

Karen E. Willcox, MNZM, PhD
Director, Oden Institute for Computational Engineering and Sciences
Associate Vice President for Research
Professor of Aerospace Engineering and Engineering Mechanics
W. A. "Tex" Moncrief, Jr. Chair in Simulation-Based Engineering and Sciences
Peter O'Donnell, Jr. Centennial Chair in Computing Systems
The University of Texas at Austin
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Education

1994 University of Auckland, Bachelor of Engineering, First Class Honours (Engineering Science)
1996 Massachusetts Institute of Technology, Master of Science (Aeronautics and Astronautics)
 Thesis: *Aeroelastic Computations in the Time Domain using Unstructured Meshes*
2000 Massachusetts Institute of Technology, PhD (Aeronautics and Astronautics)
 Thesis: *Reduced-Order Aerodynamic Models for Aeroelastic Control of Turbomachines*

Experience

University of Texas at Austin

2020-present Associate Vice President for Research
2018-present Director, Oden Institute for Computational Engineering and Sciences
2018-present Professor of Aerospace Engineering and Engineering Mechanics

Santa Fe Institute

2019-present External Professor

Massachusetts Institute of Technology

2012-2018 Professor, Aeronautics and Astronautics
2011-2013 Associate Department Head, Aeronautics and Astronautics
2008-2018 Founding Co-Director, MIT Center for Computational Engineering
2005-2012 Associate Professor, Aeronautics and Astronautics
2001-2005 Assistant Professor, Aeronautics and Astronautics

Singapore University of Technology and Design

2018 Visiting Professor (7-month stay)
2015 Visiting Professor (6-month stay)
2011 Visiting Associate Professor (6-month stay)

University of Auckland, New Zealand

2008-2009 Visiting Associate Professor, Department of Engineering Science (15-month stay)
2015 Visiting Professor, Department of Engineering Science (8-month stay)

Sandia National Laboratories

2005 Visiting Researcher, Computer Science Research Institute (5-month stay)

Stanford University

2005 Visiting Scholar (1-month stay)

Boeing Phantom Works

2000-2001 Visiting Researcher, Blended-Wing-Body Aircraft Design Group (1-year stay)

NASA Dryden Flight Research Center

1996 Aerospace Intern, Aerodynamics Branch

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Professional Interests

Research: Data to decisions in engineering systems. Computational models and methods for design, optimization, control and uncertainty quantification of engineering systems. Predictive data science and scientific machine learning. Reduced-order modeling and multi-fidelity methods. Future aircraft technologies, aircraft system optimization, aircraft environmental impact, multidisciplinary design, unmanned aerial vehicles, Digital Twin, Digital Thread.

Education: EdTech for data visualization, modeling and analytics (mapping.mit.edu). Fly-by-Wire intervention to enable scalable differentiated instruction in community colleges (fbw.mit.edu). Mapping learning outcomes across the undergraduate engineering curriculum (xoces.mit.edu); linking topics across the curriculum (crosslinks.mit.edu).

Teaching: Principles of Automatic Control (undergraduate), Computational Methods in Aerospace Engineering (undergraduate), Signals and Systems (undergraduate), Multidisciplinary System Design Optimization (graduate), Flight Vehicle Aerodynamics (graduate), Numerical Methods for Partial Differential Equations (graduate).

STEM Workforce Development: Led innovations in admissions and mentoring for undergraduate and graduate aerospace engineering student body as Associate Department Head at MIT. Supported and mentored multiple student groups at UT Austin. Led Rising Stars events at MIT and UT Austin – workshops (open to all early-career researchers) with a focus on increasing the participation of women in engineering and computational sciences. Active in outreach activities to promote girls' interest in science, math and engineering, including volunteer grade school science extension classes, outreach visits to K-12 schools, and participation in the Advisory Board for Girls' Angle. First-generation student mentor at MIT.

Professional Memberships

Member, National Academy of Engineering (NAE)

Fellow, American Institute of Aeronautics and Astronautics (AIAA)

Fellow, Society for Industrial and Applied Mathematics (SIAM)

Fellow, U.S. Association for Computational Mechanics (USACM)

Fellow, Asia-Pacific Artificial Intelligence Associate (AAIA)

Member, American Society for Engineering Education (ASEE)

Member, American Mathematical Society (AMS)

Member, Texas Academy for Medicine, Engineering, Science and Technology (TAMEST)

Leadership Activities

Professional: Active professional service and leadership through multiple conference organizing committees, conference chair positions, technical committee leadership, organizational review committees, advisory boards, and editorial positions. Professional advocacy through leadership positions in SIAM and AIAA, and membership in key National Academies, Department of Energy, and National Science Foundation committees. Testified to Congress on scientific computing (2021). Chaired major National Academies study on Foundational Research Gaps and Future Directions for Digital Twins (2022 – 2024).

Administrative: Director of the Oden Institute for Computational Engineering and Sciences at UT Austin (2018-present) and Associate Vice President for Research (2020-present). Oden Institute operations involve >450 people, 25 research groups and centers, >\$130M in active research contracts/grants, and >\$150M endowment funding. Strategic leadership for Oden Institute research priorities, faculty hiring, educational programs, administrative functions, external partnerships, financial management, and philanthropic development. Under my leadership, Oden Institute research portfolio has grown by 45% and partnerships have expanded to 26 academic departments across eight of UT's schools and colleges. Previously, served as the founding co-director of the MIT Center for Computational Engineering (2008-2018) and the Associate Head of the MIT Department of Aeronautics and Astronautics (2011-2013). In Associate Head role, led reforms in the undergraduate degree program and put in place initiatives that successfully increased undergraduate enrollment in aerospace engineering.

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Academic: Given hundreds of invited lectures in the US and internationally, including multiple plenary/keynote talks at major international conferences in engineering, mathematics, and computational sciences. Published over 150 papers in refereed archival journals. Supervised 64 graduate theses (41 M.S., 23 PhD). Multiple graduate students and postdocs hold academic positions at prestigious universities and leadership positions in industry. Secured funding and managed multi-institutional research projects from many sources including the U.S. Air Force, Boeing, Lockheed Martin, Sandia National Laboratories, U.S. Department of Energy, Federal Aviation Administration, NASA, National Science Foundation, DARPA, and U.S. Department of Education.

Major multi-institution research grants as lead include: Co-lead PI and Co-Director, M2dt Multifaceted Mathematics Capability Center (MMICC) on Multifaceted Mathematics for Predictive Digital Twins (Department of Energy, \$13.5M total budget over 5 years). Lead PI, Multidisciplinary University Research Initiative (MURI) project on Mathematics of Digital Twins (Air Force Office of Scientific Research, \$7.5M total budget over 5 years). Co-lead PI and Co-Director, AEOLUS MMICC on Advances in Experimental Design, Optimal Control, and Learning for Uncertain Complex Systems (Department of Energy, \$10M total budget over 4 years). Lead PI, MURI project on Managing Multiple Information Sources of Multi-physics Systems (Air Force Office of Scientific Research, \$7.2M total budget over 5 years). Lead PI, MURI project on Machine Learning for Physics-Based Systems (Air Force Office of Scientific Research, \$2M total budget over 3 years). Lead PI, RISE of the Machines: Robust, Interpretable, Scalable, Efficient Decision Support (Department of Energy, \$4.4M total budget over 3 years). Co-lead PI and Co-Director, DiaMonD MMICC on Mathematics at the Interfaces of Data, Models, and Decisions (Department of Energy, \$16.7M total budget over 5 years). Lead PI, Dynamic Data Driven Methods for Self-aware Aerospace Vehicles (Air Force Office of Scientific Research, \$2.5M total budget over 6 years). Lead PI, Towards Scalable Differentiated Instruction using Technology-Enabled Competency-Based Dynamic Scaffolding (Department of Education, \$2.9M total budget over 4 years).

External Boards and Committees (active)

TAMEST Selection Committee for Hill Prize in Artificial Intelligence (2025)

SIAM Task Force on Artificial Intelligence (2025 – present)

World Congress on Computational Mechanics (WCCM), Member of the Scientific Advisory Committee (2025 – 2026)

NumPEX (French initiative for Exascale), Scientific Advisory Board for Exa-MA – Methods and Algorithms at Exascale, France (2024 – present)

MD Anderson Cancer Center, Institute for Data Science in Oncology, External Advisory Board (2023 – 2026)

American Institute of Physics (AIP) Publishing, Board of Managers (2023 – present)

CIMNE – International Centre for Numerical Methods in Engineering, Spain, Scientific Advisory Council (2023 – 2027)

National Academy of Engineering, Section 1 Peer Committee (2023 – 2026)

National Academy of Engineering, U.S. Frontiers of Engineering Symposium, Chair (2023 – 2026)

Harvard University, Committee to Visit Harvard University Information Technology (HUIT) (2019 – present; Chair, 2022 – present)

International Association for Computational Mechanics (IACM), Executive Council (2022 – 2028)

Claremont McKenna College, Founding Science Advisory Council (2021 – present)

AIAA Board of Trustees (2020 – 2026)

Advisory Board, Center of Excellence on Sustainable and Energy Efficient Aviation, TU Braunschweig, Germany (2020 – present)

Santa Fe Institute, Science Board (2019 – present)

National Academies Board on Mathematical Sciences and Analytics (BMSA) (Co-chair, 2023 – present; member 2016 – present)

Girls' Angle, Advisory Board (2014 – present)

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External Boards and Committees (past)

U.S. Association for Computational Mechanics, JT Oden Medal Selection Committee (2025)
Department of the Air Force Scientific Advisory Board (2023 – 2025)
Oak Ridge National Laboratory, Advisory Committee, Computing and Computational Sciences Directorate (2023 – 2024)
TAMEST 2024 Annual Meeting, Co-Chair (2023 – 2024)
Oak Ridge National Laboratory, Search Committee, Associate Laboratory Director for the Computing and Computational Sciences Directorate (2023)
National Academies Study on Foundational Research Gaps and Future Directions for Digital Twins (Chair, 2022 – 2024)
AIAA 2023 SciTech Forum, Guiding Coalition (2022 – 2023)
MATH+ Scientific Advisory Board, Germany (2021 – 2023)
Advanced Simulation and Computing (ASC) at the Los Alamos National Laboratory, Advisory Board (2021 – 2023)
National Academies Study on Post-Exascale Computing for the National Nuclear Security Administration (2021 – 2023)
Institute for Water Futures, Australian National University, Advisory Board (2021 – 2024)
Institute for Mathematical and Statistical Innovation (IMSI), Board of Advisors (Vice-chair, 2020 – 2024)
National Science Foundation, Advisory Committee for Cyberinfrastructure (2019 – 2022, Co-chair 2020 – 2022)
SIAM 2022 Conference on Mathematics of Data Science, Co-Chair (MDS22)
AIAA 2022 SciTech Forum, Executive Steering Committee (2021 – 2022)
SIAM Activity Group on Data Science (Inaugural Program Director, 2021 – 2022)
AIAA Multidisciplinary Design Optimization (MDO) Technical Committee (2001 – 2021); Chair (2019 – 2021);
Vice-Chair (2017 – 2019); Awards Subcommittee Chair (2003 – 2006); Publications Subcommittee Chair (2011 – 2018)
SIAM Journals Committee (2019 – 2021)
National Academies Planning Committee on the Workshop on the Frontiers of Mechanistic Data-Driven Modeling for Additive Manufacturing (2019)
AIAA Fellows Selection Committee (2019 – 2022)
SIAM Fellows Selection Committee (2018 – 2020)
Department of Energy Working Group on Basic Research Needs for Scientific Machine Learning (2017 – 2019)
National Academies Committee to Assess the Risks of Unmanned Aircraft Systems (UAS) Integration (2017 – 2018)
Michigan Institute for Computational Discovery and Engineering, University of Michigan, External Advisory Board, (Member, 2017 – 2020)
Sandia National Laboratories, Computing and Information Sciences Research Foundation, External Review Board (Member, 2016 – 2024)
SIAM Committee on Science Policy (2016 – 2018)
SIAM Activity Group on Computational Science and Engineering: Vice President (2013 – 2015), Program Director (2011 – 2013)
Institute-wide Task Force on the Future of MIT Education, Co-Chair (2013 – 2014)
SIAM 2013 Conference on Computational Science and Engineering, Co-Chair (2012 – 2013)
MIT OpenCourseWare Faculty Advisory Committee (2011 – 2018; Chair 2015 – 2018)
AIAA MDO Conference Technical Chair (2011 – 2012)
Department of Engineering Science, University of Auckland, Advisory Board (Member, 2008 – 2018)
National Research Council, Committee to Conduct an Independent Assessment of the Nation's Wake Turbulence Research and Development Program (2007)
National Academies Decadal Survey of Civil Aeronautics, Aerodynamics and Acoustics Panel (2005 – 2006)

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Visiting Committees and Review Boards (past)

ExxonMobil Corporate Strategic Research, Capability Assessment External Review Panel (Physics and Mathematical Science and Scientific Computing) (2021)

Delft University of Technology, Netherlands, Review Committee, Research Assessment of Aerospace Engineering (2020 – 2022)

National Academies Panel on Review of the Information Technology Laboratory (ITL) at the National Institute of Standards and Technology (NIST) (2018)

TU Braunschweig Universities of Excellence, German Excellence Initiative, Review Committee (2018)

Colorado School of Mines, Applied Mathematics & Statistics Department Visiting Committee (Member, 2017)

HarvardX Review Committee, Harvard University (Member, 2016)

Institute for Computational Engineering and Sciences, University of Texas at Austin, Board of Visitors (2012 – 2018; Chair 2015 – 2018)

Delft University of Technology, Netherlands, Assessment Committee, Accreditation of Aerospace Engineering (2013)

National Science Foundation, Division of Mathematical Sciences, Committee of Visitors (Member, 2010)

Editorial Boards

Computer Methods in Applied Mechanics and Engineering (Editorial Board Member, 2022 – present)

International Journal of Computational Methods in Engineering Science and Mechanics (Advisory Board Member, 2022 – present)

Acta Numerica (Editorial Board Member, 2021 – present)

IEEE Computing in Science and Engineering (CiSE) (Associate Editor, 2021 – 2024)

AIAA Journal (Editorial Board Member, 2021 – present; Associate Editor, 2015 – 2020 and 2009 – 2011)

Journal on Data Centric Engineering (Advisory Board, 2019 – present)

SIAM Journal on Scientific Computing (Section Editor, 2013 – 2019; Associate Editor, 2008 – 2013)

ASA/SIAM Journal on Uncertainty Quantification (Associate Editor, 2012 – 2013)

SIAM Book Series on Computational Science and Engineering (Editorial Board Member, 2009 – present)

Major Internal Committees and Leadership Roles (at MIT and UT Austin)

UT Austin Vice President for Research Search Advisory Committee (2024)

UT Austin Provost Search Advisory Committee, Chair (2021)

Associate Vice President for Research, UT Austin (2020 – present)

Director, Oden Institute for Computational Engineering and Sciences, UT Austin (2018 – present)

MIT OpenCourseWare Faculty Advisory Committee (Chair, 2015 – 2018; Member, 2011 – 2018)

MIT Online Education Policy Initiative, Co-Chair (2015 – 2016)

Institute-wide Task Force on the Future of MIT Education, Co-Chair (2013 – 2014)

Co-Chair, Mission and Scope Subcommittee, Ad Hoc Committee on the Formation of a New Entity in the Areas of Complex and Socio-technical Systems, Information and Decision Systems, and Statistics (2013 – 2014)

Associate Department Head, MIT Department of Aeronautics and Astronautics (2011 – 2013)

Chair, Ad Hoc Committee on Statistics at MIT (2011 – 2012)

Founding Co-Director, MIT Center for Computational Engineering (2008 – 2018)

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Public Positions and Testimonies

Testified to Congress for the Subcommittee on Energy of the House Committee on Science, Space, and Technology hearing on Accelerating Discovery: the Future of Scientific Computing at the Department of Energy (May 2021).

Selected Awards and Honors

2025 Florence R. Sabin Award for Research Excellence, Graduate Women In Science (GWIS)

2024 Theodore von Karman Prize for “important contributions to computational science and engineering. Professor Willcox has pioneered the development and use of model reduction methods for optimal design, optimal control, uncertainty quantification, decision-making, and digital twins. Her fundamental work has had broad impact in many application areas including inverse problems, optimal design, aerospace engineering and precision medicine.”

2024 Japan Society for Computational Engineering and Science Grand Prize for “worldwide contribution to research in the field of computational engineering and science.”

Paper "Data-driven physics-based digital twins via a library of component-based reduced-order models" one of the top ten most cited papers published in *International Journal for Numerical Methods in Engineering* over the two-year period 1/1/2022-12/31/2023.

2024 Belytschko Lecture, Northwestern University.

Asia-Pacific Artificial Intelligence Association (AAIA) Fellow, Class of 2024

2023 U.S. Association for Computational Mechanics J. Tinsley Oden Medal “for contributions to model reduction and multi-fidelity methods for the design and optimal control of high-dimensional systems with uncertainties.”

USACM Fellow, Class of 2023. “For outstanding achievements in developing scalable methods for design of predictive digital twins under uncertainty, reduced-order modeling, data-to-decisions in aerospace engineering, and her leadership roles in computational sciences and engineering.”

2023 Duncan Lecture, Johns Hopkins University.

2022 Lecturer for the Leçons Jacques-Louis Lions, Sorbonne University.

2022 AIAA Structures, Structural Dynamics, and Materials (SDM) Lecture

Paper “Design of digital twin sensing strategies via predictive modeling and interpretable machine learning” selected as a Featured Article for *Journal of Mechanical Design*, August 2022.

Paper “A probabilistic graphical model foundation for enabling predictive digital twins at scale” selected for the *Nature Computational Science* one-year anniversary collection, January 2022.

Elected to the National Academy of Engineering “for contributions to computational engineering methods for the design and optimal control of high-dimensional systems with uncertainties” 2022.

AIAA Structures, Structural Dynamics, and Materials (SDM) Lecture, presented at AIAA SciTech Forum, January 2022.

Best Paper Award for “Toward predictive digital twins via component-based reduced-order models and interpretable machine learning”, AIAA Multidisciplinary Design Optimization Best Paper, 2020

SIAM Student Paper Prize (E. Qian), “Multifidelity Monte Carlo estimation of variance and sensitivity indices,” 2020

Southwest Research Institute Best Student Paper Award (M. Kapteyn), “Toward predictive digital twins via component-based reduced-order models and interpretable machine learning,” AIAA Non-Deterministic Approaches Conference, Scitech Forum, 2020

2020 Shell Lecture, Rice University.

Paper “Variance-based sensitivity analysis to support simulation-based design under uncertainty” one of the top 10 most accessed articles in *Journal of Mechanical Design* in 2019.

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AIAA Fellow, Class of 2019. “For outstanding contributions to the development and use of computational methods for aerospace design, and to engineering education and outreach.”

2019 Kalman Lecture, University of Potsdam, Germany.

2019 Charlemagne Distinguished Lecture, RWTH Aachen, Germany.

SIAM Fellow, Class of 2018. “For contributions to model reduction and multifidelity methods, with applications in optimization, control, design, and uncertainty quantification of large-scale systems.”

NeurIPS paper “Contour location via entropy reduction leveraging multiple information sources” selected for Spotlight Presentation (3% of submissions), 2018.

Best Paper Award, “Towards a Low-Order Model for Transonic Flutter Prediction,” AIAA Theoretical Fluid Mechanics Conference, AIAA Aviation Forum, 2017

Member of the New Zealand Order of Merit (MNZM), awarded for services to aerospace engineering and education, 2017

Distinguished Alumni Award, University of Auckland, 2016

Member, Harvard Higher Education Leaders Forum, 2016 – 2019

SIAM SIGEST Award for paper “Goal-oriented inference: Approach, linear theory, and application to advection-diffusion,” 2013

Sir Peter Blake Trust Emerging Leader Award, 2010

Selected for National Academies Frontiers of Engineering Education Symposium, 2010

AIAA MDO Technical Committee Service Award, 2008 and 2013

J. T. Oden Faculty Research Fellow, University of Texas at Austin, 2006

New Zealand Management Magazine, Young Leader, 2006

MIT Junior Bose Teaching Award, 2005

MIT Department of Aeronautics and Astronautics Teaching Award, 2004

Best Paper Award, “A Framework for Aircraft Conceptual Design and Environmental Performance Studies,” AIAA Multidisciplinary Analysis and Optimization Conference, 2004

Publications: Edited Volumes and Books

1. Benner, P., Cohen, A., Ohlberger, M. and Willcox, K., *Model Reduction and Approximation: Theory and Algorithms*, SIAM Computational Science and Engineering Book Series, SIAM, Philadelphia, PA, 2017.
2. Biegler, L., Biros, G., Ghattas, O., Heinkenschloss, M., Keyes, D., Mallick, B., Tenorio, L., van Bloemen Waanders, B., Willcox, K. and Marzouk, Y. *Large-scale Inverse Problems and Quantification of Uncertainty*, Wiley Series in Computational Statistics, John Wiley & Sons, 2011.

Publications: Refereed Journal Articles

1. Zastrow, B., Chaudhuri, A., Willcox, K., Ashley, A. and Henson, M. Block-structured Operator Inference for coupled multiphysics model reduction. *AIAA Journal*, to appear, 2025.
2. Gkimitis, L., Aretz, N., Tezzele, M., Richter, T., Benner, P. and Willcox, K. Non-intrusive reduced-order modeling for dynamical systems with spatially localized features. *Computer Methods in Applied Mechanics and Engineering*, Volume 444, 1 September 2025, 118115.

3. Farcas, I.-G., Gundevia, R., Munipalli, R. and Willcox, K. Distributed computing for physics-based data-driven reduced modeling at scale: Application to a rotating detonation rocket engine. *Computer Physics Communications*, Vol. 313, August 2025, 109619.
4. McQuarrie, S., Chaudhuri, A., Willcox, K. and Guo, M. Bayesian learning with Gaussian processes for low-dimensional representations of time-dependent nonlinear systems. *Physica D: Nonlinear Phenomena*, May 2025.
5. Aretz, N., Gunzburger, M., Morlighem and Willcox, K. Multifidelity uncertainty quantification for ice sheet simulations. *Computational Geosciences*, Vol. 29, No. 1, January 2025.
6. Sel, K., Hawkins-Daarud, A., Chaudhuri, A., Osman, D., Bahai, A., Paydarfar, D., Willcox, K., Chung, C. and Jafari, R. Survey and perspective on verification, validation, and uncertainty quantification of digital twins for precision medicine. *npj Digital Medicine*, Vol. 8, Article number: 40, January 2025.
7. Tezzele, M., Carr, S., Topcu, U. and Willcox, K. Adaptive planning for risk-aware predictive digital twins. In *Physics-based and Data-driven Modeling for Digital Twins*, Editors K. Cherifi and I.V. Gosea, SEMA SIMAI Springer Series, 2024.
8. Pham, J., Ghattas, O., Clemens, N. and Willcox, K. Real-time aerodynamic load estimation for hypersonics via strain-based inverse maps. *AIAA Journal*, Vol. 63, No. 1, pp. 99-101, January 2025.
9. Farcas, I.-G., Gundevia, R., Munipalli, R. and Willcox, K. Domain decomposition for data-driven reduced modeling of large-scale systems. *AIAA Journal*, Vol. 62, No. 11, pp. 4071-4086, November 2024.
10. Ferrari, A. and Willcox, K., Digital twins in mechanical and aerospace engineering. *Nature Computational Science*, Vol. 4, No. 3, March 2024, pp. 178-183.
11. Willcox, K. and Segundo, B., The role of computational science in digital twins. *Nature Computational Science*, Vol. 4, No. 3, March 2024, pp. 147-149.
12. Geelen, R., Balzano, L., Wright, S. and Willcox, K. Learning physics-based reduced-order models from data using nonlinear manifolds. *Chaos*, Vol. 34, No. 3, 2024
13. Khodabakhshi, P., Burkovska, O., Willcox, K. and Gunzburger, M. Multifidelity methods for uncertainty quantification of a nonlocal model for phase changes in materials. *Computers and Structures*, Vol. 297, 2024, 107328.
14. Kramer, B., Peherstorfer, B. and Willcox K. Learning nonlinear reduced models from data with Operator Inference. *Annual Review of Fluid Mechanics*, Vol. 56, pp. 521-548, January 2024.
15. Chaudhuri, A., Pash, G., Hormuth, D., Lorenzo, G., Kapteyn, M., Wu, C., Lima, E., Yankeelov, Y. and Willcox K. Predictive digital twin for optimizing patient-specific radiotherapy regimens under uncertainty in high-grade gliomas. To appear, *Frontiers in Artificial Intelligence*, 2023.
16. Torzoni, M., Tezzele, M., Mariani, S., Manzoni, A. and Willcox K. A digital twin framework for civil engineering structures. *Computer Methods in Applied Mechanics and Engineering*, Vol. 418, 2024, 116584.
17. Huang, L., Bicol, K. and Willcox, K. Modeling COVID-19 disruptions via network mapping of the Common Core Mathematics Standards. *ASEE Computers in Education Journal*, Vol. 13, No. 2, 2023. (Previously published in proceedings of the ASEE 2021 Annual Conference.)
18. Wogrin, S., Singh, A., Allaire, D., Ghattas, O., Willcox, K. From Data to Decisions: A Real-Time Measurement–Inversion–Prediction–Steering Framework for Hazardous Events and Health Monitoring. In: Darema, F., Blasch, E.P., Ravela, S., Aved, A.J. (eds) *Handbook of Dynamic Data Driven Applications Systems*. Springer, Cham, 2023.
19. Croci, S., Wright, S. and Willcox, K. Multi-output multilevel best linear unbiased estimators via semidefinite programming. *Computer Methods in Applied Mechanics and Engineering*, Vol. 413, August 2023, 1167130.
20. McQuarrie, S., Khodabakhshi, P. and Willcox, K. Non-intrusive reduced-order models for parametric partial differential equations via data-driven operator inference. *SIAM Journal on Scientific Computing*. Vol. 45, No. 4, 2023, pp. A1917-A1946.
21. Geelen, R., Wright, S. and Willcox, K. Operator inference for non-intrusive model reduction with quadratic manifolds. *Computer Methods in Applied Mechanics and Engineering*, Vol. 403, Part B, January 2023, 115717.

22. O'Leary-Roseberry, T., Du X., Chaudhuri, A., Martins, J., Willcox, K. and Ghattas, O. Learning high-dimensional parametric maps via reduced basis adaptive residual networks. *Computer Methods in Applied Mechanics and Engineering*, Vol. 402, December 2022, 115730.
23. Karandikar, J., Chaudhuri, A., Smith, S., Schmitz, T. and Willcox, K. Process window estimation in manufacturing through Entropy-Sigma active learning. *Manufacturing Letters*, Vol. 34, pp. 87-92, 2022.
24. McBane, S., Choi, Y. and Willcox, K. Stress-constrained topology optimization of lattice-like structures using component-wise reduced order models. *Computer Methods in Applied Mechanics and Engineering*, Vol. 400, October 2022, 115525.
25. Guo, M., McQuarrie, S. and Willcox, K. Bayesian operator inference for data-driven reduced-order modeling. *Computer Methods in Applied Mechanics and Engineering*, Volume 402, December 2022, 115336.
26. Kapteyn, M. and Willcox, K., Design of digital twin sensing strategies via predictive modeling and interpretable machine learning. *Journal of Mechanical Design*, Vol. 144, No. 9, 2022, 091710. (Selected as a Featured Article for *Journal of Mechanical Design*, August 2022.)
27. Cohen, B., March, A., Willcox, K. and Miller, D., A level set-based topology optimization approach for thermally radiating structures. *Structural and Multidisciplinary Optimization*, Vol. 65, No. 167, 2022.
28. Qian, E., Farcas, I., and Willcox, K., Reduced operator inference for nonlinear partial differential equations. *SIAM Journal on Scientific Computing*, Vol. 44, Issue 4, pp. A1934-A1959, 2022. <https://doi.org/10.1137/21M1393972>
29. Buchsbaum, Jeffrey C., et al. "Predictive Radiation Oncology—A New NCI–DOE Scientific Space and Community." *Radiation Research*, Vol. 197, No. 4, pp. 434-445, 2022.
30. Geelen, R. and Willcox, K., Localized non-intrusive reduced-order modeling in the operator inference framework. *Philosophical Transactions of the Royal Society A*, Vol. 380, Issue 2229, 20210206, 2022. <https://doi.org/10.1098/rsta.2021.0206>
31. Khodabakhshi, P. and Willcox, K. Non-intrusive data-driven model reduction for differential algebraic equations derived from lifting transformations. *Computer Methods in Applied Mechanics and Engineering*. Volume 389, 1 February 2022, 114296.
32. Ghattas, O. and Willcox, K., Learning physics-based models from data: Perspectives from inverse problems and model reduction. *Acta Numerica*, Vol. 30, pp. 445-554, 2021.
33. Chaudhuri, A., Kramer, B., Norton, M., Royset, J., and Willcox, K., Certifiable Risk-Based Engineering Design Optimization. *AIAA Journal*, Vol. 60, No. 2, pp. 551-565, February 2022.
34. Kapteyn, M., Knezevic, D., Huynh, D.B.P., Tran, Minh and Willcox, K., Data-driven physics-based digital twins via a library of component-based reduced-order models. *International Journal for Numerical Methods in Engineering*, Volume 123, Issue 13, pp. 2986-3003, 2022.
35. Kapteyn, M., Pretorius, J. and Willcox, K., A probabilistic graphical model foundation for enabling predictive digital twins at scale. *Nature Computational Science*, Vol. 1, No. 5, May 2021, pp. 337-347. (Selected for the *Nature Computational Science* one-year anniversary collection.)
36. Niederer, S., Sacks, M., Girolami, M. and Willcox, K., Scaling digital twins from the artisanal to the industrial. *Nature Computational Science*, Vol. 1, No. 5, May 2021, pp. 313-320.
37. Khodabakhshi, P., Willcox, K., and Gunzburger, M. A multifidelity method for a nonlocal diffusion model. *Applied Mathematics Letters*, Volume 121, November 2021, 107361.
38. Willcox, K., Ghattas, O., and Heimbach, P. The imperative of physics-based modeling and inverse theory in computational science, *Nature Computational Science*, Vol. 1, No. 3, pp. 166-168, 2021.
39. Huang, L. and Willcox, K., Network models and sensor layers to design adaptive learning using educational mapping. *Design Science*, 7, E9. doi:10.1017/dsj.2021.8, 2021.
40. Ehre, M., Papaioannou, I., Willcox, K., and Straub, D., Conditional reliability analysis in high dimensions based on controlled mixture importance sampling and information reuse. *Computer Methods in Applied Mechanics and Engineering*, Volume 381, August 2021, 113826.

41. Singh, V. and Willcox, K., Decision Making Under Uncertainty for a Digital Thread Enabled Design Process. *Journal of Mechanical Design*, 143(9): 091707, September 2021.
42. McQuarrie, S., Huang, C. and Willcox, K., Data-driven reduced-order models via regularized operator inference for a single-injector combustion process. *Journal of the Royal Society of New Zealand*, Vol. 51, No. 2 pp. 194-211, 2021, DOI: 10.1080/03036758.2020.1863237.
43. Salinger S., Kapteyn M., Kays C., Pretorius J., Willcox K., A Hardware Testbed for Dynamic Data-Driven Aerospace Digital Twins. In: Darema F., Blasch E., Ravela S., Aved A. (eds) Dynamic Data Driven Application Systems. DDDAS 2020. *Lecture Notes in Computer Science*, Vol. 12312. Springer, Cham, 2020.
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6. Huang, L., Kapteyn, M. and Willcox, K. Digital twin: Graph formulations for managing complexity and uncertainty. IEEE DigitalTwin, December 2024.
7. Pham, J., Ghattas, O. and Willcox, K. Real-time aerodynamic load estimation for hypersonics via strain-based inverse maps. AIAA Paper 2024-1228. In Proceedings of AIAA SciTech Forum & Exhibition, Orlando, FL, January 2024.
8. Geelen, R., Balzano, L. and Willcox, K. Learning latent representations in high-dimensional state spaces using polynomial manifold constructions. 62nd IEEE Conference on Decision and Control (CDC), Singapore, December 2023.

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9. Kalur, A., Mortimer, P., Sirohi, J., Geelen, R. and Willcox, K. Data-driven closures for the dynamic mode decomposition using quadratic manifolds. In Proceedings of AIAA Aviation Forum, San Diego, CA, June 2023.
10. Zastrow, B., Chaudhuri, A., Willcox, K., Ashley, A. and Henson, M. Data-driven model reduction via operator inference for coupled aeroelastic flutter. In Proceedings of AIAA SciTech Forum & Exhibition, National Harbor, MD, January 2023.
11. Farcas, I.-G., Gundeveia, R., Munipalli, R. and Willcox, K. Parametric non-intrusive reduced-order models via operator inference for large-scale rotating detonation engine simulations. In Proceedings of AIAA SciTech Forum & Exhibition, National Harbor, MD, January 2023.
12. Sella, V., Pham, J., Chaudhuri, A. and Willcox, K. Projection-based multifidelity linear regression for data-poor applications. In Proceedings of AIAA SciTech Forum & Exhibition, National Harbor, MD, January 2023.
13. Hyun, J., Chaudhuri, A., Willcox, K. and Kim, H.A. Multifidelity robust topology optimization for material uncertainties with digital manufacturing. In Proceedings of AIAA SciTech Forum & Exhibition, National Harbor, MD, January 2023.
14. Pham, J., Morreale, B., Clemens, N. and Willcox, K., Aerodynamic sensing for hypersonics via scientific machine learning. In Proceedings of AIAA Aviation Forum & Exhibition, Chicago, IL, June 2022. (Best Student Paper second place award)
15. Farcas, I., Munipalli, R. and Willcox, K. On filtering in non-intrusive data-driven reduced-order modeling. In Proceedings of AIAA Aviation Forum & Exhibition, Chicago, IL, June 2022.
16. Huang, L., Bicol, K. and Willcox, K. Modeling COVID-19 disruptions via network mapping of the Common Core Mathematics Standards. ASEE Annual Conference, July 2021. Computers in Education Best Paper Finalist.
17. Kapteyn, M. and Willcox, K. Predictive Digital Twins as a Foundation for Improved Mission Readiness. NATO Science and Technology Organization, Proceedings of STO-MP-AVT-355: Intelligent Solutions for Improved Mission Readiness of Military UxVs, 2021. DOI: 10.14339/STO-MP-AVT-355.
18. Kapteyn, M., Knezevic, D., and Willcox, K., Toward predictive digital twins via component-based reduced-order models and interpretable machine learning. In Proceedings of 2020 AIAA SciTech Forum & Exhibition, Orlando FL, January, 2020. (Best Student Paper Award)
19. Chaudhuri, A., Peherstorfer, B., and Willcox, K., Multifidelity Cross-Entropy Estimation of Conditional Value-at-Risk for Risk-Averse Design Optimization. In Proceedings of 2020 AIAA SciTech Forum & Exhibition, Orlando FL, January, 2020.
20. Qian, E., Kramer, B., Marques, A. and Willcox, K., Transform & Learn: A data-driven approach to nonlinear model reduction. In Proceedings of AIAA Aviation Forum & Exhibition, Dallas, TX, June 2019.
21. Chaudhuri, A., Marques, A., Lam, R., and Willcox, K., Reusing information for multifidelity active learning in reliability-based design optimization. 21st AIAA Non-Deterministic Approaches Conference (AIAA Scitech), San Diego, CA, January 2019.
22. Marques, A., Lam, R. and Willcox, K., Contour location via entropy reduction leveraging multiple information sources. Advances in Neural Information Processing Systems (NeurIPS) 31, 2018. (21% acceptance rate. Selected for spotlight presentation, 3% selection rate.)
23. Peherstorfer, B., Beran, P.S., and Willcox, K., Multifidelity Monte Carlo Estimation for Large-scale Uncertainty Propagation. In proceedings of 2018 AIAA Scitech Forum, Kissimmee, FL, January, 2018.
24. Feldstein, A., Lazzara, D., Princen, N., and Willcox, K., Model Uncertainty: A Challenge in Nonlinear Coupled Multidisciplinary System Design. In proceedings of 2018 AIAA Scitech Forum, Kissimmee, FL, January, 2018.
25. Kapteyn, M., Willcox, K. and Philpott, A. A Distributionally Robust Approach to Black-Box Optimization. In proceedings of 2018 AIAA Non-Deterministic Approaches Conference, AIAA SciTech Forum, Kissimmee, FL, January, 2018. (AIAA 2018-0666)
26. Lam, R. and Willcox, K. Lookahead Bayesian Optimization with Inequality Constraints. Advances in Neural Information Processing Systems (NIPS), pp. 1888-1898, 2017. (21% acceptance rate)

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27. Mainini, L. and Willcox, K. Sensor placement strategy to inform decisions. AIAA 2017-3820, in 18th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Denver, Colorado, June 2017.
28. Willcox K. and Huang, L., Mapping the CDIO Curriculum with Network Models, in Proceedings of the 13th International CDIO Conference, University of Calgary, Calgary, Canada, June 18-22, 2017.
29. Lam, R., Willcox, K. and Wolpert, D., Bayesian Optimization with a Finite Budget: An Approximate Dynamic Programming Approach. In Advances In Neural Information Processing Systems (NIPS) 29, pp. 883-891, 2016. (24% acceptance rate)
30. Seering, J., Huang, L. and Willcox, K., Mapping Outcomes in an Undergraduate Aerospace Engineering Program. American Society for Engineering Education, 12th Annual Conference & Exposition, June 2015.
31. Ng, L., Huynh, D.B.P. and Willcox, K., Multifidelity Uncertainty Propagation for Optimization Under Uncertainty, AIAA Paper 2012-5602, 14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Indianapolis, IN, September 2012.
32. Allaire, D. and Willcox, K., "A Bayesian-Based Approach to Multi-Fidelity Multidisciplinary Design Optimization," AIAA-2010-9183, presented at 13th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Fort Worth, TX, September 13-15, 2010.
33. Buffoni, M. and Willcox, K., "Projection-Based Model Reduction for Reacting Flows," AIAA-2010-5008, presented at 40th Fluid Dynamics Conference and Exhibit, Chicago, IL, June 28-July 1, 2010
34. Lehner, S., Lurati, L., Bower, G., Cramer, E., Crossley, W., Engelsen, F., Kroo, I., Smith, S., Willcox, K., "Advanced Multidisciplinary Optimization Techniques for Efficient Subsonic Aircraft Design," AIAA-2010-1321, presented at 48th AIAA Aerospace Sciences Meeting, Orlando, FL, Jan. 4-7, 2010.
35. Noel, G., Allaire, D., Jacobsen, S., Willcox, K., and Cointin, R., "Assessing the Uncertainty in FAA's Noise and Emissions Compliance Model," Inter-Noise Conference, Ottawa, Canada, August 23-26, 2009.
36. Noel, G., Allaire, D., Jacobsen, S., Willcox, K., and Cointin, R., "Assessment of the Aviation Environmental Design Tool," Eighth USA/Europe Air Traffic Management Research and Development Seminar (ATM2009), Napa, CA, June 29 - July 2, 2009.
37. March, A., Waitz, I., and Willcox, K. "A Methodology for Integrated Conceptual Design of Aircraft Configuration and Operation to Reduce Environmental Impact," AIAA-2009-7026, presented at 9th AIAA Aviation Technology, Integration, and Operations Conference, Hilton Head, SC, September 21-23, 2009.
38. Lazzara, D., Haimes, R. and Willcox, K. "Multifidelity Geometry and Analysis in Aircraft Conceptual Design," AIAA-2009-3806, presented at 27th AIAA Applied Aerodynamics Conference, San Antonio, TX, June 22-25, 2009.
39. Fidkowski, K., Engelsen, F., Willcox, K., and Kroo, I. "Stochastic Gust Analysis Techniques for Aircraft Conceptual Design," AIAA-2008-5848, presented at 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Victoria, British Columbia, September 10-12, 2008.
40. Robinson, T., Ooi, B.H., Taff, B., Willcox, K. and Voldman, J., "Surrogate-Based Optimization of a Microfluidic Weir Structure for Single-Cell Manipulation," AIAA-2008-5889, presented at 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Victoria, British Columbia, September 10-12, 2008.
41. Stirling, L., Arsie, A., Willcox, K., Frazzoli, E. and Newman, D., "Application of Quantized Control to Self-Rotation Maneuvers," 46th IEEE Conference on Decision and Control, New Orleans, LA, December 2007.
42. Allaire, D., Waitz, I. And Willcox, K., "A Comparison of Two Methods for Predicting Emissions from Aircraft Gas Turbine Engine Combustors," ASME Paper GT2007-28346, presented at the ASME International Gas Turbine and Aeroengine Technical Conference, Montreal, Canada, June 2007.
43. Allaire, D., Waitz, I. And Willcox, K., "A Comparison of Two Methods for Predicting Emissions from Aircraft Gas Turbine Engine Combustors," ASME Paper GT2007-28346, presented at the ASME International Gas Turbine and Aeroengine Technical Conference, Montreal, Canada, June 2007.

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44. Bashir, O., Ghattas, O., Hill, J., van Bloemen Waanders, B., and Willcox, K., "Hessian-Based Model Reduction for Large-Scale Data Assimilation Problems," Proceedings of International Conference on Computational Science, Beijing, China, Y. Shi et al. (Eds.): ICCS 2007, Part I, LNCS 4487, pp. 1010-1017, Springer-Verlag, May 2007.
45. Stirling, L., Willcox, K. and Newman, D., "Development of Astronaut Orientation Strategies using Optimization Methodologies," Multibody Dynamics 2007, ECCOMAS Thematic Conference, Milan, Italy, June 2007.
46. Bui-Thanh, T., Willcox, K., and Ghattas, O., "Model Reduction for Large-Scale Systems with High-Dimensional Parametric Input Space," AIAA Paper 2007-2049, presented at the 48th AIAA Structures, Structural Dynamics and Materials Conference, Waikiki, HI, April 2007.
47. Jones, A., Willcox, K., and Hileman, J., "Distributed Multidisciplinary Optimization of Aircraft Design and Takeoff Operations for Low Noise," AIAA Paper 2007-1856, presented at the 2nd AIAA Multidisciplinary Design Optimization Specialist Conference, Waikiki, HI, April 2007.
48. Hovland, S., Willcox, K., and Gravdahl, J., "MPC for large-scale systems via model reduction and multiparametric quadratic programming," 45th IEEE Conference on Decision and Control, San Diego, CA, December 2006.
49. Robinson, T., Eldred, M., Willcox, K. and Haimes, R. "Strategies for Multi-fidelity Optimization with Variable Dimensional Hierarchical Models," AIAA paper 2006-1819, presented at the 1st Multidisciplinary Design Optimization Specialist Conference, Newport, RI, April 2006.
50. Diedrich, A., Hileman, J., Tan, D., Willcox, K. and Spakovszky, Z. "Multidisciplinary Design and Optimization of the Silent Aircraft," AIAA paper 2006-1323, presented at the 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 2006.
51. Willcox, K., Ghattas, O., van Bloemen Waanders, B., and Bader, B., "A Goal-Oriented Optimization Framework for Model Reduction of Large-scale Systems," 44th IEEE Conference on Decision and Control, Seville, Spain, December 2005.
52. Bui-Thanh, T. and Willcox, K., "Model Reduction for Large-Scale CFD Applications Using the Balanced Proper Orthogonal Decomposition," AIAA Paper 2005-4617, presented at the 16th AIAA Computational Fluid Dynamics Conference, Toronto, Canada, June 2005.
53. Astrid, P., Weiland, S. and Willcox, K., "On the acceleration of a POD-based model reduction technique," Proceedings of the 16th International Symposium on Mathematical Theory of Networks and Systems, Leuven, Belgium 5-9 July 2004.
54. Willcox, K. and Bounova, G., "Mathematics in Engineering: Identifying, Enhancing and Linking the Implicit Mathematics Curriculum," presented at ASEE Annual Conference, Salt Lake City, UT, June 2004.
55. Antoine, N., Kroo, I., Willcox, K. and Barter, G. "A Framework for Aircraft Conceptual Design and Environmental Performance Studies," AIAA Paper 2004-4314, presented at the 10th AIAA Multidisciplinary Analysis and Optimization Conference, Albany, NY, August 2004.
56. Peoples, R. and Willcox, K., "A Value-Based MDO Approach to Assess Business Risk for Commercial Aircraft Design," AIAA Paper 2004-4438, presented at the 10th AIAA Multidisciplinary Analysis and Optimization Conference, Albany, NY, August 2004.
57. Gratton, D. and Willcox, K., "Reduced-Order, Trajectory Piecewise-Linear Models for Nonlinear Computational Fluid Dynamics," in Proceedings of the 5th SMA Symposium, January 2004, also AIAA Paper 2004-2329, presented at 34th AIAA Fluid Dynamics conference, Portland, OR, June 2004.
58. Peoples, R. and Willcox, K., "Value-Based Multidisciplinary Optimization for Commercial Aircraft Design," AIAA paper 2004-1542, presented at the 45th AIAA Structures, Structural Dynamics and Materials conference, Palm Springs, CA, April 2004.
59. Willcox, K. and Megretski, A., "Model Reduction for Large-Scale Linear Applications", presented at the 13th IFAC Symposium on System Identification, Rotterdam, The Netherlands, August 2003.

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60. Bui-Thanh, T., Damodaran, M. and Willcox, K., "Applications of Proper Orthogonal Decomposition for Inviscid Transonic Aerodynamics", AIAA Paper 2003-4213, presented at 15th Computational Fluid Dynamics Conference, Orlando, FL, June 2003.
61. Deremaux, Y. and Willcox, K., "Real-Time Visualization and Constraint Analysis in Multidisciplinary Design Optimization", AIAA Paper 2003-3876, presented at 15th Computational Fluid Dynamics Conference, Orlando, FL, June 2003.
62. Lassaux, G. and Willcox, K., "Model reduction for active control design using multiple-point Arnoldi methods", AIAA Paper 2003-0616, presented at 41st Aerospace Sciences Meeting & Exhibit, Reno, NV, January 2003.
63. Willcox, K., "Controllable and Observable Subspaces in Computational Fluid Dynamics", in Computational fluid dynamics, 2002 (Sydney), pp. 159-164, Springer, Berlin, 2003.
64. Markish, J. and Willcox, K., "A Value-Based Approach for Commercial Aircraft Conceptual Design," in Proceedings of the ICAS2002 Congress, Toronto, Canada, September 2002.
65. Willcox, K. and Peraire, J., "Application of Reduced-Order Aerodynamic Modeling to the Analysis of Structural Uncertainty in Bladed Disks". ASME Paper GT-30680, presented at the ASME International Gas Turbine and Aeroengine Technical Conference, Amsterdam, The Netherlands, June 2002.
66. Willcox, K., Paduano, J., Peraire J. and Hall, K., "Low Order Aerodynamic Models for Aeroelastic Control of Turbomachines". AIAA paper 99-1467, presented at the 40th AIAA Structures, Structural Dynamics and Materials conference, April 1999, St Louis, MO.

Publications: Major Reports

1. National Academies of Sciences, Engineering, and Medicine. 2023. Foundational Research Gaps and Future Directions for Digital Twins. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26894>. (Study committee chair and lead author.)
2. National Academies of Sciences, Engineering, and Medicine. Charting a Path in a Shifting Technical and Geopolitical Landscape: Post-Exascale Computing for the National Nuclear Security Administration. The National Academies Press, Washington D.C., 2023.
3. National Academies of Sciences, Engineering, and Medicine. Data-Driven Modeling for Additive Manufacturing of Metals: Proceedings of a Workshop. The National Academies Press, Washington D.C., 2019.
4. Baker, N., Alexander, F., Bremer, T., Hagberg, A., Kevrekidis, Y., Najm, H., Parashar, M., Patra, A., Sethian, J., Wild, S., and Willcox, K. Workshop Report on Basic Research Needs for Scientific Machine Learning: Core Technologies for Artificial Intelligence, February 2019. United States. doi:10.2172/1478744. <https://www.osti.gov/servlets/purl/1478744>.
5. National Academies of Sciences, Engineering, and Medicine. 2018. Assessing the Risks of Integrating Unmanned Aircraft Systems (UAS) into the National Airspace System. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25143>.
6. Willcox, K., Sarma, S., Lippel, P. "Online Education: A Catalyst for Higher Education Reforms." Final report of the MIT Online Education Policy Initiative, April 2016.
7. Final report of the Institute-wide Task Force on the Future of MIT Education, July 2014.
8. Alexander, F., Anitescu, M., Bell, J., Brown D., Ferris, M., Luskin, M., Mehrotra, S., Moser R., Pinar, A., Tartakovsky, A., Willcox, K., Wright, S., Zavala, V. A Multifaceted Mathematical Approach for Complex Systems, Report of the DOE Workshop on Mathematics for the Analysis, Simulation, and Optimization of Complex Systems, September 2011.

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9. Broderick, A., Bevilaqua, P., Crouch, J., Gregory, F., Hussain, F., Jeffers, B., Newton, D., Nguyen, D.P., Powell, J., Spain, A., Stone, R., Willcox, K., Wake Turbulence, An Obstacle to Increased Air Traffic Capacity, National Academies Press, Washington D.C., 2008.
10. Decadal Survey of Civil Aeronautics: Foundation for the Future, National Academies Press, Washington D.C., 2006. (Aerodynamics and aeroacoustics subpanel.)

Publications: Other

1. Marzouk, Y. and Willcox, K., Uncertainty Quantification, in The Princeton Companion to Applied Mathematics, N.J. Higham (ed.), Princeton University Press, 2015.
2. Miller, H., Willcox, K. and Huang, L., Crosslinks: Improving Course Connectivity Using Online Open Educational Resources, in The Bridge, The National Academy of Sciences, Volume 46, Number 3, pp. 38-44, Fall 2016.

Invited Talks (since 2018 – major keynote/plenary/named lectures are bolded)

1. "Data to Decisions: Computational methods for the next generation of aerospace systems." Future CFD Technologies Workshop, Orlando, FL, January 2018.
2. "Data to Decisions: Computational methods for the next generation of engineering systems." Engineering Product Development Research Seminar Series, Singapore University of Technology and Design, February 2018.
3. "Data to Decisions: Computational methods for the next generation of engineering systems." Institute of High Performance Computing, A*STAR, Singapore, March 2018.
4. "Data-driven operator inference for learning physics-based low-dimensional models." Engineering Systems Design Distinguished Speaker Seminar, Singapore University of Technology and Design, April 2018.
5. "Data-driven operator inference for learning physics-based low-dimensional models." Aachen Institute for Advanced Study in Computational Engineering Science, RWTH Aachen, Germany, April 2018.
6. "Data to Decisions: Computational methods for the next generation of aerospace systems." Temasek Laboratories, Singapore, May 2018.
7. "Data-driven operator inference for learning physics-based low-dimensional models." Hong Kong University, Hong Kong, May 2018.
8. "Data to Decisions: Towards the next generation of engineering systems." Design Innovation Workshop, University of Auckland, New Zealand, July 2018.
9. "Multifidelity Models and Methods: Fusing models and data to achieve efficient design, optimization, and uncertainty quantification." Invited Tutorial, Science at Extreme Scales: Where Big Data Meeting Large-Scale Computing, Institute for Pure and Applied Mathematics, University of California, Los Angeles, September 2018.
10. "Model Order Reduction: Approximate yet accurate surrogates for large-scale simulation." Invited Tutorial, Science at Extreme Scales: Where Big Data Meeting Large-Scale Computing, Institute for Pure and Applied Mathematics, University of California, Los Angeles, September 2018.
11. "Learning low-dimensional models: Nonlinear model reduction via lifting transformations and proper orthogonal decomposition." Invited Lecture, Workshop on HPC and Data Science for Scientific Discovery, Institute for Pure and Applied Mathematics, University of California, Los Angeles, October 2018.
12. "Learning low-dimensional models: Nonlinear model reduction via lifting transformations and proper orthogonal decomposition." Invited Colloquium Talk, Department of Civil Engineering, Johns Hopkins University, November 2018.
13. "Multifidelity approaches for design, uncertainty quantification, and stability boundary location." Invited talk, Institute of High Performance Computing, A*STAR, Singapore, November 2018.
14. "Lift & Learn: From nonlinear PDEs to low-dimensional polynomial approximations." Invited talk, Lawrence Livermore National Laboratories, December 2018.
15. "Lift & Learn: From nonlinear PDEs to low-dimensional polynomial approximations." Invited talk, Sandia National Laboratories, December 2018.

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16. "Projection-based model reduction: Physics-based approaches to learn low-dimensional models." Invited Colloquium Talk, Department of Mathematics, University of Houston, February 2019.
17. "Projection-based model reduction: Formulations for Physics-based Machine Learning." Keynote Talk, LANL Workshop on Machine Learning for Computational Fluid and Solid Dynamics, Santa Fe, NM, February 2019.
18. "Projection-based model reduction: Formulations for Physics-based Machine Learning." Invited talk, Department of Mathematics, Southern Methodist University, March 2019.
19. "Projection-based model reduction: Formulations for Physics-based Machine Learning." Invited talk, Department of Mathematics, University of Texas at Dallas, March 2019
20. "Data to Decisions: Computational Methods for the Next Generation of Engineering Systems." Keynote Talk, **SIAM Central Valley Regional Student Conference**, University of California, Merced, April 2019.
21. "Projection-based model reduction: Formulations for Physics-based Machine Learning." **Charlemagne Distinguished Lecture**, RWTH Aachen, April 2019.
22. "Data-driven reduced models, model adaptation, and Digital Twins." Invited talk, Lockheed Martin Aeronautics Internal Workshop on Digital Strategy, Fort Worth, TX, June 2019.
23. "Interdisciplinary Research and Education for a Computational Future." Invited talk, Aspen Symposium, Forum on Higher Education, Aspen, CO, June 2019.
24. "Predictive Data Science for Physical Systems: From Model Reduction to Scientific Machine Learning." Keynote Talk, **New York Scientific Data Summit**, New York, NY, June 2019.
25. "Predictive Data Science for Physical Systems: From Model Reduction to Scientific Machine Learning." Invited Lecture, **International Congress on Industrial and Applied Mathematics (ICIAM)**, Valencia, Spain, July 2019.
26. "Predictive Data Science for Physical Systems: From Model Reduction to Scientific Machine Learning." Invited talk, ONERA Laboratories, Toulouse, France, July 2019
27. "From Nonlinear Partial Differential Equations to Low-dimensional Models: Physics-based Model Reduction." Invited Plenary Talk, **US National Congress on Computational Mechanics (USNCCM)**, Austin, TX, July 2019
28. "Interdisciplinary Education for a Computational Future." Harvard Higher Education Leaders Forum, Cambridge, MA, September 2019.
29. "Predictive data science for physical systems: From model reduction to scientific machine learning." **Kalman Lecture**, University of Potsdam, Germany, September 2019.
30. "Towards efficient multifidelity modeling for engineering design under uncertainty: From model reduction to scientific machine learning." Invited Keynote, **European Numerical Mathematics and Advanced Applications Conference**, Egmond aan Zee, The Netherlands.
31. "Interdisciplinary Education for a Computational Future." Santa Fe Institute, October 2019.
32. "Predictive data science: From model reduction to scientific machine learning." Invited Keynote Talk, **INFORMS Annual Meeting**, Seattle, WA, October 2019.
33. "Digital Technologies & Educational Mapping: A Catalyst for Innovation in Higher Education." Invited Plenary Talk, **Collaboration for Online Higher Education Research (COHERE) Conference**, University of Calgary, November 2019.
34. "Predictive data science: From model reduction to scientific machine learning." Invited Keynote Talk, **SC19**, Denver, CO, November 2019.
35. "Multifidelity uncertainty quantification for optimization under uncertainty." Invited Plenary Lecture. Workshop on Uncertainty Quantification, The Australian National University, November 2019.
36. "Big Decisions need more than just Big Data." Invited Keynote Lecture. **23rd International Conference on Modelling and Simulation (MODSIM)**, Canberra, Australia, December 2019.
37. "Data-centric engineering: From physics-based models to scientific machine learning." Invited talk, International Workshop on Data-Centric Engineering, Cambridge, MA, December 2019.
38. "A technology roadmap towards Digital Thread." Invited talk, Panel on Multidisciplinary Design Optimization & Model-based Systems Engineering, AIAA SciTech Forum, Orlando, FL, January 2020.
39. "Toward predictive digital twins via component-based reduced-order models and interpretable machine learning." Invited talk, Institute of High Performance Computing, A*STAR, Singapore, January 2020.

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40. "Challenges and progress in learning physics-based reduced models for combustion processes." Invited Plenary Talk, Workshop on Exuberance of Machine Learning in Transport Phenomena, Dallas, TX, February 2020.
41. "Predictive data science: From physics-based models to scientific machine learning." **Shell Lecture** (invited), Rice University, February 2020.
42. "Predictive Digital Twins & Multifidelity Modeling." Invited talk, Lockheed Martin Aeronautics, Dallas, TX, February 2020.
43. "Predictive data science: From physics-based models to scientific machine learning." Invited talk, ICERM Workshop on the Mathematics of Model Reduction, Providence, RI, February 2020.
44. "Towards Predictive Data Science: From Scientific Machine Learning to Digital Twins." Keynote Talk, **Women in Data Science (WiDS) Conference**, Austin, TX, March 2020.
45. "Scientific Machine Learning: Where physics-based modeling meets data-driven learning." Invited Talk, Santa Fe Institute Colloquium, May 2020.
46. "Computing Needs for Digital Twins: Where physics-based modeling meets data-driven learning." Keynote Talk, NASA High-End Computing Workshop, June 2020.
47. "Predictive digital twins: Where data-driven learning meets physics-based modeling." Invited Plenary Talk, **Workshop on Learning for Dynamics and Control (L4DC)**, June 2020.
48. "Scientific Machine Learning: Where data-driven learning meets physics-based modeling." Keynote Talk, **JuliaCon**, July 2020.
49. "Toward predictive digital twins: From physics-based modeling to scientific machine learning." Keynote Talk, **ASME Design Automation Conference**, August 2020.
50. "Predictive digital twins: Where dynamic data-driven learning meets physics-based modeling." Keynote Talk, DDDAS2020, October 2020.
51. "The future needs Computational Science and Engineering." Keynote Talk, Altair Technology Conference, October 2020.
52. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk, University of Pennsylvania, October 2020.
53. "Predictive Digital Twins: From physics-based modeling to scientific machine learning." Invited Plenary Talk, **Institute for Mathematical and Statistical Innovation (IMSI) Opening Conference**, October 2020.
54. Invited Panelist, Mathematical Foundations Panel. Sandia National Laboratories Trusted AI Roundtable, October 2020.
55. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk, Texas A&M University, October 2020.
56. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk at Workshop on Physics-guided AI to Accelerate Scientific Discovery, AAAI Fall Symposium, November 2020.
57. "Digital Twins and Their Applications." Workshop on Digital Twins in Production Engineering and High Performance Computing Education, Invited Plenary Talk, U. Tennessee, December 2020.
58. "The future needs Computational Science and Engineering." Invited Talk at Technology Convergence for a Smarter, More Connected World: Market Trends, CIMdata Community Webinar, December 2020.
59. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." ECE Distinguished Lecture at George Washington University, December 2020.
60. "Research and Education at the Oden Institute for Computational Engineering and Science." Invited Talk, MD Anderson Cancer Center, December 2020.
61. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk at Workshop on Machine Learning for Engineering Modeling, Simulation, and Design. Neural Information Processing Systems (NeurIPS), December 2020.
62. "Aerospace Design in the Age of Big Data and Big Compute." Invited Plenary Talk, **AIAA SciTech Forum & Exhibition**, January 2021.

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63. "Big Data, Big Models and Digital Twins: Computational Perspectives from Aerospace Engineering" Invited Keynote Talk, DOE/NCI Workshop on Accelerating Precision Radiation Oncology through Advanced Computing and Artificial Intelligence, January 2021.
64. "A Probabilistic Graphical Model Foundation for Predictive Digital Twins." Invited Plenary Talk, **SIAM Conference on Computational Science and Engineering**, March 2021.
65. "Predictive Digital Twins and the Data-driven Future of Computational Science." Invited Keynote Talk, **AI CON**, March 2021.
66. "Predictive Digital Twins for engineering systems: From physics-based modeling to scientific machine learning." Invited Talk, Christ's College Engineering Society, University of Cambridge, March 2021.
67. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk, Sayas Numerics Seminar, April 2021.
68. "Predictive Digital Twins and the Data-driven Future of Computational Science." Invited Talk, Indian Institute of Science, April 2021.
69. "Aerospace Education and Innovation in the Digital Age." Invited Plenary Talk, **SAE Brazil AeroDesign**, April 2021.
70. "Data Assimilation, Digital Twins, and the Data-driven Future of Aerospace Systems." Invited Plenary Talk. Air Force Workshop on Computational Math in Hypersonics, April 2021.
71. "At the Interfaces of Computational Science & Aerospace Engineering." Invited Plenary Talk, Air Force Workshop on New Scientific Questions for Hypersonics, April 2021.
72. "Predictive Digital Twins and the Data-driven Future of Computational Science." Invited Talk, College of Engineering Distinguished Lecture Series, New Mexico State University, April 2021.
73. Willcox, K., "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Talk, Computational Mathematics and Applications Seminar, Oxford University, May 2021.
74. "Predictive Digital Twins: From physics-based modeling to scientific machine learning." Invited Keynote Lecture, **Conference on Advancing Analysis & Simulation in Engineering (CAASE21)**, June 2021.
75. "A Probabilistic Graphical Model Foundation for Enabling Predictive Digital Twins at Scale," Invited Plenary Lecture, **European Control Conference**, July 2021.
76. "Transformational Technology Approaches for Dynamic Statistical, Data-Driven, and Mechanistic Modeling," Keynote Lecture, NCI Joint VIRTUAL Project Teams Meeting: Cancer Biology Machine Learning/Mechanistic Modeling and Cancer Patient Digital Twin, July 2021.
77. "Digital Twins for Complex Engineering Systems: From Physics Based Models to Scientific Machine Learning," Invited Talk, **ISA/SPE Digital Transformation Virtual Conference**, August 2021.
78. "A Probabilistic Graphical Model Foundation for Enabling Predictive Digital Twins at Scale," RTRC Fellows Lecture (Invited), Raytheon Technologies Corporation, August 2021.
79. "Predictive Digital Twins: Mathematical Foundations and Application to Structural Health Monitoring," Keynote Lecture, MaP Scientific Symposium, ETH Zurich, August 2021.
80. "Predictive Digital Twins: Perspectives from Aerospace Engineering." Invited Talk, Data Science Work Group, MD Anderson Cancer Center, August 2021.
81. "Predictive Digital Twins: From physics-based modeling to scientific machine learning." Invited Keynote Talk, Computing in Engineering Forum, University of Wisconsin-Madison, September 2021.
82. "Research needs and future directions: Scaling digital twins from the artisanal to the industrial." Invited Plenary Talk, Workshop on Aviation Digital Twins: Applications and Opportunities, the MITRE Corporation, October 2021.
83. "Predictive Digital Twins and the Data-Driven Future of Aerospace Systems." Invited Keynote Talk, the 13th International Symposium on Non-Destructive Testing (NDT) in Aerospace, NASA Langley Research Center, October 2021.
84. "Mathematical and Computational Foundations for Enabling Predictive Digital Twins at Scale." Invited Talk, Santa Fe Institute, October 2021.
85. "Predictive Digital Twins." Invited Talk, MD Anderson Cancer Center Data Science and Modeling Forum, October 2021.

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86. "Engineering Design in the Age of Big Data and Big Compute." Invited Keynote Talk, **NAFEMS World Congress**, October 2021.
87. "Operator Inference: Bridging Model Reduction and Scientific Machine Learning." Invited Keynote Talk, Workshop on Computational Science and Machine Learning, Lorentz Center, The Netherlands, October 2021.
88. "Predictive Digital Twins: Revolutionizing Decision-making Across Science, Technology, and Society." Invited Keynote Talk, 2nd Annual Research Retreat in Oncological Data and Computational Sciences, November 2021.
89. "Digital Twins." Invited Presentation and Panelist for Ocean Studies Board, National Academies of Science, Engineering and Medicine, November 2021.
90. "Predictive Digital Twins: From physics-based modeling to scientific machine learning." Invited Keynote Lecture, **EPFL Digital Twin Days**, November 2021.
91. "Enabling Predictive Digital Twins at Scale." Invited Keynote Talk, **Siemens Conference on Simulation and Digital Twin**, November 2021.
92. "Predictive Digital Twins: From physics-based modeling to scientific machine learning." Invited Talk, Applied Materials, December 2021.
93. "From reduced-order modeling to scientific machine learning: How computational science is enabling the design of next-generation aerospace systems." **AIAA Structures, Structural Dynamics, and Materials (SDM) Lecture**, presented at AIAA Scitech Forum, January 2022.
94. Invited Panelist for "Do we still need physics-based models?", Panel for Roger Sargent Lecture, Imperial College London, January 2022.
95. "Digital Twins for Future Aerospace Systems." Invited Lecture, Columbia University, February 2022.
96. "Learning physics-based models from data: Perspectives from model reduction." Invited Talk, Harvard University, February 2022.
97. "Learning physics-based models from data: Perspectives from model reduction." Invited Talk, MOX Colloquium, Politecnico di Milano, February 2022.
98. "Mathematical and Computational Foundations for Enabling Predictive Digital Twins at Scale." Invited Keynote Talk, **SupercomputingAsia 2022 (SCA22)**, Singapore, March 2022.
99. "Digital Twins. The personalized future of computing for complex systems." Invited Talk, **TedX UT Austin**, March 2022.
100. "Learning physics-based models from data: Perspectives from model reduction." Invited Plenary Talk, **SIAM Conference on Uncertainty Quantification**, April 2022.
101. "Physics-based model reduction approaches to learn low-dimensional surrogate models." Invited Talk, Caterpillar, May 2022.
102. "From reduced-order modeling to scientific machine learning: How computational science is enabling the design of next-generation engineering systems." Invited Talk, Ansys TechTalk, May 2022.
103. "Artificial Intelligence for the Prediction and Control of Complex Systems," Invited Keynote Talk, DOE Workshop on AI for Science, Energy and Security, June 2022.
104. "Predictive Digital Twins for Complex Systems," Invited Talk, University of Auckland, July 2022.
105. "Digital Twins: The personalized future of computing for complex systems." Invited Talk, NCI-DOE Collaboration Executive Committee Meeting, August 2022.
106. "From reduced-order modeling to scientific machine learning: How computational science is enabling the design of next-generation aerospace systems." Invited Keynote Talk, NASA Engineering Safety Center, Structures Technical Discipline Team Annual Meeting, August 2022.
107. "Beyond forward simulations: From reduced-order models to digital twins with computational science." Opening Keynote Talk, **Congress on Numerical Methods in Engineering**, Spain, September 2022.
108. "Beyond forward simulations: From reduced-order models to digital twins with computational science." Keynote Talk, **Sayas Numerics Day**, Baltimore, MD, September 2022.
109. "Digital Twins. The personalized future of computing for complex systems." Invited Talk, Society of Women Engineers, Central Illinois Chapter, October 2022.

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110. "Learning physics-based models from data: Perspectives from projection-based model reduction." Invited mini-course (three lectures), **2022 Leçons Jacques-Louis Lions**, Sorbonne University, Paris, October 2022.
111. "Mathematical and Computational Foundations for Enabling Predictive Digital Twins at Scale." Invited Colloquium Talk, 2022 Leçons Jacques-Louis Lions, Sorbonne University, Paris, October 2022.
112. "Beyond forward simulations: From reduced-order models to digital twins with computational science." Invited Plenary Talk, **5th Annual Meeting of the SIAM Texas-Louisiana Section**, Houston, TX, November 2022.
113. "Predictive Digital Twins: From Aerospace Engineering to Computational Oncology." Invited Plenary Talk, **Computational Techniques and Applications Conference (CTAC)**, Brisbane, Australia, November 2022.
114. Forum 360: Addressing Increasing Complexity in Aerospace Systems, Invited Panel, AIAA SciTech Forum & Exhibition, National Harbor, MD, January 2023.
115. "Predictive Digital Twins at Scale." Opening Keynote Lecture, **Multicore World**, Wellington, New Zealand, February 2023.
116. "Digital Twins: A personalized future of computing for complex systems". Community Lecture (invited plenary session), **SIAM Conference on Computational Science and Engineering**, Amsterdam, The Netherlands, February 2023.
117. "Digital Twins: How high-performance computing is personalizing the future for complex systems." **Supercomputing Spotlights Webinar Series**, April 2023.
118. "Learning physics-based models from data: Perspectives from projection-based model reduction", MIT Distinguished Seminar Series in Computational Science and Engineering, April 2023.
119. Willcox, K., "Reduced-Order Models as Enablers for Design, Control and Predictive Digital Twins." **AFRL/AFOSR Chief Scientist Distinguished Lecture**, April 2023.
120. "Digital Twins." CTO Forum, May 2023.
121. "Nonlinear manifold approximations for reduced-order modeling of nonlinear systems." Semi-Plenary Talk, Workshop on Mathematical Foundations of Data Assimilation and Inverse Problems, Foundations of Computational Mathematics, Paris, June 2023.
122. "Redefining Simulation and Design in the Age of AI: Fact or Fiction?" Invited Plenary Talk, **AFRL AVTech**, Dayton, September 2023.
123. "Learning physics-based models from data: Perspectives from projection-based model reduction." **Duncan Lecture**, Johns Hopkins University, Baltimore, MD, September 2023.
124. "The Mathematics of Digital Twins." **Panorama of Mathematics**, Hausdorff Center for Mathematics, Bonn, Germany, October 2023.
125. "Learning physics-based models from data: Perspectives from projection-based model reduction." Invited Plenary Lecture, **Advances in Computational Mechanics (ACM23)**, Austin, TX, October 2023.
126. "Digital Twins and their Applications Across Engineering, Science and Medicine" **LaCàN/CIMNE Invited Public Lecture**, Barcelona, Spain, November 2023.
127. Willcox, K., "Reduced-Order Models as Enablers for Design, Control and Predictive Digital Twins." Invited Plenary Talk, **MORTech conference**, Paris, France, November 2023.
128. "Future Directions for Digital Twins." Invited Plenary Talk, **Multicore World**, Christchurch, New Zealand, February 2024.
129. "Future Directions for Digital Twins." Opening Keynote Talk, **NAFEMS ASSESS**, Atlanta, GA, March 2024.
130. "From reduced-order modeling to scientific machine learning: How computational science is enabling the design of next-generation engineering systems." Head's Distinguished Colloquium, Mechanical Engineering, Purdue University, March 2024.
131. "Enforcing structure in scientific machine learning: The role of projection-based reduced-order modeling." Invited Plenary Talk, **GAMM Annual Meeting**, Magdeburg, Germany, March 2024.
132. "Redefining Engineering Simulation and Design in the Age of AI: Fact or Fiction?" SFI Symposium on the Past and Future of Complexity Science, Santa Fe, NM, April 2024.
133. "Enforcing structure in scientific machine learning: The role of projection-based reduced-order modeling." **Belytschko Lecture**, Northwestern University, May 2024.

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134. "Adventures at the Interfaces of Mathematics, Computing and Aerospace." Invited Keynote Talk, **Do The Maths**, University of New South Wales, Sydney, Australia, June 2024. (Do The Maths is an outreach event that brought 500 high school girls to UNSW for the day. Willcox was the 2024 UNSW Women in Mathematics and Statistics Ambassador.)
135. "Digital Twins and their Applications Across Engineering, Science and Medicine." **Public Lecture, Sydney, Australia**, June 2024.
136. "From reduced-order modeling to scientific machine learning." **Theodore von Karman Prize Lecture**, Spokane, WA, July 2024.
137. "Mathematical and Computational Foundations for Predictive Digital Twins at Scale." Opening Plenary Lecture, **World Congress on Computational Mechanics**, Vancouver, Canada, July 2024.
138. "Distributed Operator Inference for physics-based data-driven reduced modeling at scale." Workshop on Data-driven Applications for Exascale Supercomputers, Athens, Greece, September 2024.
139. "Digital Twins and Their Impact on Engineering." Invited Keynote Talk, **Auckland University Engineering Alumni Association**, Auckland, New Zealand, October 2024.
140. "Mathematical and Computational Foundations for Predictive Digital Twins at Scale." Invited Plenary Talk, **DDDAS 2024**, New Brunswick, NJ, November 2024.
141. "Mathematical and Computational Foundations for Predictive Digital Twins at Scale." Opening Plenary Lecture, **XLV Ibero-Latin American Congress on Computational Methods in Engineering (CILAMCE 2024)**, Maceió, Brazil, November 2024.
142. "Digital Twin: Graphical Formulations for Managing Complexity and Uncertainty." **Multicore World**, Christchurch, New Zealand, February 2025.
143. "Digital Twins and their Impact Across Science, Technology and Society." Invited Talk, Virginia Tech National Security Institute, March 2025.
144. "Predictive Digital Twins at Scale: Graphical Formulations to Manage Uncertainty and Complexity." Invited Lecture, Scientific Computing Institute, University of Utah, April 2025.
145. "Predictive Digital Twins: Graphical Formulations for Managing Complexity and Uncertainty." Opening Keynote Talk, Harrington Symposium, Austin, TX, May 2025.
146. "Computational Methods, Models and Simulation Structures of the Future." Invited Talk, Workshop on Models and Simulation Structures for the Future of the DAF Test Community, Edwards Air Force Base, May 2025.
147. "Reduced-order Models as a Foundation for Predictive Digital Twins." **JSCES Grand Prize Lecture**, Tokyo, Japan, June 2025.
148. "Graphical Formulations for Predictive Digital Twins." **Spencer C. Schantz Distinguished Lecture**, MOPTA, Azores, Portugal, June 2025.
149. "Multifidelity Uncertainty Quantification Methods." Invited Talk, Workshop on Efficient Sampling Algorithms for Complex Models, Institute for Mathematical Sciences, National University of Singapore, July 2025.
150. Willcox, K. "Reduced-order modeling and uncertainty quantification foundations for predictive digital twins." Invited Talk, A*STAR Institute for High Performance Computing, Singapore, July 2025.
151. Willcox, K. "Predictive Digital Twins." Invited Talk, Auckland Bioengineering Institute, University of Auckland, New Zealand, July 2025.

PhD Students Supervised

1. Patricia Astrid, TU Eindhoven PhD 2004. Now at Shell Global Solutions.
2. Tan Bui-Thanh, MIT PhD 2007. Now Associate Professor of Aerospace Engineering and Engineering Mechanics, UT Austin.
3. Theresa Robinson. MIT PhD 2007. Now at Rolls Royce.
4. Leia Stirling, MIT PhD 2008. Now Associate Professor of Industrial and Operations Engineering, University of Michigan.

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5. Svein Hovland, Norwegian University of Science and Technology PhD 2008. Now at Frontier International.
6. Doug Allaire, MIT PhD 2009. Now Associate Professor of Mechanical Engineering, Texas A&M University.
7. Van Bo Nguyen, National University of Singapore PhD 2011. Now at A*STAR Institute for High Performance Computing.
8. David Lazzara, MIT PhD 2012. Now at The Boeing Company.
9. Andrew March, MIT PhD 2012. Now at MIT Lincoln Laboratory.
10. Ngoc Hien Nguyen, National University of Singapore PhD 2012. Now at National University of Singapore.
11. Chad Lieberman, MIT PhD 2013. Now at Chad E Lieberman Consulting.
12. Leo Ng, MIT PhD 2013. Now at Mathworks.
13. Chelsea Curran (He), MIT PhD 2014. Now at MIT Lincoln Laboratory.
14. Sergio Amaral, MIT PhD 2015. Now at Millenium Management.
15. Brian Cohen, MIT PhD 2018. Now at MIT Lincoln Laboratory.
16. Remi Lam, MIT PhD 2018. Now at DeepMind.
17. Max Opgenoord, MIT PhD 2018. Now at Amazon.
18. Harriet Li, MIT PhD 2019. Now at Johns Hopkins University Applied Physics Laboratory.
19. Victor Singh, MIT PhD 2019. Now at The Boeing Company.
20. Elizabeth Qian, MIT PhD 2021. Now Assistant Professor at Georgia Tech.
21. Michael Kapteyn, MIT PhD 2021. Now at UT Austin.
22. Sean McBane, UT Austin PhD 2022. Now at Cadence.
23. Shane McQuarrie, UT Austin PhD 2023. Now von Neumann Fellow at Sandia National Laboratories.

Postdoctoral Researchers Supervised

1. Doug Allaire (MIT). Now Associate Professor, Texas A&M University.
2. Kayla Bicol (MIT). Now at CenterPoint Energy.
3. Marcelo Buffoni (MIT). Now at ABB Switzerland Ltd.
4. Anirban Chaudhuri (MIT). Now Research Associate at UT Austin.
5. Laurence Cook (MIT). Now at Arrival.
6. Tiangang Cui (MIT). Now Senior Lecturer, Monash University.
7. Sonjoy Das (MIT). Now Adjunct Associate Professor, University at Buffalo.
8. Ionut Farcas (UT Austin). Now Assistant Professor, Virginia Tech.
9. Krzysztof Fidkowski (MIT). Now Professor, University of Michigan.
10. Michalis Frangos (MIT). Now at Red Bull Technologies/Formula 1.
11. Vikram Garg (MIT). Now at Esgee Technologies.
12. Rudy Geelen (UT Austin). Now Assistant Professor, Texas A&M University.
13. Mengwu Guo (UT Austin). Now Assistant Professor, Twente University.
14. Phuong Huynh (MIT). Now Head of Operation and Research, Akseos.
15. Aniketh Kalur (UT Austin). Now Assistant Professor, IIT Madras.
16. Michael Kapteyn (UT Austin). Now Research Associate at UT Austin.
17. Parisa Khodabakhshi (UT Austin). Now Assistant Professor, Lehigh University.
18. James Koch (UT Austin). Now Staff Scientist at Pacific Northwest National Laboratory.
19. Boris Kramer (MIT). Now Associate Professor, University of California, San Diego.
20. Remi Lam (MIT). Now at DeepMind.
21. Qifeng Liao (MIT). Now Associate Professor, ShanghaiTech University.

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22. Chad Lieberman (MIT). Now at Chad E Lieberman Consulting.
23. Laura Mainini (MIT). Now Chaired Professor at Imperial College.
24. Alexandre Marques (MIT). Now at Neural Magic.
25. Benjamin Peherstorfer (MIT). Now Associate Professor, Courant Institute, New York University.
26. Marco Tezzele (UT Austin). Now Assistant Professor, Emory University.
27. Demet Ulker (MIT). Now at DASH Systems.
28. Ralf Zimmermann (MIT). Now Associate Professor, University of Southern Denmark.