Steffen W. R. Werner

Curriculum Vitae as of January 12, 2026

Position and Contact

Job title	Assistant professor
Mailing address	Virginia Polytechnic Institute and State University
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	225 Stanger St
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Office address	Virginia Polytechnic Institute and State University
	418 Data and Decision Sciences Building
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ORCID	0000-0003-1667-4862
Google Scholar	https://scholar.google.de/citations?user=F2v1uKAAAAAJ&hl=en

Professional Experience

since 05/2025 **Affiliate faculty member**, *Virginia Tech National Security Institute, Virginia Tech*, Blacksburg, VA 24061, USA

since 08/2023 **Assistant professor**, *Department of Mathematics and Division of Computational Modeling and Data Analytics, Virginia Tech*, Blacksburg, VA 24061, USA

09/2021–08/2023 **Postdoctoral associate**, *Department of Computer Science, Courant Institute of Mathematical Sciences, New York Univsersity*, New York, NY 10012, USA

10/2016–08/2021 **Doctoral researcher**, *Computational Methods in Systems and Control Theory, Max Planck Institute for Dynamics of Complex Technical Systems*, Magdeburg, Germany

05/2016–09/2016, 10/2014–01/2016 **Student employee**, *Computational Methods in Systems and Control Theory, Max Planck Institute for Dynamics of Complex Technical Systems*, Magdeburg, Germany

- Development and maintenance of MATLAB toolboxes and codes

01/2016–04/2016 **Industrial intern**, *proALPHA Business Solutions GmbH*, Weilerbach, Germany

- Analysis of modern version control systems
- Application programming

10/2013–09/2014 **Student employee**, *Otto von Guericke University*, Magdeburg, Germany

- Tutor for mathematical courses
- Tutor for the consultation of the Department of Mathematics

Education

10/2016–08/2021 **Doctoral studies (doctor rerum naturalium)**, *Department of Mathematics, Otto von Guericke University*, Magdeburg, Germany, summa cum laude (excellent)
Thesis: *Structure-Preserving Model Reduction for Mechanical Systems* [50]
- 04/2017–08/2021: Associate researcher in the German Research Foundation (DFG) Research Training Group 2297 "Mathematical Complexity Reduction (MathCoRe)", Magdeburg
- 10/2016–09/2019: Project research in the German Research Foundation (DFG) Priority Program 1897 "Calm, Smooth and Smart – Novel Approaches for Influencing Vibrations by Means of Deliberately Introduced Dissipation"

10/2014–09/2016 **Master of Science**, *Department of Mathematics, Otto von Guericke University*, Magdeburg, Germany, very good with distinction
Thesis: *Hankel-Norm Approximation of Descriptor Systems* [51]

10/2011–09/2014 **Bachelor of Science**, *Department of Mathematics, Otto von Guericke University*, Magdeburg, Germany, very good with distinction
Thesis: *Numerische Berechnung der Eigenwerte großer Hamiltonisch-positiver Matrizen* [52]

07/2011 **Abitur (university entrance diploma)**, *Diesterweg-Gymnasium*, Tangermünde-Havelberg, Germany

Research Interests

scientific computing, model order reduction, data-driven modeling, scientific machine learning, numerical linear algebra, optimization and control, computational decision making, matrix equations, mathematical software

Awards and Honors

08/2025–08/2028 **Luther and Alice Hamlett Junior Faculty Fellow**, College of Science, Virginia Tech, Blacksburg, VA, USA

03/2020 **Best Paper Award Automatisierungstechnik**, *for the contribution "A comparison of second-order model order reduction methods for an artificial fishtail"*, at - Automatisierungstechnik, De Gruyter, Austria

06/2019 **SIAM Student Chapter Certificate of Recognition**, Society for Industrial and Applied Mathematics (SIAM), Philadelphia, PA, USA

External and Internal Funding for Research and Education

08/2025–08/2028 **Luther and Alice Hamlett Junior Faculty Fellow**, College of Science, Virginia Tech, Blacksburg, VA, USA
$30,000 (for 3 years)

07/2024–07/2026 **New Faculty Mentoring Grant**, College of Science, Virginia Tech, Blacksburg, VA, USA
$1,500 (for 2 years)

Professional Service

Editorial Service

since 09/2024 **Co-editor**, *MORwiki*, The MORwiki Community (http://modelreduction.org)

since 05/2023 **Associate editor for code reviews**, *Computational Science and Engineering*, Springer

Conference, Workshop and Program Organization

05/18/2026–05/22/2026 **27th Conference of the International Linear Algebra Society (ILAS 2026)**, Blacksburg, VA, USA, Co-organizers: Christopher Beattie, Paul Cazeaux, Eric de Sturler, Mark Embree, Serkan Gugercin, Agnieszka Miedlar, Mirjeta Pasha, Megan Wawro (Virginia Tech)
(one week conference)

01/12/2026–04/17/2026 **Junior Trimester Program "Computational multifidelity, multilevel, and multiscale methods"**, *Hausdorff Research Institute for Mathematics*, Bonn, Germany, Co-organizers: Christian Döding (University of Bonn), Moritz Hauck (Heidelberg University), Emil Løvbak (Karlsruhe Institute of Technology), Andreas Rupp (Saarland University), Johan Wärnegård (KTH Royal Institute of Technology)
(three months program)

11/04/2023 **Workshop "Model Reduction and Numerical Linear Algebra"**, Blacksburg, VA, USA, Co-organizers: Mark Embree, Serkan Gugercin, Agnieszka Miedlar (Virginia Tech)
(one day workshop)

Minisymposium, Minitutorial and Special Session Organization

01/07/2026 **Minisymposium "Recent Advances in Model Order Reduction and Data-Driven Modeling: Theory and Computations"**, *Joint Mathematics Meetings (JMM 2026)*, Washington, D.C., USA, Co-organizer: Ionut-Gabriel Farcas (Virginia Tech)
(two sessions)

03/05/2025 **Minitutorial "Data-Driven Reduced Modeling in the Time and Frequency Domains: Fundamentals, Best Practices, and Implementation"**, *SIAM Conference on Computational Science and Engineering (CSE25)*, Fort Worth, TX, USA, Co-organizers: Ionut-Gabriel Farcas (Virginia Tech), Shane A. McQuarrie (Sandia National Labs)
(two sessions)

03/03/2025 **Minisymposium "Physics-Enhanced Data-Driven Control of Complex Systems"**, *SIAM Conference on Computational Science and Engineering (CSE25)*, Fort Worth, TX, USA
(two sessions)

02/20/2025 **Minisymposium "Recent Advances in Model Order Reduction and Data-driven Modelling"**, *11th Vienna International Conference on Mathematical Modelling MATHMOD 2025*, Vienna, Austria, Co-organizers: Hendrik Kleikamp (University of Münster), Sean Reiter (Virginia Tech), Jens Saak (MPI Magdeburg)
(three sessions)

07/23/2024 **Minisymposium "Modeling and learning of structured dynamical systems"**, *16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics (WCCM-PANACM Vancouver 2024)*, Vancouver, British Columbia, Canada, Co-organizer: Serkan Gugercin (Virginia Tech)
(one session)

05/15/2024–05/16/2024 **Minisymposium "Matrix and Tensor Equations in Action: Simulation, Model Reduction and Scientific Machine Learning"**, *SIAM Conference on Applied Linear Algebra (LA24)*, Paris, France, Co-organizer: Jens Saak (MPI Magdeburg)
(three sessions)

02/27/2023 **Minisymposium "Goal-Oriented and Context-Aware Scientific Machine Learning"**, *SIAM Conference on Computational Science and Engineering (CSE23)*, Amsterdam, The Netherlands, Co-organizer: Thomas O'Leary-Roseberry (UT Austin)
(two sessions)

Society Service

since 04/2017 **Member of the Society for Industrial and Applied Mathematics (SIAM)**

04/2017–09/2020 **Student Chapter of SIAM Magdeburg, Germany**

- 04/2017–09/2018, 10/2019–09/2020: IT Officer
- 10/2018–09/2019: President

Publications

Submitted

[1] R. Smith and S. W. R. Werner. A tangential low-rank ADI method for solving indefinite Lyapunov equations. e-print 2512.04983, arXiv, 2025. Numerical Analysis (math.NA). doi:10.48550/arXiv.2512.04983.

[2] S. Reiter and S. W. R. Werner. Data-driven balanced truncation for second-order systems with generalized proportional damping. e-print 2506.10118, arXiv, 2025. Numerical Analysis (math.NA). doi:10.48550/arXiv.2506.10118.

[3] M. S. Ackermann, I. V. Gosea, S. Gugercin, and S. W. R. Werner. Second-order AAA algorithms for structured data-driven modeling. e-print 2506.02241, arXiv, 2025. Numerical Analysis (math.NA). doi:10.48550/arXiv.2506.02241.

[4] S. W. R. Werner and B. Peherstorfer. An adaptive data sampling strategy for stabilizing dynamical systems via controller inference. e-print 2506.01816, arXiv, 2025. Optimization and Control (math.OC). doi:10.48550/arXiv.2506.01816.

Journal Articles

[5] J. Heiland, Y. Kim, and S. W. R. Werner. Deep polytopic autoencoders for low-dimensional linear parameter-varying approximations and nonlinear feedback controller design. *Adv. Comput. Math.*, 51(6):55, 2025. doi:10.1007/s10444-025-10269-1.

[6] S. W. R. Werner and B. Peherstorfer. System stabilization with policy optimization on unstable latent manifolds. *Comput. Methods Appl. Mech. Eng.*, 433, Part A:117483, 2025. doi:10.1016/j.cma.2024.117483.

[7] J. Saak and S. W. R. Werner. Using LDL^T factorizations in Newton's method for solving general large-scale algebraic Riccati equations. *Electron. Trans. Numer. Anal.*, 62:95–118, 2024. doi:10.1553/etna_vol62s95.

[8] Q. Aumann and S. W. R. Werner. Adaptive choice of near-optimal expansion points for interpolation-based structure-preserving model reduction. *Adv. Comput. Math.*, 50(4):79, 2024. doi:10.1007/s10444-024-10166-z.

[9] S. W. R. Werner and B. Peherstorfer. On the sample complexity of stabilizing linear dynamical systems from data. *Found. Comput. Math.*, 24(3):955–987, 2024. doi:10.1007/s10208-023-09605-y.

[10] I. V. Gosea, S. Gugercin, and S. W. R. Werner. Structured barycentric forms for interpolation-based data-driven reduced modeling of second-order systems. *Adv. Comput. Math.*, 50(2):26, 2024. doi:10.1007/s10444-024-10118-7.

[11] P. Benner, S. Gugercin, and S. W. R. Werner. Structured interpolation for multivariate transfer functions of quadratic-bilinear systems. *Adv. Comput. Math.*, 50(2):18, 2024. doi:10.1007/s10444-024-10109-8.

[12] P. Benner, S. Gugercin, and S. W. R. Werner. A unifying framework for tangential interpolation of structured bilinear control systems. *Numer. Math.*, 155(3–4):445–483, 2023. doi:10.1007/s00211-023-01380-w.

[13] J. Heiland and S. W. R. Werner. Low-complexity linear parameter-varying approximations of incompressible Navier-Stokes equations for truncated state-dependent Riccati feedback. *IEEE Control Syst. Lett.*, 7:3012–3017, 2023. doi:10.1109/LCSYS.2023.3291231.

[14] S. W. R. Werner, M. L. Overton, and B. Peherstorfer. Multifidelity robust controller design with gradient sampling. *SIAM J. Sci. Comput.*, 45(2):A933–A957, 2023. doi:10.1137/22M1500137.

[15] S. W. R. Werner and B. Peherstorfer. Context-aware controller inference for stabilizing dynamical systems from scarce data. *Proc. R. Soc. A: Math. Phys. Eng. Sci.*, 479(2270):20220506, 2023. doi:10.1098/rspa.2022.0506.

[16] P. Benner, J. Heiland, and S. W. R. Werner. A low-rank solution method for Riccati equations with indefinite quadratic terms. *Numer. Algorithms*, 92(2):1083–1103, 2023. doi:10.1007/s11075-022-01331-w.

[17] Q. Aumann and S. W. R. Werner. Structured model order reduction for vibro-acoustic problems using interpolation and balancing methods. *J. Sound Vib.*, 543:117363, 2023. doi:10.1016/j.jsv.2022.117363.

[18] P. Benner, J. Heiland, and S. W. R. Werner. Robust output-feedback stabilization for incompressible flows using low-dimensional $\mathcal{H}_\infty$-controllers. *Comput. Optim. Appl.*, 82(1):225–249, 2022. doi:10.1007/s10589-022-00359-x.

[19] P. Benner, Y. Filanova, D. Karachalios, S. Monem Abdelhafez, J. Przybilla, and S. W. R. Werner. Mathematische Komplexitätsreduktion: Modellreduktion dynamischer Systeme. *Mitteilungen der Deutschen Mathematiker-Vereinigung*, 29(4):198–204, 2021. doi:10.1515/dmvm-2021-0075.

[20] R. Jendersie and S. W. R. Werner. A comparison of numerical methods for model reduction of dense discrete-time systems. *at-Automatisierungstechnik*, 69(8):683–694, 2021. doi:10.1515/auto-2021-0035.

[21] P. Benner, S. Gugercin, and S. W. R. Werner. Structure-preserving interpolation for model reduction of parametric bilinear systems. *Automatica*, 132:109799, 2021. doi:10.1016/j.automatica.2021.109799.

[22] P. Benner, S. Gugercin, and S. W. R. Werner. Structure-preserving interpolation of bilinear control systems. *Adv. Comput. Math.*, 47(3):43, 2021. doi:10.1007/s10444-021-09863-w.

[23] P. Benner and S. W. R. Werner. Frequency- and time-limited balanced truncation for large-scale second-order systems. *Linear Algebra Appl.*, 623:68–103, 2021. Special issue in honor of P. Van Dooren, Edited by F. Dopico, D. Kressner, N. Mastronardi, V. Mehrmann, and R. Vandebril. doi:10.1016/j.laa.2020.06.024.

[24] P. Benner and S. W. R. Werner. Hankel-norm approximation of large-scale descriptor systems. *Adv. Comput. Math.*, 46(3):40, 2020. doi:10.1007/s10444-020-09750-w.

[25] J. Saak, D. Siebelts, and S. W. R. Werner. A comparison of second-order model order reduction methods for an artificial fishtail. *at-Automatisierungstechnik*, 67(8):648–667, 2019. doi:10.1515/auto-2019-0027.

Book Chapters

[26] R. S. Beddig, P. Benner, I. Dorschky, T. Reis, P. Schwerdtner, M. Voigt, and S. W. R. Werner. Structure-preserving model reduction for dissipative mechanical systems. In P. Eberhard, editor, *Calm, Smooth and Smart*, volume 102 of *Lect. Notes Appl. Comput. Mech.*, pages 209–230. Springer, Cham, 2024. doi:10.1007/978-3-031-36143-2_11.

[27] P. Benner and S. W. R. Werner. MORLAB—The Model Order Reduction LABoratory. In P. Benner, T. Breiten, H. Faßbender, M. Hinze, T. Stykel, and R. Zimmermann, editors, *Model Reduction of Complex Dynamical Systems*, volume 171 of *International Series of Numerical Mathematics*, pages 393–415. Birkhäuser, Cham, 2021. doi:10.1007/978-3-030-72983-7_19.

[28] P. Benner and S. W. R. Werner. MORLAB – A model order reduction framework in MATLAB and Octave. In A. M. Bigatti, J. Carette, J. H. Davenport, M. Joswig, and T. de Wolff, editors, *Mathematical Software – ICMS 2020*, volume 12097 of *Lecture Notes in Comput. Sci.*, pages 432–441. Springer International Publishing, Cham, 2020. doi:10.1007/978-3-030-52200-1_43.

Proceedings

[29] S. Reiter and S. W. R. Werner. Interpolatory model reduction of dynamical systems with root mean squared error. *IFAC-Pap.*, 59(1):385–390, 2025. 11th Vienna International Conference on Mathematical Modelling MATHMOD 2025. doi:10.1016/j.ifacol.2025.03.066.

[30] P. Benner, S. Gugercin, and S. W. R. Werner. Structure-preserving interpolation of quadratic-bilinear systems via regular multivariate transfer functions. *Proc. Appl. Math. Mech.*, 24(3):e202400048, 2024. doi:10.1002/pamm.202400048.

[31] S. W. R. Werner, I. V. Gosea, and S. Gugercin. Structured vector fitting framework for mechanical systems. *IFAC-Pap.*, 55(20):163–168, 2022. 10th Vienna International Conference on Mathematical Modelling MATHMOD 2022. doi:10.1016/j.ifacol.2022.09.089.

[32] P. Benner and S. W. R. Werner. Frequenz- und zeitbeschränktes balanciertes Abschneiden für Systeme zweiter Ordnung. In T. Meurer and F. Woittennek, editors, *Tagungsband GMA-FA 1.30 'Modellbildung, Identifikation und Simulation in der Automatisierungstechnik' und GMA-FA 1.40 'Systemtheorie und Regelungstechnik', Workshops in Anif, Salzburg, 23.-27.09.2019*, pages 460–474, 2019.

[33] P. Benner and S. W. R. Werner. MORLAB – Model Order Reduction LABoratory. In T. Meurer and F. Woittennek, editors, *Tagungsband GMA-FA 1.30 'Modellbildung, Identifikation und Simulation in der Automatisierungstechnik' und GMA-FA 1.40 'Systemtheorie und Regelungstechnik', Workshops in Anif, Salzburg, 23.-27.09.2019*, pages 337–342, 2019.

[34] R. S. Beddig, P. Benner, I. Dorschky, T. Reis, P. Schwerdtner, M. Voigt, and S. W. R. Werner. Model reduction for second-order dynamical systems revisited. *Proc. Appl. Math. Mech.*, 19(1):e201900224, 2019. doi:10.1002/pamm.201900224.

[35] P. Benner, J. Heiland, and S. W. R. Werner. Robust controller versus numerical model uncertainties for stabilization of Navier-Stokes equations. *IFAC-Pap.*, 52(2):25–29, 2019.

3rd IFAC/IEEE CSS Workshop on Control of Systems Governed by Partial Differential Equation CPDE 2019. doi:10.1016/j.ifacol.2019.08.005.

[36] P. Benner and S. W. R. Werner. Balancing related model reduction with the MORLAB toolbox. *Proc. Appl. Math. Mech.*, 18(1):e201800083, 2018. doi:10.1002/pamm.201800083.

[37] P. Benner and S. W. R. Werner. Model reduction of descriptor systems with the MORLAB toolbox. *IFAC-Pap.*, 51(2):547–552, 2018. 9th Vienna International Conference on Mathematical Modelling MATHMOD 2018. doi:10.1016/j.ifacol.2018.03.092.

[38] P. Benner and S. W. R. Werner. MORLAB - Modellreduktion in MATLAB. In T. Meurer and F. Woittennek, editors, *Tagungsband GMA-FA 1.30 'Modellierung, Identifikation und Simulation in der Automatisierungstechnik' und GMA-FA 1.40 'Theoretische Verfahren der Regelungstechnik', Workshop in Anif, Salzburg, 18.-22.09.2017*, pages 508–517, 2017.

[39] P. Benner and S. W. R. Werner. On the transformation formulas of the Hankel-norm approximation. *Proc. Appl. Math. Mech.*, 17(1):823–824, 2017. doi:10.1002/pamm.201710379.

Software

[40] P. Benner, J. Saak, and S. W. R. Werner. MORLAB – Model Order Reduction LABoratory (version 6.0), September 2023. See also: https://www.mpi-magdeburg.mpg.de/projects/morlab. doi:10.5281/zenodo.7072831.

[41] P. Benner and S. W. R. Werner. SOLBT – Limited balanced truncation for large-scale sparse second-order systems (version 3.0), April 2021. doi:10.5281/zenodo.4600763.

[42] P. Benner and S. W. R. Werner. SOMDDPA – Second-Order Modally-Damped Dominant Pole Algorithm (version 2.0), April 2021. doi:10.5281/zenodo.3997649.

[43] P. Benner and S. W. R. Werner. SOMDDPA – Second-Order Modally-Damped Dominant Pole Algorithm (version 1.1), January 2020. doi:10.5281/zenodo.3332706.

[44] P. Benner and S. W. R. Werner. Limited balanced truncation for large-scale sparse second-order systems (version 2.0), January 2020. doi:10.5281/zenodo.3331592.

[45] P. Benner and S. W. R. Werner. MORLAB – Model Order Reduction LABoratory (version 5.0), August 2019. see also: https://www.mpi-magdeburg.mpg.de/projects/morlab. doi:10.5281/zenodo.3332716.

[46] P. Benner and S. W. R. Werner. Limited balanced truncation for large-scale sparse second-order systems (version 1.0), February 2019. doi:10.5281/zenodo.2553926.

[47] P. Benner and S. W. R. Werner. SOMDDPA – Second-Order Modally Damped Dominant Pole Algorithm (version 1.0), February 2019. doi:10.5281/zenodo.2553902.

[48] P. Benner and S. W. R. Werner. MORLAB – Model Order Reduction LABoratory (version 4.0), December 2018. see also: https://www.mpi-magdeburg.mpg.de/projects/morlab. doi:10.5281/zenodo.1574083.

[49] P. Benner and S. W. R. Werner. MORLAB-3.0 – model order reduction laboratory, September 2017. see also: https://www.mpi-magdeburg.mpg.de/projects/morlab. doi:10.5281/zenodo.842659.

Theses

[50] S. W. R. Werner. *Structure-Preserving Model Reduction for Mechanical Systems*. Dissertation, Otto-von-Guericke-Universität, Magdeburg, Germany, 2021. doi:10.25673/38617.

[51] S. Werner. Hankel-norm approximation of descriptor systems. Master's thesis, Otto-von-Guericke-Universität, Magdeburg, Germany, 2016. doi:10.25673/4507.

[52] S. Werner. Numerische Berechnung der Eigenwerte großer Hamiltonisch-positiver Matrizen. Bachelor's thesis, Otto-von-Guericke-Universität, Magdeburg, Germany, 2014.

Contributions to Other Projects

I made contributions to the content of the following software projects:

- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S. – The Matrix Equations Sparse Solvers Library (version 3.1), February 2025. See also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.14929081.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S. – The Matrix Equations Sparse Solvers Library (version 3.0), September 2023. See also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.7701424.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S.-2.2 – The Matrix Equations Sparse Solvers Library, February 2022. see also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.5938237.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S.-2.1 – The Matrix Equations Sparse Solvers Library, April 2021. see also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.4719688.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S.-2.0.1 – The Matrix Equations Sparse Solvers Library, February 2020. see also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.3606345.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S.-2.0 – The Matrix Equations Sparse Solvers Library, August 2019. see also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.3368844.
- J. Saak, M. Köhler, and P. Benner. M-M.E.S.S.-1.0.1 – The Matrix Equations Sparse Solvers Library, April 2016. see also: https://www.mpi-magdeburg.mpg.de/projects/mess. doi:10.5281/zenodo.50575.

Conference Contributions

Oral Presentations

01/07/2026 **Structured Nonlinear Model Reduction Via Multivariate Interpolation**, *Joint Mathematics Meetings (JMM 2026)*, Washington, D.C., USA, (invited minisymposium talk)

01/04/2026 **Learning Mechanical Systems Via Data-driven Balanced Truncation**, *Joint Mathematics Meetings (JMM 2026)*, Washington, D.C., USA, (invited minisymposium talk)

11/11/2025 **Data-driven Balanced Truncation for Learning Mechanical Systems**, *Reduced Order and Surrogate Modeling for Digital Twins*, IMSI, Chicago, IL, USA, (invited plenary talk, online)

10/22/2025 **Computational Methods for Learning Interpretable Models and Reliable Decision Making**, *Virginia Tech National Security Institute Technical Seminar, Virginia Tech*, Blacksburg, VA, USA, (invited seminar talk)

09/08/2025 **Data-driven Balanced Truncation for Mechanical Systems**, *Applied Numerical Analysis Seminar, Virginia Tech*, Blacksburg, VA, USA

06/26/2025 **Efficiently Solving Nonstandard Riccati Equations Via Indefinite Factorizations**, *26th Conference of the International Linear Algebra Society (ILAS 2025)*, National Sun Yat-sen University, Kaohsiung, Taiwan, (invited minisymposium talk)

06/24/2025 **Reduced-order modeling of mechanical systems via structured barycentric forms**, *26th Conference of the International Linear Algebra Society (ILAS 2025)*, National Sun Yat-sen University, Kaohsiung, Taiwan, (invited minisymposium talk)

06/10/2025 **Structured Representations of Rational Functions for Learning Mechanical Dynamical Systems: A Barycentric Approach**, *Householder Symposium XXII*, Cornell University, Ithaca, NY, USA, (invited talk)

04/10/2025 **Multivariate Rational Function Interpolation For Structured Nonlinear Model Reduction**, *Challenges, Opportunities, and New Horizons in Rational Approximation*, Banff International Research Station, Banff, AB, Canada, (invited plenary talk)

03/03/2025 **Data Efficient Low-Dimensional Controller Inference Via Adaptive Sampling**, *SIAM Conference on Computational Science and Engineering (CSE25)*, Fort Worth, TX, USA, (invited minisymposium talk)

01/07/2025 **From Data to Structure: Learning Mechanical Systems Via Rational Functions**, *Computational Learning for Model Reduction*, ICERM, Providence, RI, USA, (invited plenary talk)

10/21/2024 **Learning Mechanical Systems Via a Structured AAA Algorithm**, *SIAM Conference on Mathematics of Data Science (MDS24)*, Atlanta, GA, USA, (invited minisymposium talk)

09/30/2024 **Adaptive data sampling for low-dimensional controller inference**, *Applied Numerical Analysis Seminar, Virginia Tech*, Blacksburg, VA, USA

09/13/2024 **An adaptive data sampling scheme for low-dimensional controller inference**, *Model Reduction and Surrogate Modeling (MORe2024)*, La Jolla, California, USA

07/23/2024 **Adaptive choice of near-optimal interpolation points for structure-preserving model reduction**, *16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics (WCCM-PANACM Vancouver 2024)*, Vancouver, British Columbia, Canada, (invited minisymposium talk)

05/15/2024 **Using Indefinite Low-Rank Factorizations for Solving Large-Scale Riccati Equations**, *SIAM Conference on Applied Linear Algebra (LA24)*, Paris, France, (invited minisymposium talk)

03/22/2024 **Structure-Preserving Interpolation of Quadratic-Bilinear Systems via Regular Multivariate Transfer Functions**, *94th GAMM Annual Meeting, Section "Dynamics and Control"*, Magdeburg, Germany

03/05/2024 **Solving large-scale linear and nonlinear algebraic matrix equations**, *Center for Hierarchical and Robust Modeling of Non-Equilibrium Transport (CHaRMNET)*, (invited online talk)

03/01/2024 **Structure-Preserving Interpolation of Quadratic-Bilinear Systems**, *Applied Numerical Analysis Seminar, Virginia Tech*, Blacksburg, VA, USA

09/08/2023 **Learning mechanical systems using structured barycentric forms**, *Applied Numerical Analysis Seminar, Virginia Tech*, Blacksburg, VA, USA

06/26/2023 **Context-aware learning for stabilizing dynamical systems from scarce data**, *Applied Mathematics Seminar, FernUni Schweiz*, Brig-Glis, Switzerland, (invited seminar talk)

05/25/2023 **Context-aware learning for stabilizing dynamical systems from scarce data**, *Workshop and Conference on Nonlinear Model Reduction for Control*, Blacksburg, VA, USA

02/27/2023 **Context-Aware Learning of Stabilizing Controllers in the Scarce Data Regime**, *SIAM Conference on Computational Science and Engineering (CSE23)*, Amsterdam, The Netherlands, (invited minisymposium talk)

01/30/2023 **Context-aware learning of controllers for stabilizing dynamical systems**, *Virginia Tech*, Blacksburg, VA, USA, (invited talk)

01/04/2023 **Learning mechanical systems using structured barycentric forms**, *Joint Mathematics Meetings (JMM 2023)*, Boston, MA, USA, (invited minisymposium talk)

09/27/2022 **Stabilizing Dynamical Systems in the Scarce Data Regime**, *SIAM Conference on Mathematics of Data Science (MDS22)*, San Diego, CA, USA, (invited minisymposium talk)

09/23/2022 **Context-aware learning of low-dimensional stabilizing controllers in the scarce data regime**, *Model Reduction and Surrogate Modeling (MORe)*, Berlin, Germany

07/27/2022 **Structured Vector Fitting Framework for Mechanical Systems**, *10th Vienna International Conference on Mathematical Modelling (MATHMOD)*, Vienna, Austria, (invited minisymposium talk)

07/02/2022 **Stabilizing Dynamical Systems in the Scarce Data Regime**, *Workshop on New Trends in Computational Science in Engineering and Industrial Mathematics*, Magdeburg, Germany, (invited minisymposium talk)

06/01/2022 **Stabilizing Dynamical Systems in the Scarce Data Regime**, *ICERM Spring 2020 Reunion Event*, Providence, RI, USA, (invited talk)

04/22/2022 **Stabilizing Dynamical Systems in the Scarce Data Regime**, *Numerical Analysis and Scientific Computing Seminar, Courant Institute of Mathematical Sciences, New York University*, New York, NY, USA, (invited seminar talk)

04/15/2022 **Context-Aware Learning of Stabilizing Controllers from Data**, *SIAM Conference on Uncertainty Quantification (UQ22)*, Atlanta, GA, USA, (invited minisymposium talk)

03/29/2022 **A New Tangential Interpolation Framework for Model Reduction of Bilinear Systems**, *3rd Workshop on Optimal Control of Dynamical Systems and Applications*, Osijek, Croatia, (invited talk, hybrid conference)

07/20/2021 **Robust Output-Feedback Stabilization for Incompressible Flows using Low-Dimensional H-Infinity Controllers**, *SIAM Conference on Control and Its Applications (CT21)*, Spokane, WA, USA, (invited minisymposium talk, online conference)

06/24/2021 **Structure-Preserving Interpolation for Bilinear Systems**, *8th European Congress of Mathematics (8ECM)*, Portorož, Slovenia, (invited minisymposium talk, online conference)

03/16/2021 **Structure-Preserving Model Reduction for Bilinear Systems**, *91st GAMM Annual Meeting, Section "Dynamics and Control" (GAMM 2020@21)*, Kassel, Germany, (online conference)

01/11/2021 **Model Reduction of Parametric Bilinear Mechanical Systems**, *14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020)*, Paris, France, (online conference)

07/16/2020 **MORLAB – A Model Order Reduction Framework in MATLAB & Octave**, *International Congress on Mathematical Software (ICMS 2020)*, Braunschweig, Germany, (online conference)

05/20/2020 **Structure-Preserving Interpolation for Bilinear Control Systems**, *Weekly Fellow Seminar Series of "MathCoRe"*, Magdeburg, Germany, (online seminar)

09/25/2019 **Frequenz- und zeitbeschränktes balanciertes Abschneiden für Systeme zweiter Ordnung**, *Meeting of the GMA Fachausschuss 1.30 "Modellbildung, Identifikation und Simulation in der Automatisierungstechnik" and GMA Fachausschuss 1.40 "Systemtheorie und Regelungstechnik"*, Anif, Austria

09/25/2019 **MORLAB – Model Order Reduction LABoratory**, *Meeting of the GMA Fachausschuss 1.30 "Modellbildung, Identifikation und Simulation in der Automatisierungstechnik" and GMA Fachausschuss 1.40 "Systemtheorie und Regelungstechnik"*, Anif, Austria, (interactive software session)

09/10/2019 **Limited Model Reduction for an Artificial Fishtail**, *Meeting of the European SIAM and GAMM Student Chapters (MESIGA 2019)*, Aachen, Germany

08/30/2019 **Frequency- and Time-Limited Balanced Truncation for Second-Order Systems**, *4th Workshop on Model Reduction of Complex Dynamical Systems (MODRED 2019)*, Graz, Austria

06/26/2019 **How to Reduce the Model of an Artificial Fishtail**, *Weekly Fellow Seminar Series of "MathCoRe"*, Magdeburg, Germany

05/20/2019 **Robust Controller versus Numerical Model Uncertainties for Stabilization of Navier-Stokes Equations**, *3rd IFAC/IEEE CSS Workshop on Control of Systems Governed by Partial Differential Equations CPDE and XI Workshop Control of Distributed Parameter Systems, CDPS 2019*, Oaxaca, Mexico, (invited session talk)

02/28/2019 **H-Infinity Balanced Truncation for Feedback Control of Flow Problems**, *SIAM Conference on Computational Science and Engineering (CSE19)*, Spokane, WA, USA, (invited minisymposium talk)

02/22/2019 **H-Infinity Balanced Truncation for Feedback Control of Flow Problems**, *Applied Numerical Analysis Seminar, Virginia Polytechnic Institute and State University*, Blacksburg, VA, USA, (invited seminar talk)

09/21/2018 **MORLAB – A Model Reduction Framework in MATLAB & Octave**, *Meeting of the European SIAM and GAMM Student Chapters (MESIGA 2018)*, Berlin, Germany

05/16/2018 **Model Reduction of Linear Dynamical Systems with the MORLAB Toolbox**, *Weekly Fellow Seminar Series of "MathCoRe"*, Magdeburg, Germany

04/20/2018 **MORLAB – A Framework for Model Reduction in MATLAB & OCTAVE**, *GAMM-Fachausschuss Dynamik und Regelungstheorie*, Berlin, Germany

03/21/2018 **Balancing Related Model Reduction with the MORLAB Toolbox**, *89th GAMM Annual Meeting, Section "Dynamics and Control"*, Munich, Germany

02/22/2018 **Model Reduction of Descriptor Systems with the MORLAB Toolbox**, *9th Vienna International Conference on Mathematical Modelling (MATHMOD 2018)*, Vienna, Austria

09/22/2017 **MORLAB – Modellreduktion in MATLAB**, *Meeting of the GMA Fachausschuss 1.30 "Modellbildung, Identifikation und Simulation in der Automatisierungstechnik" and GMA Fachausschuss 1.40 "Systemtheorie und Regelungstechnik"*, Anif, Austria

05/17/2017 **Model Reduction for Linear Systems**, *Weekly Fellow Seminar Series of "MathCoRe"*, Magdeburg, Germany

03/09/2017 **Hankel-Norm Approximation of Descriptor Systems**, *88th GAMM Annual Meeting, Section "Dynamics and Control"*, Weimar, Germany

01/12/2017 **Hankel-Norm Approximation of Descriptor Systems**, *3rd Workshop on Model Reduction of Complex Dynamical Systems (MODRED 2017)*, Odense, Denmark

Presented Posters

09/10/2024 **Model reduction of large-scale sparse systems in MATLAB and Octave with the MORLAB toolbox**, *Model Reduction and Surrogate Modeling (MORe2024)*, La Jolla, California, USA

05/13/2024 **Efficiently Computing Solutions to Matrix Equations in MATLAB and Octave**, *SIAM Conference on Applied Linear Algebra (LA24)*, Paris, France

06/06/2023 **CaCI: Context-aware Controller Inference for Stabilizing Dynamical Systems**, *Mathematical and Scientific Machine Learning (MSML)*, Providence, RI, USA

09/28/2022 **Structure-Preserving Learning of Mechanical Systems**, *SIAM Conference on Mathematics of Data Science (MDS22)*, San Diego, CA, USA

09/21/2022 **Balancing-related model reduction of large-scale sparse systems in MATLAB and Octave with the MORLAB toolbox**, *Model Reduction and Surrogate Modeling (MORe)*, Berlin, Germany

11/07/2019 **Solving Matrix Equations with the MORLAB Toolbox**, *METT VIII – 8th Workshop on Matrix Equations and Tensor Techniques*, Magdeburg, Germany

08/28/2019 **MORLAB – Model Order Reduction LABoratory**, *4th Workshop on Model Reduction of Complex Dynamical Systems (MODRED 2019)*, Graz, Austria

02/27/2019 **MORLAB – Model Order Reduction LABoratory**, *SIAM Conference on Computational Science and Engineering (CSE19)*, Spokane, WA, USA, (invited poster)

04/12/2018 **Computing the Hankel-Norm Approximation of Large-Scale Descriptor Systems**, *Model Reduction of Parametrized Systems IV (MoRePaS 2018)*, Nantes, France

06/01/2017 **Hankel-Norm Approximation of Descriptor Systems**, *Gene Golub SIAM Summer School: Data Sparse Approximations and Algorithms*, Berlin, Germany

Additional Participation

06/29/2023 **Dynamics of Complex Technical Systems: Current Status and Future Perspectives (25 Years Max Planck Institute Magdeburg)**, *Magdeburg, Germany*

06/12/2022–06/17/2022 **Householder Symposium XXI**, *Selva di Fasano, Italy* (invited participation)

06/20/2018–06/22/2018 **International Workshop on Optimal Control of Dynamical Systems and Applications**, *Osijek, Croatia*

02/26/2018–03/01/2018 **12th Elgersburg Workshop**, *Elgersburg, Germany*

09/06/2017–09/08/2017 **2nd MOR PhD Students Workshop**, *Munich, Germany*

Research Stays

01/11/2026–04/17/2026 **Hausdorff Research Institute for Mathematics**, *Bonn, Germany*, as part of the Junior Trimester Program "Computational multifidelity, multilevel, and multiscale methods" (3 months)

06/19/2023–06/28/2023 **FernUni Schweiz**, *Thun, Switzerland*, local collaborator: Matthias Voigt (1.5 weeks)

07/04/2022–07/08/2022 **Max Planck Institute for Dynamics of Complex Technical Systems**, *Magdeburg, Germany*, local collaborators: Quirin Aumann, Peter Benner, Jens Saak (1 week)

02/01/2019–04/30/2019 **Virginia Polytechnic Institute and State University**, *Blacksburg, VA, USA*, local supervisors: Christopher Beattie, Serkan Gugercin (3 months)

Teaching Experience

Fall term 2025 **CMDA 3605 (Mathematical Modeling: Methods and Tools I)**, *Lecturer (self-directed)*, Virginia Tech, Blacksburg, USA

Spring term 2025 **MATH 5414 (TS: Learning Dynamical Systems: From Data to Models)**, *Lecturer (self-directed)*, Virginia Tech, Blacksburg, USA

Fall term 2024 **CMDA 3605 (Mathematical Modeling: Methods and Tools I)**, *Lecturer (self-directed)*, Virginia Tech, Blacksburg, USA

Spring term 2024 **CMDA 3605 (Mathematical Modeling: Methods and Tools I)**, *Lecturer (self-directed)*, Virginia Tech, Blacksburg, USA

Fall term 2023 **CMDA 3605 (Mathematical Modeling: Methods and Tools I)**, *Lecturer (self-directed)*, Virginia Tech, Blacksburg, USA

11/2019 **Introduction to MATLAB**, *Lecturer (self-directed)*, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, (one week compact course)

Winter term 2017/2018 **Funktionentheorie (Complex Analysis)**, *Co-lecturer together with Jan Heiland*, Otto von Guericke University, Magdeburg, Germany

Summer term 2014 **Consultation hour for the Department of Mathematics**, *Tutor*, Otto von Guericke University, Magdeburg, Germany

Summer term 2014 **Stochastik für Ingenieure (Stochastic for Engineers)**, *Exercise tutor*, Otto von Guericke University, Magdeburg, Germany

Winter term 2013/2014 **Explorative Datenanalyse (Exploratory Data Analysis)**, *Exercise tutor*, Otto von Guericke University, Magdeburg, Germany

Student Supervision

Current Graduate Students

since 2024 **Mike Ackermann**, *Co-advised with Serkan Gugercin*

since 2024 **Rudi Smith**, *Co-advised with Agnieszka Miedlar*

Bachelor Students

06/13/2019 **Robert Jendersie**, *Thesis: "Model Order Reduction of Linear Discrete-Time Systems"*, Co-advisor: Christian Lessig, Otto von Guericke University, Magdeburg, Germany

Undergraduate Research Projects

01/2025–05/2025 **Ethan Crouse**, *"Stabilization of dynamical systems with manifold reinforcement learning"*, Virginia Tech, Blacksburg, USA

01/2025–05/2025 **Theodore Li**, *"Subspace identification used to establish dynamics in time-sensitive ICU patient data"*, Virginia Tech, Blacksburg, USA
(Winner of the Layman Prize Competition for Undergraduate Research in Math 2025)

01/2025–05/2025 **Yejin Moon**, *"Analyzing Virginia Tech's Sport Statistics with Linear Algebra"*, Virginia Tech, Blacksburg, USA
(Received CMDA Undergraduate Research Award for Spring Term 2025)

10/2024–12/2024 **Yejin Moon**, *"Model Development for Virginia Tech Baseball Performance"*, Virginia Tech, Blacksburg, USA

01/2024–05/2024 **Surya Veluguri**, *"Data-driven modeling of dynamical systems in the time domain"*, Virginia Tech, Blacksburg, USA
(Received CMDA Undergraduate Research Award for Spring Term 2024)

01/2024–05/2024 **Levi Walker**, *"Data-driven modeling of dynamical systems in the frequency domain"*, Virginia Tech, Blacksburg, USA
(Received CMDA Undergraduate Research Award for Spring Term 2024)

09/2023–11/2023 **Isha Singh**, *"Reinforcement learning for stabilizing dynamical processes"*, Virginia Tech, Blacksburg, USA

11/2022–04/2023 **Rahul Manavalan**, *"Simulation and stabilization of hall thrusters"*, Co-Advisor: Benjamin Peherstorfer, TU Munich, Munich, Germany

Interns

11/2018–03/2019 **Robert Jendersie**, *Implementations in the MORLAB toolbox and other MATLAB related coding tasks*

Additional Qualification

05/26/2025–06/27/2025 **Pre-Stonewall Queer US History Elective**, *Workshop held by Ashleigh "Bing" Bingham (Virginia Tech)*, Blacksburg, VA, USA
- Workshop content: history of LGBTQ+ identities and issues in the U.S. before 1969

03/17/2025–04/25/2025 **VirTual Trans Safe Zone**, *Workshop held by Haleigh Wallace (Virginia Tech)*, Blacksburg, VA, USA
- Workshop content: introduction to trans identities and issues

02/03/2025–03/06/2025 **VirTual Safe Zone 101**, *Workshop held by Haleigh Wallace (Virginia Tech)*, Blacksburg, VA, USA
- Workshop content: introduction to minority groups, LGBTQ+ identities and issues

01/16/2024–05/08/2024 **Proposal Development Institute**, *Workshop held in the College of Science, Virginia Tech*, Blacksburg, VA, USA
- Workshop content: research proposal writing step by step

08/10/2023–05/12/2024 **Faculty Academy**, *Workshop series held in the College of Science, Virginia Tech*, Blacksburg, VA, USA
- Workshop content: time management, leadership skills, grant application, university resource usage

12/07/2023 **Professional Development Network Reading Day**, *Workshop held by the Technology-enhanced Learning and Online Strategies (Virginia Tech)*, Blacksburg, VA, USA
- Workshop content: generative AI for teaching, iThenticate usage, website hosting for students and faculty, LinkedIn Learning

10/11/2023 **How People Learn**, *Course held by the Center for Excellence in Teaching and Learning (Virginia Tech)*, Blacksburg, VA, USA
- Course content: biology of human learning, strategies to increase student learning

10/04/2023 **Developing Assessment and Grading Strategies to Promote Student Learning**, *Course held by the Center for Excellence in Teaching and Learning (Virginia Tech)*, Blacksburg, VA, USA
- Course content: general and alternative assessment strategies for student learning

11/12/2021, 11/05/2021 **Responsible Conduct of Research**, *Course held by Christine Ponder (Senior Director of Research Affairs, NYU)*, New York, NY, USA
- Course content: scientific practice, data management, scientific misconduct

10/21/2020–10/23/2020 **Good Scientific Practice**, *Course held by Helga Nolte (CoachInScience)*, Magdeburg, Germany
- Course content: scientific practice, data management, scientific misconduct

09/23/2020–09/25/2020 **Leadership Skills**, *Course held by Sabine Lerch (Soft Skills for Science)*, Magdeburg, Germany
- Course content: leadership models, critical feedback, mediation

12/10/2019–12/11/2019 **Presentation Skills**, *Course held by the National Institute for Science Communication*, Karlsruhe, Germany
- Course content: body language, presentation structures, art of persuasion

Language Skills

German	Mother tongue
English	Advanced
French	Elementary

Programming Skills

Expert	MATLAB, LaTeX
Advanced	Python
Intermediate	Julia, Shell, Java, C, Progress
Basic	BASIC, C++, CSS, Delphi, Haskell, HTML, Javascript, Maple, Pascal, PHP, Prolog