

Curriculum Vitae

Alexander Litvinenko

<https://ecrc.kaust.edu.sa/Pages/Litvinenko.aspx>
http://stochastic_numerics.kaust.edu.sa/Pages/LitvinenkoAlexander.aspx

Name: Alexander Litvinenko
Nationality: German
Languages: Russian (native), English, German, **Dutch**

Contact Details

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Research Interests

Fast low-rank tensor methods for solving multi-parametric partial differential equations or systems with uncertainties, inverse problems, Bayesian update, data assimilation, optimal design of experiment, effective parallel algorithms and implementations, compression of large data sets, post-processing of large data sets.

Education

2002 – 2006 Ph.D. in Mathematics, Max-Planck-Institut für Mathematik in den Naturwissenschaften, Leipzig, Germany
Advisor: Prof. Wolfgang Hackbusch
Thesis title: “Application of Hierarchical Matrices For Solving Multiscale Problems”

2000 - 2002 Master degree in Mathematics, Novosibirsk State University and Laboratory of Data Analysis of Sobolev Institute of Mathematics, Russia

1996 – 2000 Bachelor degree in Mathematics, Novosibirsk State University, Russia

Skills

Programming languages: very solid experience in C and Matlab

Software libraries: low-rank tensor libraries for compression large data sets and for solving multi-parametric and high-dimensional problems; multi-linear algebra; uncertainty quantification and sensitivity analysis libraries. TTtoolbox, HLIBPro, HLIB, Hierarchical Tucker Toolbox, UG4, stochastic Galerkin sglib

Employment

2017 - 2018 Research Scientist in the Bayesian Computational Statistics & Modeling group, King Abdullah University of Science & Technology (KAUST), Saudi Arabia, directed by Professor Haavard Rue

- 2015 - 2017** Research Scientist in the Extreme Computing Research Center, KAUST, directed by Professor David Keyes
- 2013 - 2018** Research Scientist in the Uncertainty Quantification Center, KAUST, directed by Professor Raul Tempone
- 2007 - 2013** Post Doctoral position at Institute of Scientific Computing, TU Braunschweig, Germany, directed by Professor H.G. Matthies

Grants awarded

- (1) “Management and Minimisation of Uncertainties in Numerical Aerodynamics¹. Part II ” (MUNA), Number 20A0604G, German ministry BMWI, **130K Euro, leading co-PI**, 2010-2012, report ².
- (2) “Effective approaches and solution techniques for conditioning, robust design and control in the subsurface”³ (CODECS), German DFG, **leading co-PI**, ~**160K Euro**, 2012-2014.

Grants and proposal applications:

- “Minimisation of uncertainty and Bayesian inference in reservoir models”, Saudi National Science, Technology and Innovation Plan, 2 years, **375K\$, leading co-PI**, positive review, funding pending.
- Other 10 proposals were not awarded.

Reviewer

Mathematical Reviews, BIT, SISC, CAMWA, SINUM, JUQ, Theoretical and Computational FD, Water Resources Research, Journal of Physics A: Mathematical and Theoretical, SIAM J. Financial Mathematics

Teaching Experience

Two lecture courses at KAUST:

Spring 2013 Low-rank tensor approximation

Winter 2014 Hierarchical Matrices ⁴

Lecture courses and practical exercises at TU Braunschweig, Germany⁵:

Spring 2013⁶ Simulation of fluid dynamics

Winter 2013 Partial Differential Equation 1,
Numerical simulations in fluid dynamics

Spring 2012 Uncertainty Quantification, Parametric Problems and Model
Reduction

Simulation of fluid dynamics

Winter 2012⁷ Introduction to Scientific Computing

Summer 2011⁸ Uncertainty Quantification, Parametric Problems and Model
Reduction

Simulation of fluid dynamics⁹

¹ http://www.dlr.de/as/desktopdefault.aspx/tabid-3174/4820_read-6972/

² <https://www.dropbox.com/sh/7duwcmr5mpew5/AACshe-2iW05DsC40nagN9Z9a?dl=0>

³ <http://gepris.dfg.de/gepris/projekt/195436228>

⁴ <https://sri-uq.kaust.edu.sa/Pages/Seminar-51.aspx>

⁵ All information can be found <https://www.tu-braunschweig.de/wire/lehre/archiv> or in the annual reports

<https://www.tu-braunschweig.de/wire/forschung/berichte> -> Annual Reports

⁶ <https://www.tu-braunschweig.de/Medien-DB/iwr/jb2013.pdf>

⁷ <https://www.tu-braunschweig.de/Medien-DB/iwr/Jahresberichte/jb2012.pdf>

⁸ <https://www.tu-braunschweig.de/wire/lehre/archiv/ss11/spde>

Winter 2011	Introduction to Scientific Computing
Winter 2011	Introduction to PDEs and Numerical Methods ¹⁰
Summer 2010	Advanced Methods for ODEs and DAEs
Fall 2010	Introduction to Scientific Computing
Fall 2009	Introduction to Scientific Computing
Spring 2009	Advanced Methods for ODEs and DAEs
Summer 2008-2012	Refresh course: Introduction to language C

Co-Supervision of Students

Bachelor and Master students at TU Braunschweig:

- Nathalie Rauschmayr, Master Thesis "Coprocessing und Postprocessing von Fluidproblemen mit Paraview".
- Jeremy Rodriguez, "Introduction to Hierarchical Matrices"
- Steffen Andreas Kihn, "Entscheidungsbaeume" (German "Decision trees")
- Aidin Nojavan, Ates Burak, Borzoo Maiefatzade, K. Jamadar, Al-Qudsi Ahmad were my research assistants in different DFG and BMBF research projects (MUNA, CODECS). These students did industrial projects under my supervision.

Joint Organizer for the following mini-symposia (M), workshops (W) and conferences (C)

- C.1 HPC SAUDI 2017, <http://www.hpcsaudi.org/>, responsible for poster session
- M.0 SIAM UQ 2018, Orange County, California, mini "Low-rank approximations for the forward- and the inverse problems, Bayesian Update and UQ".
- M.1 SIAM CSE 2017, Atlanta, mini "Tensor completion techniques in Data Assimilation, Bayesian Update and UQ".
- M.2 SIAM UQ 2016, EPFL, <https://www.siam.org/meetings/uq16/program.php>
- M.3 ICIAM 2015, <http://www.iciam2015.cn/>
- M.4 SIAM CSE 2015, Salt Lake City, USA
- M.5 SIAM UQ 2014, Savannah, USA
- M.6 Young Researchers' Minisymposia "Stochastic partial differential equations (SPDEs) and applications", GAMM 2012, Darmstadt, Germany
- W.1 Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2016) Jan 05 2016 - Jan 10 2016, KAUST
- W.2 Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2015) Jan 06 2015 - Jan 09 2015, KAUST
- W.3 Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2014) Jan 06 2014 - Jan 10 2014, KAUST.
- W.4 Scalable Hierarchical Algorithms for eXtreme Computing (SHAXC-2), April 2014, KAUST.

Talks/Presentations

[Further information available at:

https://stochastic_numerics.kaust.edu.sa/Pages/LitvinenkoAlexander-Talks.aspx]

⁹ <https://www.tu-braunschweig.de/wire/lehre/archiv/ss11/fluidm>

¹⁰ <https://www.tu-braunschweig.de/wire/lehre/archiv/ws10/pde1>

Invited Talks

- (1) Low-rank tensor methods for solving PDEs with uncertain coefficients, University of Edinburgh, March 2017.
- (2) Low-rank tensor methods for solving PDEs with uncertain coefficients, University of Nottingham, March 2017.
- (3) Low-rank tensor methods for PDEs with uncertain coefficients and Bayesian Update surrogate, UNSW, Sydney, Australia, February 2017
- (4) Low-rank tensor methods for PDEs with uncertain coefficients and Bayesian Update surrogate, Colorado Denver, USA, January 2017
- (5) Numerical methods for solving stochastic PDEs in Tensor Train data format, Leuven, Belgium, July 2016.
- (6) Numerical methods for solving stochastic partial differential equations in the Tensor Train format , Aug. 18, 2015, Leipzig.
- (7) Introduction into hierarchical matrix technique, July 2015, group "Computational Methods in Systems and Control Theory" of Prof. P. Benner, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany.
- (8) Response Surface in low-rank Tensor Train Format for Uncertainty Quantification, August 2014, WIAS Berlin, Germany.
- (9) Data sparse approximation of the Karhunen-Loeve expansion, Oberwolfach Mini-Workshop: Numerical Upscaling for Media with Deterministic and Stochastic Heterogeneity, Germany, 02.2013.
- (10) Sampling and Low-Rank Tensor Approximations, Oberwolfach Workshop Numerical Methods for PDE Constrained Optimization with Uncertain Data, Germany, 01.2013.
- (11) Low-rank direct Bayesian update of polynomial chaos coefficients, GAMM Activity Group Applied and Numerical Linear Algebra Workshop, Bremen, Germany, 22.09.2011.
- (12) Data sparse approximation of the Karhunen-Loeve expansion, Workshop at HU Berlin, organized by C. Carstensen, Germany, 2008.

Contributed Talks

- (1) Likelihood approximation with hierarchical matrices for large spatial datasets, 7th Workshop on High-Dimensional Approximation, Sydney, Australia, Feb. 13-17, 2017.
- (2) Tensor completion techniques in Data Assimilation, Bayesian Update and UQ problems, SIAM CSE, Atlanta, Feb. 27, 2017.
- (3) Approximation of non-linear Bayesian Update for inverse problems, Inverse Problems & Modeling and Simulation, Fethiye, Turkey, May 2016.
- (4) Non-linear approximation of Bayesian Update, ENKF Workshop, Norway, May 2016.
- (5) Hierarchical matrix techniques for maximum likelihood covariance estimation, The Third Scalable Hierarchical Algorithms for eXtreme Computing (SHAXC-3) workshop, King Abdullah University of Science and Technology, May 2016.
- (6) Hierarchical matrix techniques for maximum likelihood covariance estimation, SIAM UQ, Lausanne, April 2016.
- (7) Possible applications of low-rank tensors in statistics and UQ. Hausdorff School 2016: Low-rank Tensor Techniques in Numerical Analysis and Optimization, Bonn, Germany, April 2016.
- (8) Hierarchical matrix techniques for maximum likelihood covariance estimation, GAMM Conference, 7-11 March 2016, Braunschweig, Germany.
- (9) Fast and cheap approximation of large covariance matrix with hierarchical matrix technique, UQAW Workshop, 5-11 Jan. 2016, KAUST.
- (10) Polynomial Chaos Expansion of random coefficients and the solution of stochastic

- partial differential equations in the Tensor Train format, Aug. 10-14, 2015, ICIAM in Beijing, China
- (11) Efficient Analysis of High Dimensional Data in Tensor Formats, Aug. 10-14, 2015, ICIAM in Beijing, China
 - (12) Sampling and low-rank tensor Approximation of the Response Surface, UMRIDA UQ Workshop, TU Delft, 15 April, 2015.
 - (13) Polynomial Chaos Expansion of random coefficients and the solution of stochastic partial differential equations in the Tensor Train format, SIAM CSE, Salt Lake City, USA, 2015.
 - (14) Response Surface in low-rank Tensor Train Format for Uncertainty Quantification, September 2014, University of Stuttgart, Germany.
 - (15) Inverse Problems and Uncertainty Quantification, December 2014, Hong Kong, Conference IPOC2014.
 - (16) Response Surface in low-rank Tensor Train Format for Uncertainty Quantification, SHAXC, Workshop at KAUST, April 2014.
 - (17) Implementation of Non-linear Bayesian Update of Random Variables, SIAM UQ Conference, USA, March 2014.
 - (18) Efficient Analysis of High Dimensional Data in Tensor Formats, KAUST, 04.2013 Non-sampling functional approximation of linear and non-linear Bayesian Update, GAMM Conference, Novi Sad, Serbia, 03.2013.
 - (19) Non-sampling functional approximation of linear and non-linear Bayesian Update, SIAM CSE Conference, Boston, USA, 02.2013.
 - (20) Non-sampling functional approximation of linear and non-linear Bayesian Update, GAMM Seminar, MIS MPG Leipzig, Germany, 01.2013.
 - (21) Tensor Approximation Methods for Parameter Identification, SIAM Conference on Applied Linear Algebra, Valencia, Spain, 06.2012.
 - (22) Uncertainty Quantification in Numerical Aerodynamics, SIAM UQ Conference, Raleigh, NC, USA, 04.2012.
 - (23) Efficient Analysis of High Dimensional Data in Tensor Formats, SIAM UQ Conference, Raleigh, NC, USA, 04.2012.
 - (24) Uncertainty Quantification in numerical Aerodynamic via low-rank Response Surface, GAMM Conference, Darmstadt, Germany, 03.2012.
 - (25) Efficient Analysis of High Dimensional Data in Tensor Formats, Workshop High-Order Numerical Approximation for Partial Differential Equations, Hausdorff Center for Mathematics, University of Bonn, Germany, 02.2012.
 - (26) Efficient Analysis of High Dimensional Data in Tensor Formats, GAMM Seminar Analysis and Numerical Methods in Higher Dimensions, Leipzig, 01.2012.

Seminar Talks

- (1) Introductory talk in Extreme Computing Research Center, Oct. 2015, KAUST.
- (2) Overview of numerical methods for Uncertainty Quantification, CS Graduate Seminar, KAUST, May 2014.
- (3) Application of Hierarchical matrices for domain decomposition, KAUST, SRI UQ, 2014
- (4) AMCS Graduate Seminar: Scalable hierarchical algorithms for PDEs and UQ, KAUST, April 2014.
- (5) Uncertainty Quantification, Inverse Problems and application, KICP Meeting, KAUST, April 2014.
- (6) Response Surface in low-rank Tensor Train Format for Uncertainty Quantification, May 2014, KAUST.
- (7) AMCS Graduate Seminar: Scalable hierarchical algorithms for PDEs and UQ Alexander Litvinenko and Rio Yokota, KAUST, April 2014.
- (8) Research project meeting, Talk in MIS MPI Leipzig, Germany, 04.2013.

- (9) Sampling-free linear Bayesian update of polynomial chaos representations, Research Seminar on TU Braunschweig, 12.2012.
- (10) Multi-linear algebra and different tensor formats with applications, Research Seminar Technische Universität Braunschweig, Germany, 05.2012.
- (11) Low-rank direct Bayesian update of polynomial chaos coefficients, GAMM Activity Group Applied and Numerical Linear Algebra Workshop, Bremen, Germany, 22.09.2011
- (12) Uncertainties Quantification and Data Compression in numerical Aerodynamics, GAMM conference, Graz, Austria, 19.04.2011.
- (13) Low-rank response surface with application in numerical aerodynamic, 1st International Symposium on Uncertainty Modelling in Engineering (ISUME), CVUT Prague, Czech Republic, 02.05.2011.
- (14) Efficient Analysis of High Dimensional Data in Tensor Formats, Workshop on Sparse Grids, Hausdorff Research Institute for Mathematics, Bonn, Germany, 05.2011.
- (15) Uncertainties Quantification and Data Compression in numerical Aerodynamics, SIAM CSE conference, Reno, USA, 1.03.2011.
- (16) Low-rank data format for uncertainty quantification. SMTDA-2010 International Conference, Crete, Greece, 08.-11.06.2010.
- (17) Sparse data formats and efficient numerical methods for uncertainties quantification in numerical aerodynamics. IV European Congress on Computational Mechanics (ECCM IV): Solids, Structures and Coupled Problems in Engineering, Paris, France, 16.-21.05.2010.
- (18) Sparse data formats and efficient numerical methods for uncertainties quantification in numerical aerodynamics. Fourth International Workshop on the Numerical Analysis of Stochastic Partial Differential Equations, TU Bergakademie, Freiberg, Germany, 20-21.09.2010.
- (19) Sparse data representation of random fields, GAMM 2009, Germany.
- (20) Numerical methods for stochastic transport equation, SIAM Geosciences, Leipzig, Germany, 2009.
- (21) Application of sparse tensor techniques for solving stochastic transport equation, Inverse problems conference, Vienna, Austria, 2009.
- (22) Data sparse approximation of the Karhunen-Loeve expansion, GAMM Meeting, MIS MPI Leipzig, Germany, 2008.
- (23) Sparse techniques for information extraction in stochastic PDEs, Bonn, Germany, 2008.
- (24) Quantification of uncertainties in angle of attack and Mach number, NODESIM-CFD Workshop on Quantification of CFD Uncertainties, Brussel, Belgium, 2009.

Technology Transfer: Project Meetings and Talks for Industry Partners

- (1) Uncertainty Quantification with applications, presentation for Veolia, 18. Dec. 2015, KAUST.
- (2) Low-rank tensor approximation of big data, Nov. 25, 2015, meeting with Aramco, KAUST.
- (3) Uncertainty quantification with applications , Nov. 17, 2015, meeting with Aramco, KAUST.
- (4) Introduction to tensors: different formats, arithmetics, ranks, few examples, Goethe University Frankfurt, Germany, July 23, 2015.
- (5) Level sets, April 20-23, 2015, Aramco, Dhahran, Saudi Arabia.
- (6) Uncertainty Quantification and Risk Management, Meeting with industry partner LaFarge Company, KAUST, April 2014.
- (7) Response Surface and its low-rank update for uncertainty quantification in reservoir modeling, Meeting with Aramco, April 2014.

- (8) Uncertainty Quantification with application in geology, Meeting with Maaden, KAUST, October 2013.
- (9) Efficient Uncertainty Quantification for the Complete Field Solution, MUNA Final Project meeting, DLR Braunschweig, Germany, 10.2012.
- (10) Non-linear Bayesian Update, CODECS Project meeting, RWTH Aachen, Aachen, 05.2012.
- (11) Efficient Analysis of High Dimensional Data in Tensor Formats, University of Trier, Germany, 02.2012.
- (12) Bayesian Update in low-rank tensor format, Workshop on Matrix Equations and Tensor Techniques, Aachen, Germany, 22.11.2011.
- (13) Project meeting. Low-rank approximation and Bayesian update, University of Trier, 11.11.2011.
- (14) Low-rank approximation and Bayesian update, University of Stuttgart, Germany, 31.05.2011.
- (15) Numerical methods for quantification of uncertainties in stochastic aerodynamics, MUNA Workshop, DLR Braunschweig, Germany, 2009.
- (16) Quantification of uncertainties in the angle of attack and Mach number, MUNA Project meeting, RWTH Aachen, Germany, 2009.
- (17) Numerical methods for quantification of uncertainties in stochastic aerodynamics, MUNA Project meeting, Braunschweig, 2009.
- (18) Comparison of Monte Carlo and sparse grids methods, Stuttgart, Germany 2009.
- (19) Stochastic framework for turbulence modeling, MUNA Project meeting, RWTH Aachen, Germany, 2008.
- (20) Mathematical methods for quantification of uncertainties in stochastic Navier-Stokes Equation, DLR, Germany, 2008.
- (21) Stochastic numerical methods, MUNA Project meeting, Uni Trier, Germany, 2008.
- (22) Numerical methods for quantification of uncertainties in stochastic aerodynamics, MUNA Project meeting, Braunschweig, 2008.

Publications

Peer reviewed Journal papers

- 1 D. Liu, A. Litvinenko, C. Schillings, V. Schulz, *Quantification of airfoil geometry-induced aerodynamic uncertainties - comparison of approaches*, accepted to SIAM/ASA J. of Uncertainty Quantification, 2017.
- 2 H.G. Matthies, E. Zander, B.V. Rosić, A. Litvinenko, *Parameter estimation via conditional expectation: a Bayesian inversion*, *Advanced Modeling and Simulation in Engineering Sciences* 3 (1), 24, 2016.
- 3 H.G. Matthies, E. Zander, B. Rosic, A. Litvinenko, O. Pajonk, *Inverse Problems in a Bayesian Setting*, Chapter in *Computational Methods for Solids and Fluids*, Vol. 41 of series *Comp. Meth. in Appl. Sciences*, pp 245-286, 2016.
- 4 S. Dolgov, B. N. Khoromskij, A. Litvinenko, H. G. Matthies, *Polynomial Chaos Expansion of random coefficients and the solution of stochastic partial differential equations in the Tensor Train format*, *IAM/ASA J. Uncertainty Quantification* 3(1), pp 1109-1135, 2015.
- 5 M. Espig, W. Hackbusch, A. Litvinenko, H.G. Matthies, P. Wähnert, *Efficient low-rank approximation of the stochastic Galerkin matrix in tensor formats*, *Computers & Mathematics with Applications* 67 (4), 818-829, 2014
- 6 L. Giraldi, A. Litvinenko, D. Liu, H.G. Matthies, A. Nouy, *To Be or Not to Be Intrusive? The Solution of Parametric and Stochastic Equations---the "Plain Vanilla" Galerkin Case*, *SIAM Journal on Scientific Computing* 36 (6), A2720-A2744, 2014
- 7 B. Rosic, A. Litvinenko, O. Pajonk and H. G. Matthies, *Sampling-free linear Bayesian update of polynomial chaos representations*, *J. Comp. Physics*, 231(2012), pp 5761-5787.
- 8 O. Pajonk, B. Rosic, A. Litvinenko, H. G. Matthies, *A Deterministic Filter for non Gaussian Bayesian Estimation*, *Physica D: Nonlinear Phenomena*, 241(2012), pp.775-788.
- 9 M. Espig, W. Hackbusch, A. Litvinenko, H. G. Matthies, Ph. Wähnert, *Efficient low-rank approximation of the stochastic Galerkin matrix in tensor formats*, *Computers & Mathematics with Applications*, (2012), ISSN 0898-1221, 10.1016/j.camwa.2012.10.008.
- 10 W. Nowak, A. Litvinenko, *Kriging accelerated by orders of magnitude: combining low-rank covariance approximations with FFT-techniques*, *Mathematical Geosciences*, 01/2013; 45:411-435. DOI: 10.1007/s11004-013-9453-6
- 11 M. Espig, W. Hackbusch, A. Litvinenko, H. G. Matthies and E. Zander, *Efficient Analysis of High Dimensional Data in Tensor Formats*, *Springer Lecture Note series* (88) for *Computational Science and Engineering*, pp 31-56, 2013.

- 12 B. Rosic, A. Kucerová, J. Sykora, O. Pajonk, A. Litvinenko, H. G. Matthies: *Parameter Identification in a Probabilistic Setting*, *Engineering Structures* (2013), Vol. 50, pp 179–196, DOI: 10.1016/j.engstruct.2012.12.029.
- 13 B.N. Khoromskij, A. Litvinenko, H. G. Matthies, *Application of hierarchical matrices for computing the Karhunen-Loeve expansion*, Springer, Computing, 84:49-67, 2009.
- 14 B.N. Khoromskij, A. Litvinenko, *Domain decomposition based H-matrix preconditioner for the skin problem in 2D and 3D*. Domain Decomposition Methods in Science and Engineering XVII Lecture Notes in Computational Science and Engineering, 2008, Volume 60, II, pp 175-182.
- 15 V. Berikov, G. S. Lbov, A. Litvinenko, *Discrete recognition problem with a randomized decision function*. Pattern Recognition and Image Analysis, Vol.14/2, pp 211-221, 2004.
- 16 V. Berikov, A. Litvinenko *Choice of optimal decision tree complexity in discrete pattern recognition problem / Isskustvennii intellect. 2*, 2004, pp. 17-21, [Russian].
- 17 V. Berikov, A. Litvinenko, *The influence of prior knowledge on the expected performance of a classifier*. Pattern Recognition Letters, Vol. 24/15, pp 2537-2548, 2003.

Peer reviewed Conference papers

1. A. Litvinenko, M. Genton, Y. Sun, D. Keyes, *Hierarchical matrix techniques for approximating large covariance matrices and estimating its parameters*, PAMM 16 (1), 731-732, 2016.
2. A. Litvinenko, H. G. Matthies and T. A. El-Moselhy, *Sampling and Low-Rank Tensor Approximation of the Response Surface*, Proceedings Monte Carlo and Quasi-Monte Carlo Methods 2012, edited by Josef Dick, Frances Y. Kuo, Gareth W. Peters, and Ian H. Sloan, 16 pages, Springer-Verlag.
3. A. Litvinenko, H. G. Matthies, *Uncertainty Quantification and Non-Linear Bayesian Update of PCE Coefficients*, PAMM 13 (1), 379-380
4. P. Wähnert, A. Litvinenko, M. Espig, H. G. Matthies and W. Hackbusch, *Approximation of the stochastic Galerkin matrix in the low-rank canonical tensor format*, PAMM Proc. Appl. Math. Mech. Special Issue: 83nd Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Darmstadt 2012
5. A. Litvinenko and H. G. Matthies, *Uncertainty Quantification in numerical Aerodynamic via low-rank Response Surface*, PAMM Proc. Appl. Math. Mech. Special Issue: 83nd Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Darmstadt 2012;
6. B. Rosic; H. G. Matthies, A. Litvinenko, O. Pajonk, A. Kucerova, and J. Sykora,

Bayesian Updating of uncertainties in the description of heat and moisture transport in heterogenous materials, International Conference on Adaptive Modeling and Simulation ADMOS 2011, D. Aubry and P. Diez (Eds), pp. 415-423, 2011.

7. A. Litvinenko and H. G. Matthies, *Uncertainties Quantification and Data Compression in numerical Aerodynamics*, PAMM Proc. Appl. Math. Mech. 11, 877-878 / DOI10.1002/pamm.201110425. Special Issue: 82nd Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Graz 2011; Editors: G. Brenn, G.A. Holzapfel, M. Schanz and O. Steinbach.
8. A. Litvinenko and H. G. Matthies, *Low-Rank Data Format for Uncertainty Quantification*, International Conference on Stochastic Modeling Techniques and Data Analysis Proceedings, pp. 477-484, Chania, Greece, 2010. Editor: Christos H. Skiadas.
9. A. Litvinenko and H. G. Matthies, *Sparse data representation of random fields*. Proceedings in Applied Mathematics and Mechanics, PAMM Vol. 9, Wiley-InterScience, pages 587-588, 2009.
10. B. N. Khoromskij, A. Litvinenko, *Data Sparse Computation of the Karhunen-Loeve Expansion*, AIP Conference Proceedings, 1048-1, pp 311-314, 2008.
11. V. Berikov, A. Litvinenko. *On the evaluation of discrete classifiers // Computer Data Analysis and Modeling. Robustness and Computer Intensive Methods. Proceedings of the Sixth International Conference (September 10-14), Minsk, Belarus 2001*, proceedings, pp. 10-15.
12. V. Berikov, G.S. Lbov, A. Litvinenko. *Evaluation of recognition performance for discrete classifier. // The 6-th German-Russian Workshop Pattern Recognition and Image Understanding ORGW2003. Katun, Altai Region, Russia*. pp 34-37.

ArXiv manuscripts:

1. A. Litvinenko, Y. Sun, M.G. Genton, D. Keyes, *Likelihood Approximation With Hierarchical Matrices For Large Spatial Datasets*, arXiv preprint, 23 pages, 2017. Submitted to *Computational Statistics and Data Analysis Journal*.
2. A. Litvinenko, *Partial inversion of elliptic operator to speed up computation of likelihood in Bayesian inference*, arXiv preprint arXiv:1708.02207, 30 pages, 2017
3. A. Litvinenko, N. Litvinenko, *Application of Bayesian Networks for Estimation of Individual Psychological Characteristics*, arXiv preprint arXiv:1708.00060, 20 pages, 2017
4. H.G. Matthies, A. Litvinenko, B.V. Rosic, E. Zander, *Bayesian Parameter Estimation via Filtering and Functional Approximations*, arXiv preprint arXiv:1611.09293, 2016

5. S. Dolgov, B. N. Khoromskij, A. Litvinenko, H. G. Matthies, *Computation of the Response Surface in the Tensor Train data format*, preprint arXiv:1406.2816, 2014.
6. Litvinenko, H. G. Matthies. *Inverse problems and uncertainty quantification*, arXiv preprint arXiv: 1312.5048.
7. W. Boukaram, H. Ltaief, A. Litvinenko, A. Abdelfattah and D. Keyes, *Accelerating Matrix-Vector Multiplication on Hierarchical Matrices Using Graphical Processing Units*, extended abstract, International Computational Science and Engineering Conference, May 11-12, 2015, Qatar, http://repository.kaust.edu.sa/kaust/bitstream/10754/347275/1/Hmatvec_extended_abstract.pdf

Chapters in books

1. A. Litvinenko and H. G. Matthies, *Numerical Methods for Uncertainty Quantification and Bayesian update in Aerodynamics*, chapter in the book Management and Minimisation of Uncertainties and Errors in Numerical Aerodynamics – Results of the German collaborative project MUNA, pp. 267-283, Editors: B. Eisfeld, H. Barnewitz, W. Fritz, F. Thiele, Springer, 2013
2. H. G. Matthies, A. Litvinenko, O. Pajonk, B. V. Rosić, E. Zander, *Parametric and Uncertainty Computations with Tensor Product Representations*, Book “Uncertainty Quantification in Scientific Computing”, IFIP Advances in Information and Communication Technology Vol. 377, 2012, pp 139- 150, DOI: 10.1007/978-3-642-32677-6.

Book

- A. Cherepanov, A. Litvinenko. *Global problems of humanity and searching of ways of solving*. Material for discussions. Moscow 2000. Book (in Russian), 197 pages.

Lecture notes

- V. Berikov, A. Litvinenko. Lecture notes: *Methods for statistical data analysis with decision trees*, Novosibirsk, Russia, 2002, <http://www.math.nsc.ru/AP/datamine/eng/decisiontree.htm>

Papers in progress

1. A. Litvinenko, HLIBCov: *Likelihood Approximation With Parallel Hierarchical Matrices For Large Spatial Datasets*, September 2017.
2. M. Espig, W. Hackbusch, A. Litvinenko and H.G. Matthies, *An Efficient Method for the Computation of the Stochastic Galerkin Projection by Means of Tensor Format Representations*.
3. A. Litvinenko, Y. Marzouk, H. G. Matthies, M. Scavino, A. Spantini, *Bayesian update of a random variable via its characteristic function*.
4. A. Litvinenko, E. Uysal, H. Ulku, J. Ooppelstrup, R. Tempone, H. Bagci, *Computation of Electromagnetic Fields Scattered From Dielectric Objects of Uncertain Shapes Using a Multilevel Monte Carlo Scheme*.
5. A. Litvinenko, H. Najm, H.G. Matthies, *Data free inference of uncertain parameters in chemical models by the (non)-linear Bayesian Update and MCMC*.

6. A. Litvinenko, B. Khoromskij, V. Khoromskaia, H.G. Matthies, *Tucker Tensor analysis of Matern functions in spatial statistics*
7. A. Litvinenko, H. G. Matthies, E. Zander, *Non-Linear Bayesian Update of Random Variables*
8. D. Keyes, A. Litvinenko, D. Logashenko, G. Wittum, *Parallel multigrid method for solving density driven flow with uncertain parameters.*