “Tutorial on transmit beamspace MIMO radar,” University of Texas at Austin, USA, Seminar on ECE Dept. invited speaker, Mar. 3, 2017.
- (9) “Freedom of transmitter optimization in radar and communication and some related topics” University of Texas at Austin, USA, Seminar on ECE Dept. invited speaker, Mar. 1, 2017.
- (10) “Transmit beamspace in MIMO radar,” Universidad de Sevilla, Sevilla, Spain, International Seminar on Electronics and Telecommunications invited speaker, July 7, 2016.

- (11) “Massive MIMO pilot decontamination,” Universidad de Sevilla, Sevilla, Spain, International Seminar on Electronics and Telecommunications invited speaker, July 6, 2016.
- (12) “Analog to information conversion,” Universidad de Sevilla, Sevilla, Spain, International Seminar on Electronics and Telecommunications invited speaker, July 6, 2016.
- (13) “Improved DOA estimation with small sample size and its subspace leakage analysis,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, Dec. 19, 2014.
- (14) “Advances in active MIMO sensing,” distinguished lecturer in ELLIIT Distinguished Lecture Series, Linköping University, Sweden, Oct. 13, 2014.
- (15) “Subspace leakage analysis and frequency estimation with small sample size,” invited lecturer in Mini-Workshop on Signal Processing and Big Data, Aalto University, Finland, Aug. 8, 2014.
- (16) “Advances in MIMO radar,” distinguished lecture in the State Key Laboratory of Acoustics, Chinese Academy of Sciences, Beijing, China, July 11, 2014.
- (17) “Tradeoffs in MIMO radar,” tutorial talk in Sensor Array and Multichannel Signal Processing Workshop given together with Prof. Marco Lops, A Coruña, Spain, June 22, 2014.
- (18) “Robust beamforming for jammers suppression for MIMO radar,” invited talk in a Session in Radar Conference, Cincinnati, OH, USA, May 20, 2014.
- (19) “Efficiency and security analysis in multi-user communication systems,” invited speaker in International seminars on Modern Methods in Systems Research, Kharkiv National University of Radio and Electronics, Kharkiv, Ukraine, Mar. 5, 2014.
- (20) “Iterative root-MUSIC algorithm for DOA estimation,” invited talk in a Session in Computational Advances in Multi-Sensor Adaptive Processing Workshop, The Friendly Island, Saint Martin, Dec. 16, 2013.
- (21) “Sum rate maximization in multi-operator two-way relay networks with a MIMO AF relay via POTDC,” invited talk in a Session in European Signal Processing Conference, Marrakesh, Morocco, Sept. 12, 2013.
- (22) “Modern engineering is computational engineering,” Installation Lecture at Aalto University, Espoo, Finland, Mar. 6, 2013.
- (23) “Analog-to-information conversion,” invited talk in GETA Winter School on Compressive Sensing, Ruka, Finland, Feb. 12, 2013.
- (24) “Power control for collaborative beamforming in wireless sensor networks,” invited talk in a Session in Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, California, USA, Nov. 7, 2011.
- (25) “Resource allocation games under power constraints,” NOKIA, Helsinki, Finland, NOKIA International Research Seminar speaker, Aug. 12, 2011.
- (26) “Segmented compressed sampling for analog-to-information conversion,” Aalto University, Helsinki, Finland, International Research Seminar in Signal Processing speaker, Aug. 11, 2011.
- (27) “Segmented compressed sampling for analog-to-information conversion,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, July 14, 2011.
- (28) “Cooperative resource allocation games under spectral mask and total power constraints,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on

Mobile Communications speaker, Dec. 15, 2010.

- (29) "Transmit energy focusing in MIMO radar aka phased-MIMO radar: beampattern analysis, SINR improvement, and direction finding," Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, Dec. 8, 2010.
- (30) "Why the phased-MIMO radar outperforms the phased-array and MIMO radars," invited speaker in the Session on Waveform diversity in European Signal Processing Conference, Aalborg, Denmark, Aug. 26, 2010.
- (31) "Transmit energy focusing in MIMO radar aka phased-MIMO radar and its use for direction finding," invited speaker in Aalborg University, Aalborg, Denmark, Aug. 23, 2010.
- (32) "Multi-link collaborative beamforming with sidelobe control capabilities in wireless sensor networks," invited speaker in International seminars on Modern Methods in Systems Research, Kharkiv National University of Radio and Electronics, Kharkiv, Ukraine, Aug. 17, 2010.
- (33) "Direction finding for MIMO radar with colocated antennas using transmit beamspace preprocessing," invited speaker in the Session on MIMO radar in CAMSAP'09 Conference, Aruba, Dutch Antilles, Dec. 15, 2009.
- (34) "Phased MIMO radar: A tradeoff between phased-array and MIMO radar," University of Waterloo, Waterloo, Ontario, Canada, Nortel Networks Distinguished Seminar Series speaker, Dec. 11, 2009.
- (35) "Phased MIMO radar," Darmstadt University of Technology, International Research Seminar on Communication Systems speaker, Jun. 17, 2009.
- (36) "Cooperative games in multi-user systems: Nash bargaining for overall benefits," Kharkiv National University of Radioelectronics, Faculty of Computer Science, International Research Seminar on Computer Science speaker, Dec. 25, 2008.
- (37) "Robust estimation of parameters," Kharkiv National University of Radioelectronics, Faculty of Computer Science, International Research Seminar on Computer Science speaker, Dec. 19, 2008.
- (38) "Robust adaptive beamforming: Evolution of approaches, analysis and comparison," Key-note speaker in the Session on Underwater Acoustic and Signal Processing in Acoustics: Robust Array Processing in 156th Meeting of the Acoustic Society of America, Miami, Nov. 12, 2008.
- (39) "Resource allocation in wireless networks via convex optimization," the University of Twente, Twente, Netherland, Colloquium speaker, June 16, 2008.
- (40) "Resource allocation in wireless networks," Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, June 13, 2008.
- (41) "Blind unitary prewhitening," Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, June 13, 2008.
- (42) "Optimization in communication networks: from convex to non-convex approaches with practical applications," Royal Institute of Technology (KTH), Stockholm, Sweden, International Research Seminar speaker, Oct. 18, 2007.
- (43) "Multi-linear data arrays: Algorithms and applications," University College London, London, UK, Colloquium speaker, June 28, 2007.
- (44) "Robust adaptive beamforming," Joint Research Institute on Signal Processing Heriot-Watt University and the University of Edinburgh, Edinburgh, Scotland, Colloquium speaker, June 4,

2007.

- (45) “Precoder design for space-time coded MIMO systems with correlated Rayleigh fading channels,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, May 24, 2007.
- (46) “Performance and capacity analysis for OSTBC MIMO systems with receive antenna selection,” Ilmenau University of Technology, Ilmenau, Germany, International Research Seminar on Mobile Communications speaker, May 24, 2007.
- (47) “Robust adaptive beamforming and applications,” University of Waterloo, Waterloo, Ontario, Canada, Nortel Networks Distinguished Seminar Series speaker, Mar. 7, 2007.
- (48) “Robust adaptive beamforming,” Dresden University of Technology, Dresden, Germany, Colloquium speaker, Mar. 2, 2007.
- (49) “Adaptive OFDM techniques with one-bit-per-subcarrier channel state feedback,” McMaster University, Hamilton, Ontario, Canada, Dept. of Electrical and Computer Engineering Colloquium speaker, Nov. 16, 2006.
- (50) “Parameter estimation in linear models based on outage probability minimization,” Invited speaker in Asilomar’06 Conference, Pacific Grove, California, USA, Oct. 30, 2006.
- (51) “Robust minimum variance adaptive beamformers and multiuser MIMO receivers: From worst-case to probabilistically constrained designs,” invited speaker in the Session on Optimization in Signal Processing in ICASSP’06 Conference, Toulouse, France, May 15, 2006.
- (52) “Probabilistically-constrained estimators,” Technion, Haifa, Israel, Dept. of Electrical Engineering Colloquium speaker, Feb. 9, 2005.
- (53) “Application of ICA for automatic noise and interference cancellation in multisensory biomedical signals,” invited speaker in ICA’2000 Conference, Helsinki, Finland, Jun. 19, 2000.

## TEACHING EXPERIENCE

- (1) *Convex Optimization*; Falls 2022, 2023; Instructor; Dept. of Information and Communications Engineering, Aalto University, Espoo, Finland; (ELEC-E5424 graduate course; 33 participants in 2022, 38 participants in 2023).
- (2) *Large Scale Data Analysis*, Winter 2016, 2017, 2019, 2020, 2021, 2022, 2023; Instructor; Dept. of Information and Communications Engineering, Aalto University, Espoo, Finland; (ELEC-E5490 graduate course; started in 2016).
- (3) *Introduction to Estimation, Detection, and Learning*; Winter 2020, 2021, 2022; Fall 2023; Instructor; Dept. of Information and Communications Engineering, Aalto University, Espoo, Finland; (ELEC-C5310 undergraduate course; started in 2020, 26 participants in 2023).
- (4) *Convex Optimization I and II*, Falls 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021; Instructor; Dept. of Signal Processing and Acoustics, Aalto University, Espoo, Finland; (S-88.4400 in years 2013 and 2014 and ELEC-E5420 since 2015 graduate course; 14 participants in 2013, 11 participants in 2014, 14 participants in 2015, 28 participants in 2016, 17 participants in 2017, 31 participants in 2018, 48 participants in 2019, 34 participants in 2020, 37 participants in 2021).
- (5) *Convex Optimization*; Winters 2011, 2012; Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (ECE740 graduate course; 9 participants in 2011 and 10 participants in 2012). Evaluations: 4.8 out of 5.

Also taught in Ilmenau University of Technology, Germany in Summer 2011 (17 participants)

- (6) *Statistical and Adaptive Signal Processing*; Winters 2008, 2009, and 2010; Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (ECE740 graduate course; 12 participants in 2008, 12 participants in 2009, 17 participants in 2010). Evaluations: 4.8 out of 5.
- (7) *Discrete Time Signals and Systems*; Falls 2010, 2011, 2012; Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (EE338 undergraduate course; 50 participants in 2010 and 53 participants in 2011). Evaluations: 4.6 out of 5.
- (8) *Digital Communications*; Winters 2007, 2008, and 2009; Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (EE485 undergraduate course; 14 participants in 2007, 15 participants in 2008, 17 participants in 2009). Evaluations: 4.1 out of 5.
- (9) *Numerical Analysis for Electrical and Computer Engineers*; Winters 2008, 2009, 2010, 2011, and 2012; Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (EE231 undergraduate course; 79 participants in 2008, 81 participants in 2009, 80 participants in 2010, 79 participants in 2011, and 75 participants in 2012). Evaluations: 4.1 out of 5.
- (10) *Digital Signal Processing*; Fall 2007; Instructor; Dept. of Electrical, Electronic, and Computer Engineering, Heriot-Watt University, UK; (graduate course; 55 participants).
- (11) *Computer Hardware*; Fall 2007; Instructor; Dept. of Electrical, Electronic, and Computer Engineering; Heriot-Watt University, UK; (graduate course; 11 participants).
- (12) *Technical Communication in Computer and Electrical Engineering*; Fall 2006; Second Instructor; Dept. of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada; (EE200 undergraduate course; 30 participants).
- (13) *MIMO Communication and Space-Time Coding*; Fall 2005; Second Instructor, Communication Systems Group, Darmstadt University of Technology, Darmstadt, Germany; (graduate course; 17 participants).
- (14) *Advanced Algorithms for Smart Antenna Systems*; Spring 2005 and 2006; Instructor; Communication Systems Group, Darmstadt University of Technology, Darmstadt, Germany; (graduate course; 12 participants in 2005 and 14 participants in 2006).
- (15) *Decision Making Theory*; Fall 1998; Instructor; Dept. of Artificial Intelligence and Information Systems, Kharkov National University of Radioelectronics, Kharkov, Ukraine; (graduate course; 24 participants).
- (16) *Introduction to Programming*; Fall 1998; Instructor; Dept. of Electrotechnics, Kharkov State Automobiles and High-ways University, Kharkov, Ukraine; (undergraduate course; about 150 participants).
- (17) *Electrotechnics and Electrical Machines*; Spring 1998; Instructor; Dept. of Electrotechnics, Kharkov State Automobiles and High-ways University, Kharkov, Ukraine; (undergraduate course; 75 participants).
- (18) *Automatic Control*; Fall 1997; Instructor; Dept. of Technical Cybernetics, Kharkov National University of Radioelectronics, Kharkov, Ukraine; (undergraduate course; 79 participants).
- (19) *Real-Time Control Systems*; Spring 1997; Instructor; Dept. of Technical Cybernetics, Kharkov National University of Radioelectronics, Kharkov, Ukraine; (graduate course; 22 partici-

pants).

- (20) *Exploitation of Control Systems*; Fall 1996; Second Instructor; Dept. of Technical Cybernetics, Kharkov National University of Radioelectronics, Kharkov, Ukraine; (graduate course; 22 participants).

## STUDENTS ADVISED

### Ph.D.

- (1) **Majdoddin Esfandiari**, Ph.D., 02/19 – 10/23, “Advances and New Applications of Spectral Analysis,” Aalto University, Finland.
- (2) **Farshad G. Veshki**, Ph.D., 05/19 – 06/23, “Methods for Convolutional Sparse Coding and Coupled Feature Learning with Applications to Image Fusion,” Aalto University, Finland.
- (3) **Mihai Iulian Florea**, Ph.D., 11/14 – 10/18, “Constructing Accelerated Algorithms for Large-Scale Optimization: Framework, Algorithms, and Applications,” Aalto University, Finland.
- (4) **Yongzhe Li**, Ph.D., 10/14 – 10/18, “Advances and New Opportunities in MIMO Radar: Theoretical Analysis and Algorithms,” Aalto University, Finland.
- (5) **Karthik Upadhyaya**, Ph.D., 09/14 – 08/18, “Channel Estimation in Large-Scale Multi-Antenna Systems for 5G and Beyond: Novel Pilot Structures and Algorithms,” Aalto University, Finland.
- (6) **Mahdi Shaghaghi**, Ph.D., 09/09 – 11/14, “Parameter Estimation in Low-Rank Models from Small Sample Size and Undersampled Data: DOA and Spectrum Estimation,” University of Alberta, Canada.
- (7) **Jie Gao**, Ph.D., 09/09 – 12/13, “Efficiency and Security Analysis in Multi-User Wireless Communication Systems: Cooperation, Competition and Malicious behavior,” (co-supervised with Dr. Hai Jiang), University of Alberta, Canada.
- (8) **Arash Khabbazi**, Ph.D., 05/09 – 07/13, “Generalized Quadratically Constrained Quadratic Programming and Its Applications in Array Processing and Cooperative Communications,” University of Alberta, Canada.
- (9) **Omid Taheri**, Ph.D., 09/07 – 11/12, “Signal Processing for Sparse Discrete Time Systems,” University of Alberta, Canada.
- (10) **Mohammed F.A. Ahmed**, Ph.D., 09/06 – 04/11, “Collaborative Beamforming for Wireless Sensor Networks,” University of Alberta, Canada.
- (11) **Zengmao Chen**, Ph.D., 11/07 – 04/11, “Interference Modelling and Management for Cognitive Radio Networks,” (co-supervised with Drs. Cheng-Xiang Wang and John Thompson), Haring Watt University and University of Edinburgh, U.K.
- (12) **Yue Rong**, Ph.D., 11/02 – 11/05, “Advanced Algorithms for Multi-Antenna and Multi-Carrier Communication Systems,” (co-supervised with Dr. A.B. Gershman), Darmstadt University of Technology, Germany.

### M.Sc.

- (1) **Markus Yli-Niemi**, M.Sc. 09/17 – 11/18, “Computationally Efficient Algorithms for Radar Signal Design in Spectrally Busy Environment,” Aalto University, Finland.



- (2) **Farshad G. Veshki**, M.Sc. 09/16 – 09/18, “Supervised Coupled Dictionary Learning for Multi-Focus Image Fusion,” (co-supervised with Dr. M. Elmusrati), Aalto University and University of Vaasa, Finland.
- (3) **Matthew W. Morency**, M.Sc. 08/13 – 08/15, “Algebraic and Adaptive MIMO Radar,” Aalto University, Finland.
- (4) **Yongzhe Li**, M.Sc. 03/13 – 10/14, “Ambiguity Function of the Transmit Beamspace-Based MIMO Radar,” Aalto University, Finland.
- (5) **Hao Fang**, M.Sc. 05/11 – 06/13, “Parallel Sampling and Reconstruction with Permutation in Multidimensional Compressed Sensing,” (co-supervised with Dr. H. Jiang), University of Alberta, Canada.
- (6) **Xiaowen Gong**, M.Sc. 09/08 – 07/10, “Joint Bandwidth and Power Allocation in Wireless Communication Networks,” (co-supervised with Dr. C. Tellambura), University of Alberta, Canada.
- (7) **Jie Gao**, M.Sc. 09/07 – 08/09, “Cooperative Linear Precoding for Spectrum Sharing in Multi-User Wireless Systems: Game Theoretic Approach,” (co-supervised with Dr. H. Jiang), University of Alberta, Canada.
- (8) **Khoa T. Phan**, M.Sc. 05/06 – 05/08, “Resource Allocation in Wireless Networks via Convex Programming,” (co-supervised with Dr. C. Tellambura), University of Alberta, Canada.
- (9) **Liang Li**, M.Sc., 5/06 - 12/06, “Adaptive MIMO Systems with Low-Rate Feedback” (co-supervised with Dr. A.B. Gershman), Darmstadt University of Technology, Germany.
- (10) **Yasser Karanouh**, M.Sc., 11/05 - 11/06, “Robust Algorithms for Broadcasting with Imperfect CSI” (co-supervised with Dr. A.B. Gershman), Darmstadt University of Technology, Germany.
- (11) **Muhammad Waseem**, M.Sc., 10/05 - 9/06, “Joint Channel Estimation and Decoding in MIMO Systems” (co-supervised with Dr. A.B. Gershman), Darmstadt University of Technology, Germany.
- (12) **Yue Rong**, M.Sc., 5/02 – 10/03, “Blind Signal Spatial Signature Estimation Using PARAFAC Model” (co-supervised with Dr. A.B. Gershman), Duisburg-Essen University, Germany.

## PROJECTS

- (1) “Towards Scalable and AI-based Solutions for Beyond 5G Radio Access Networks”, PI; NSF and Academy of Finland Grant, USA and Finland, (557,647 EUR), Period: 1/23 – 12/25
- (2) “Massive and Sparse Antenna Array Processing for Millimeter-wave Communications”, PI; Academy of Finland Grant, Finland, (544,008 EUR), Period: 1/19 – 12/21.
- (3) “Multiple Waveforms Design for Radar Co-existence”, PI; SAAB Funded, Sweden-Finland, (57,000 EUR), Period: 06/18 – 08/18.
- (4) “Transmit Beamspace for Active Compressive Sensing and Communication with Multiple Waveforms”, PI; Academy of Finland Grant, Finland, (458,301 EUR), Period: 9/16 – 8/20.
- (5) “Topics in MIMO Radar”, CI, (PI: Prof. V. Koivunen); Finnish Defence Agency, Finland, Period: 9/14 – 12/15.
- (6) “Phased-MIMO Radar”, PI; NSERC Discovery Grant - Individual, Canada, (125,000 CAD), Period: 4/12 – 3/17 (interrupted 8/14).
- (7) “Phased-MIMO Radar: Transmit Beamspace, Transmit-Receive Beamforming, Parameter

Estimation, and Applications”, PI; NSERC Accelerator Supplements - Individual, Canada, (120,000 CAD), Period: 4/12 – 3/15 (interrupted 8/14).

- (8) “2D Sparse Array Optimization Algorithms for Multiple Transmit Beam and Multiple Receive Beam Radar”, PI; Samsung Thales Co., Ltd., Korea, (148,000 CAD), Period: 5/12 – 7/14.
- (9) “Robust Adaptive Beamforming for Multi-Antenna Systems”, PI; NSERC Discovery Grant - Individual, Canada, (115,000 CAD), Period: 4/07 – 3/12.
- (10) “Robust Parameter Estimation Using Stochastic Programming and Applications for Wireless Systems”, PI; Alberta Ingenuity New Faculty Award, Canada, (300,000 CAD), Period: 9/07 - 8/11.
- (11) “Intelligent Signal Processing for Ubiquitous High-Capacity, Heterogeneous, Scalable Wireless Networks”, CI (and 4 others); NSERC Strategic Project, (589,500 CAD - 20%), Period: 11/07 - 10/10.
- (12) “Space-Time Processing for Smart Antennas in Wireless Communications”, CI, (PI: Prof. A.B. Gershman); Alexander von Humboldt Foundation and German Ministry of Education and Research, joint project with Dept. of Communication Systems, Duisburg-Essen University and Fraunhofer Institute, Duisburg, Germany; Period: 3/02 – 5/05.

## PROFESSIONAL SOCIETIES AND SERVICE

Memberships: *IEEE Member* since 2002, elevated to *Senior Member* in 2005, and *Fellow* in 2018  
*EURASIP Member* since 2005  
*Professional Engineer* of Alberta, Canada since 2009.

### IEEE Technical Committee Member:

Signal Processing for Communication and Networking (SPCOM) Technical Committee, IEEE Signal Processing Society (2010 - 2016).

Sensor Array and Multi-Channel Signal Processing (SAM) Technical Committee, IEEE Signal Processing Society (2007 - 2012)

### Editorship:

*Senior Area Editor:* IEEE Signal Processing Letters (2016 - 2020)

*Associate Editor:* IEEE Trans. Signal Processing (2006 - 2010)  
IEEE Signal Processing Letters (2007 - 2009)

*Leading Guest Editor:* Special Issue on “Optimization Techniques in Wireless Communications” of EURASIP Journal on Wireless Communications and Networking, 2009

*Guest Editor:* Special Issue on “Advances in DOA Estimation and Source Localization” of International Journal of Antennas and Propagation, 2017

*Guest Editor:* Special Issue on “Tensor Decomposition for Signal Processing and Machine Learning” of IEEE Journal on Selected Topics in Signal Processing, 2020-2021

### Conference Organizer:

*Technical co-Chair,* IEEE 4th Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), San Juan, Puerto Rico, Dec. 13–16, 2011.

*Track Chair,* 45th Annual Asilomar Conf. Signals, Systems, and Computers, Pacific Grove, Cali-

fornia, USA, Nov. 6–9, 2011.

*Tutorial Chair*, 10th Int. Sympos. Wireless Commun. Systems (ISWCS), Ilmenau, Germany, Aug. 27–30, 2013.

*Technical co-Chair*, IEEE 10th Sensor Array and Multichannel Signal Processing Workshop (SAM), Manchester, UK, 2018.

*General co-Chair*, 31st European Signal Processing Conference (EUSIPCO), Helsinki, Finland, Sept. 4–8, 2023.

*Technical co-Chair*, IEEE 9th Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Los Suenos, Costa Rico, Dec. 10–13, 2023.

*Special Session Organizer*: Special session on Convex Optimization Techniques for Beamforming and MIMO Signal Processing, 1st IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (IEEE CAMSAP'05), Dec. 13-15, Puerto Vallarta, Mexico; Special session on Global Optimization and Applications to Signal Processing and Communications, 2nd IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (IEEE CAMSAP'07), Dec. 12-14 2007, Virgin Islands, USA.

*Reviews for Funding Organizations*: Natural Sciences and Engineering Research Council of Canada (NSERC); Israel Science Foundation (ISF), Israel; Belgian Reserach Council; Chilean National Science and Technology Commission (CONICYT); The Research Foundation – Flanders (FWO), Belgium; The Icelandic Research Fund, Iceland.

*Book Reviews*: for Cambridge Press.

*Reviewer*: for IEEE Transactions on Signal Processing; IEEE Signal Processing Magazine; IEEE Journal of Selected Topics in Signal Processing; IEEE Transactions on Audio, Speech and language Processing; IEEE Signal Processing Letters; EURASIP Signal Processing; Journal of Applied Signal Processing; Digital Signal Processing; IEEE Transactions on Aerospace and Electronic Systems; IEEE Aerospace and Electronics Systems Magazine; IEEE Transactions on Communications; IEEE Transactions on Wireless Communications; IEEE Journal of Selected Areas in Communications; IEEE Communications Letters; IEEE Transactions on Multimedia; IEEE Transactions on Ultrasonic, Ferroelectric, and Frequency Control; IEEE Transactions on Green Communications and Networking; Elsevier Neurocomputing; EURASIP Journal on Wireless Communications and Networking; IEEE Transactions on Vehicular Technology; IEEE Transactions on Neural Networks; IEEE Transactions on Geoscience and Remote Sensing; IET Signal Processing; Elsevier International Journal of Electronics and Communications; Journal of the Acoustical Society of America; Neurocomputing.

*Conference Program/Technical Committee Member*: IEEE CAMSAP 2005, Puerto Vallarta, Mexico; IEEE IWCMC, 2007, Honolulu, Hawaii, USA; IEEE CAMSAP 2007, Virgin Islands, USA; 21st IEEE CCECE 2008, Niagara Falls, Ontario, Canada; 5th IEEE SAM 2008, Darmstadt, Germany; IEEE IWCMC 2008, Chania, Crete Island, Greece; IEEE CCECE 2009, St. Johns Island, Canada; IEEE IWCMC 2009, Leipzig, Germany; IEEE CAMSAP 2009, Aruba, Dutch Antilles; 25th Queen's Biennial Symposium on Communications, 2010, Kingston, ON, Canada; IEEE ICASSP 2011 Prague, Czech Republic; IEEE ICC 2011, Kyoto, Japan; IEEE IWCMC 2011, Istanbul, Turkey; IEEE PIMRC 2011, Toronto, ON, Canada; IEEE SPAWC 2011, San Francisco, CA, USA; IEEE GLOBECOM 2011, Asilomar 2011, Asilomar, CA, USA; 4th IEEE CAMSAP 2011, San Juan, Puerto Rico; IEEE ICC 2012, Ottawa, Canada; IEEE WCNC 2012, Paris, France; 37th IEEE ICASSP 2012, Kyoto, Japan; IEEE VTC 2012, Quebec City, Canada; IEEE SAM 2012, Hoboken,

NJ, USA; IEEE SPAWC 2012, Cesme, Turkey; IEEE CWIT 2013, Toronto, Ontario, Canada; IEEE Radar Conference 2013, Ottawa, Ontario, Canada; 38th IEEE ICASSP 2013, Vancouver, British Columbia, Canada; 14th IEEE SPAWC 2013, Darmstadt, Germany; 52nd IEEE Conf. Decision and Control 2013, Florence, Italy; 21st EUSIPCO, Marrakech, Morocco, 2013; 5th IEEE CAMSAP, The Friendly Island, Saint Martin, 2013; 39th IEEE ICASSP 2014, Florence, Italy; IEEE CCECE 2014, Toronto, Canada; 22nd EUSIPCO 2014, Lisbon, Portugal; 8th IEEE SAM 2014, A Coruna, Spain; 15th IEEE SPAWC 2014, Toronto, Ontario, Canada; IEEE BlackSeaCom 2014, Kishenev, Moldova; IEEE Globecom 2014, Austin, TX, USA; IEEE ICC 2015, London, UK; 40th IEEE ICASSP 2015, Brisbane, Australia; IEEE ICUWB 2015, Montreal, Canada; IEEE Globecom 2015, San Diego, CA, USA; 3rd Intern. Workshop Compressed Sensing Theory and its Applications to Radar, Sonar and Remote Sensing 2015, Pisa, Italy; IEEE SPAWC 2015, Stockholm, Sweden; IEEE GlobalSIP 2015, Orlando, Florida, USA; IEEE ICASSP 2016, Shanghai, China; AusCTW 2016, Melbourne, Victoria, Australia; IEEE ICC 2016, Kuala Lumpur, Malaysia; IEEE Globecom 2016, Washington DC, DC, USA; IEEE ICASSP 2017, New Orleans, USA; IEEE ICC 2017, Paris, France; IEEE SPAWC 2017, Sapporo, Japan; IEEE GLOBECOM 2017, Singapore; IEEE CAMSAP 2017, Caracao, Dutch Antilles; IEEE ICC 2018, Kansas City, MO, USA; IEEE ICASSP 2018, Calgary, Alberta, Canada; IEEE SAM 2018, Sheffield, UK; 26th EUSIPCO 2018, Rome, Italy; IEEE SPAWC 2018, Kalamata, Greece; and other conferences.

*Conference Session Chair:* IEEE ISSPIT 2003, Darmstadt, Germany; 60th IEEE VTC 2004 Fall, Los Angeles, CA; IEEE CAMSAP 2005, Puerto Vallarta, Mexico; IEEE CAMSAP 2007, Virgin Islands, USA; IEEE ICASSP 2007 Hawaii, USA; IEEE CCECE 2008, Niagara Falls, Canada; IEEE ICASSP 2008, Las Vegas, USA; IEEE CAMSAP 2010, Aruba Island, the Netherlands; IEEE ICASSP 2011, Prague, Czech Republic; Asilomar 2011, Asilomar, CA, USA; 38th IEEE ICASSP 2013, Vancouver, British Columbia, Canada; 5th IEEE CAMSAP, The Friendly Island, Saint Martin, 2013; 39th IEEE ICASSP 2014, Florence, Italy; IEEE BlackSeaCom 2014, Kishenev, Moldova; 8th IEEE SAM 2014, A Coruna, Spain; 48th Asilomar 2014, Pacific Grove, California, USA; 6th IEEE CAMSAP 2015, Cancun, Mexico; 41st IEEE ICASSP 2016, Shanghai, China; IEEE ICASSP 2017, New Orleans, USA; and other conferences.

*Reviewer for Conferences:* IEEE ICASSP 2002, Orlando, FL; IEEE ICASSP 2003, Hong Kong; IEEE ISSPIT 2003, Darmstadt, Germany; IEEE ICASSP 2004, Montreal, Canada; IEEE GLOBECOM 2004, Dallas, TX; EUSIPCO 2004, Vienna, Austria; IEEE ICASSP 2005, Philadelphia, PA; IEEE SPAWC 2005, New York, NY; IEEE VTC 2005 Fall, Dallas, TX; IEEE CAMSAP 2005, Puerto Vallarta, Mexico; IEEE ICASSP 2006, Toulouse, France; IEEE ICC 2006, Istanbul, Turkey; EUSIPCO 2006, Florence, Italy; IEEE VTC 2006 Fall, Montreal, Quebec, Canada; IEEE PIMRC 2006, Helsinki, Finland; ICARCV 2006, Singapore; ISSPA 2007, Sharjah, United Arab Emirates; IEEE ICASSP 2007, Hawaii, USA; EUSIPCO 2007, Poznan, Poland; IEEE IWCMC 2007, Honolulu, Hawaii, USA; ISCIT 2008, Sydney, Australia; IEEE ICC 2008, Beijing, China; EUSIPCO 2008, Lausanne, Switzerland; IEEE IWCMC 2008, Crete Island, Greece; IEEE GLOBECOM 2008, New Orleans, LA, USA; IEEE ISCAS 2009, Taipei, Taiwan; IEEE CCECE 2009, St. Johns Island, Canada; IEEE IWCMC 2009, Leipzig, Germany; IEEE ICASSP 2009, Taipei, Taiwan; IEEE CAMSAP 2009, Aruba, Dutch Antilles; IEEE GLOBECOM 2009, Honolulu, Hawaii, USA; Queen's Biennial Symposium on Communications 2010, Kingston, ON, Canada; IEEE ICC 2010, Cape Town, South Africa; IEEE WCNC 2010, Sydney, Australia; IEEE ISCAS, 2010, Paris, France; IEEE VTC 2010, Taipei, Taiwan; IEEE ICASSP 2010, Dallas, TX, USA; IEEE SECON 2010, Boston, Massachusetts, USA; IEEE GLOBECOM, 2010, Miami, Florida, USA; IEEE ICASSP 2011, Prague, Czech Republic; IEEE ICC 2011, Kyoto, Japan; IEEE PIMRC 2011, Toronto, ON, Canada; IEEE SPAWC 2011, San Francisco, CA, USA; Asilomar 2011, Asilomar, CA, USA; 4th IEEE CAMSAP 2011, San Juan, Puerto Rico; IEEE IWCMC 2011, Istanbul, Turkey; IEEE GLOBECOM 2011,

Houston, TX, USA; IEEE ICC 2012, Ottawa, Canada; IEEE WCNC 2012, Paris, France; ACC 2012, Montreal, Canada; IEEE ICC 2012, Ottawa, Canada; IEEE WCNC 2012, Paris, France; 37th IEEE ICASSP 2012, Kyoto, Japan; IEEE VTC 2012, Quebec City, Canada; IEEE SAM 2012, Hoboken, NJ, USA; IEEE SPAWC 2012, Cesme, Turkey; IEEE CWIT 2013, Toronto, Ontario, Canada; IEEE Radar Conference 2013, Ottawa, Ontario, Canada; 38th IEEE ICASSP 2013, Vancouver, British Columbia, Canada; 14th IEEE SPAWC 2013, Darmstadt, Germany; 52nd IEEE Conf. Decision and Control 2013, Florence, Italy; 21st EUSIPCO, Marrakech, Morocco, 2013; 5th IEEE CAMSAP, The Friendly Island, Saint Martin, 2013; 39th IEEE ICASSP 2014, Florence, Italy; IEEE CCECE 2014, Toronto, Canada; 22nd EUSIPCO 2014, Lisbon, Portugal; 8th IEEE SAM 2014, A Coruna, Spain; 15th IEEE SPAWC 2014, Toronto, Ontario, Canada; IEEE BlackSeaCom 2014, Kishenev, Moldova; IEEE Globecom 2014, Austin, TX, USA; IEEE ICC 2015, London, UK; IEEE ICASSP 2015, Brisbane, Australia; IEEE ICUWB 2015, Montreal, Canada; IEEE Globecom 2015, San Diego, CA, USA; CoSeRa 2015, Pisa, Italy; IEEE SPAWC 2015, Stockholm, Sweden; IEEE GlobalSIP 2015, Orlando, Florida, USA; IEEE ISSPIT 2015, Abu Dhabi, UAE; IEEE ICASSP 2016, Shanghai, China; AusCTW 2016, Melbourne, Victoria, Australia; IEEE ICC 2016, Kuala Lumpur, Malaysia; IEEE Globecom 2016, Washington DC, DC, USA; IEEE ICCSN 2016, Beijing, China; IEEE ICASSP 2017, New Orleans, USA; IEEE ICC 2017, Paris, France; IEEE SPAWC 2017, Sapporo, Japan; IEEE GLOBECOM 2017, Singapore; IEEE CAMSAP 2017, Caracao, Dutch Antilles; IEEE ICC 2018, Kansas City, MO, USA; IEEE ICASSP 2018, Calgary, Alberta, Canada; IEEE SAM 2018, Sheffield, UK; 26th EUSIPCO 2018, Rome, Italy; IEEE SPAWC 2018, Kalamata, Greece; IEEE ICC 2019, Shanghai, China; IEEE ICASSP 2019, Brighton, UK; IEEE SPAWC 2019, Cannes, France; 27th EUSIPCO 2019, A Coruna, Spain; IEEE CAMSAP 2019, Guadeloupe, West Indies; IEEE GlobalSIP 2019, Ottawa, Canada; IEEE ICASSP 2020, Barcelona, Spain; 28th EUSIPCO 2020, Amsterdam, Netherlands; IEEE Radar Conf. 2020, Florence, Italy; Asilomar CSSC 2020, Pacific Grove, CA, USA; IEEE ICASSP 2021, Toronto, Canada; IEEE ICC 2021, Montreal, Canada; 29th EUSIPCO 2021, Dublin, Ireland; IEEE SPAWC 2021, Lucca, Italy; Asilomar CSSC 2021, Pacific Grove, CA, USA; IEEE ICASSP 2022, Singapore; 30th EUSIPCO 2022, Belgrade, Serbia; IEEE SPAWC 2022, Oulu, Finland; Asilomar CSSC 2022, Pacific Grove, CA, USA; IEEE SAM 2022, Trondheim, Norway; IEEE SPAWC 2022, Oulu, Finland; IEEE ICASSP 2023, Rhodes Island, Greece; IEEE ICC 2023, Rome, Italy; 31st EUSIPCO 2023, Helsinki, Finland; IEEE CAMSAP 2023, Costa Rica; IEEE ICASSP 2024, Seoul, Korea; ANTS 2024, Konstanz, Germany; IEEE ICMLCN 2024, Stockholm, Sweden; IEEE ICC 2024, Denver, CO, USA.

*To isolate mathematics from the practical demands of the sciences is to invite the sterility of a cow shut away from the bulls.*

*– Pafnutiy L. Chebyshev –*