

**Karen E. Willcox, MNZM, PhD**  
**Director, Institute for Computational Engineering and Sciences, University of Texas at Austin**  
**Professor of Aerospace Engineering and Engineering Mechanics**  
**W. A. "Tex" Moncrief, Jr. Chair in Simulation-Based Engineering and Sciences**  
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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  
2018-present Director, Institute for Computational Engineering and Sciences  
2018-present Professor of Aerospace Engineering and Engineering Mechanics

Massachusetts Institute of Technology  
2001-2018 Professor, Aeronautics and Astronautics  
2011-2013 Associate Department Head, Aeronautics and Astronautics  
2008-2018 Founding Co-Director, MIT Center for Computational Engineering

Singapore University of Technology and Design  
2011, 2015, 2018 Visiting Professor (3 x 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

### **Professional Interests**

Research: Data to decisions in engineering systems. Computational models and methods for design, optimization, control and uncertainty quantification of engineering systems. Reduced order modeling and multi-fidelity methods. Future aircraft technologies, aircraft system optimization, aircraft environmental impact, multidisciplinary design, unmanned aerial vehicles, digital twins.

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

Teaching Experience: 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).

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### **Professional Memberships**

Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA)

Member, American Society for Engineering Education (ASEE)

Member, Society for Industrial and Applied Mathematics (SIAM)

### **Visiting Committees and Review Boards**

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

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

External Review Board, Computing and Information Sciences Research Foundation, Sandia National Laboratories (Member, 2016 – present)

HarvardX Review Committee, Harvard University (Member, 2016)

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

### **External Boards and Committees**

National Academies Committee to Assess the Risks of Unmanned Aircraft Systems (UAS) Integration (2017)

National Academies Board on Mathematical Sciences and Analytics (BMSA) (2016 – present)

SIAM Committee on Science Policy (Member, 2016 – present)

SIAM Activity Group on Computational Science and Engineering: Vice President (2013 – 2015), Program Director, (2011 – 2013)

Co-Chair, SIAM 2013 Conference on Computational Science and Engineering

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

MIT OpenCourseWare Faculty Advisory Committee (2011 – present; Chair 2015 – present)

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)

AIAA Multidisciplinary Design Optimization (MDO) Technical Committee (2001 – present); Vice-Chair (2017 – present); Awards Subcommittee Chair (2002 – 2006); Publications Subcommittee Chair (2010 – present); MDO Conference Technical Chair (2011 – 2012)

### **Advisory Boards**

Advisory Board, Department of Engineering Science, University of Auckland (Member, 2008 – present)

External Advisory Board, Michigan Institute for Computational Discovery and Engineering, University of Michigan (Member, 2017 – present)

### **Editorial Boards**

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

*AIAA Journal* (Associate Editor, 2015 – present, 2009 – 2011)

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

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

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### **Selected Awards and Honors**

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

Member of the New Zealand Order of Merit, 2017

Distinguished Alumni Award, University of Auckland, 2016

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

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

### **Leadership Activities**

Academic: Given well over 100 invited lectures in the US and internationally, including multiple keynote talks at major international conferences. Published over 90 papers in refereed archival journals. Supervised theses for 49 graduate students (33 S.M., 16 PhD). Secured funding and managed multi-institutional research projects from many sources including the U.S. Air Force, Boeing, U.S. Department of Energy, Federal Aviation Administration, NASA, National Science Foundation, DARPA, and U.S. Department of Education.

Major multi-institution research grants include: Lead PI, Multidisciplinary University Research Initiative (MURI) project on Managing Multiple Information Sources of Multi-physics Systems (Air Force Office of Scientific Research, \$7.2M total budget over 5 years). Co-lead PI and Co-Director, DiaMonD Multifaceted Mathematics Capability Center 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, \$2.9 total budget over 4 years).

Active professional service and leadership through multiple conference organizing committees, conference chair positions, organizational review committees, advisory boards, and editorial positions.

Active in outreach activities to promote girls' interest in science, mathematics and engineering; including volunteer grade school science extension classes, many outreach visits to schools, and participation in the Advisory Board for Girls' Angle.

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### 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. Swischuk, R., Mainini, L., Peherstorfer, B. and Willcox, K., Projection-based model reduction: Formulations for physics-based machine learning, *Computers and Fluids*, to appear, 2018.
2. Heinkenschloss, M., Kramer, B., Takhtaganov, T. and Willcox, K., Conditional-Value-at-Risk Estimation via Reduced-Order Models, *SIAM/ASA Journal on Uncertainty Quantification*, to appear, 2018.
3. Cook, L., Jarrett, J. and Willcox, K., Generalized information reuse for optimization under uncertainty with non-sample average estimators, *International Journal for Numerical Methods in Engineering*, to appear, 2018.
4. Qian, E., Peherstorfer, B., O'Malley, D., Vesselinov, V. and Willcox, K., Multifidelity Monte Carlo estimation of variance and sensitivity indices, *SIAM/ASA Journal on Uncertainty Quantification*, Vol. 6, No. 2, pp. 683-706, 2018.
5. Singh, V. and Willcox, K., Engineering Design with Digital Thread. To appear, *AIAA Journal*, 2018. Also in proceedings of 2018 AIAA Scitech Forum, Kissimmee, FL, January, 2018.
6. Baptista, R., Marzouk, Y., Willcox, K. and Peherstorfer, B., Optimal Approximations of Coupling in Multidisciplinary Models. *AIAA Journal*, Vol. 56, No. 6, pp. 2412-2428, 2018. (An earlier version of this work appeared in AIAA paper 2017-1935, 58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference (AIAA Scitech), Grapevine, TX, January 2017.)
7. Peherstorfer, B., Kramer, B. and Willcox, K., Multifidelity preconditioning of the cross-entropy method for rare event simulation and failure probability estimation. *SIAM/ASA Journal on Uncertainty Quantification*, Vol. 6, No. 2, pp. 737-761, 2018.
8. Li, H., Garg, V. and Willcox, K. Model adaptivity for goal-oriented inference using adjoints, *Computer Methods in Applied Mechanics and Engineering*, Vol. 331, pp. 1-22, April 2018.
9. Rude, U., Willcox, K., McInnes, L.C., De Sterck, H., Biros, G., Bungartz, H., Coronas, J., Cramer, E., Crowley, J., Ghattas, O., Gunzburger, M., Hanke, M., Harrison, R., Heroux, M., Hesthaven, J., Jimack, P., Johnson, C., Jordan, K.E., Keyes, D.E., Krause, R., Kumar, V., Mayer, S., Meza, J., Mørken, K.M., Oden, J.T., Petzold, L., Raghavan, P., Shontz, S.M., Trefethen, A., Turner, P., Voevodin, V., Wohlmuth, B., and Woodward, C.S. Research and Education in Computational Science and Engineering, *SIAM Review*, Vol. 60, No. 3, 2018.
10. Curran, C., Allaire, D. and Willcox, K., Sensitivity Analysis Methods for Mitigating Uncertainty in Engineering System Design, *Systems Engineering*, published online January 2018. (Also AIAA Paper 2015-0899, 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Kissimee, FL, January 5-9 2015.)
11. Opgenoord, M., Drela, M. and Willcox, K., Towards a Low-Order Model for Transonic Flutter Prediction, *AIAA Journal*, to appear 2018. (Also AIAA Paper 2017-4340, AIAA Theoretical Fluid Mechanics Conference Best Paper.)
12. Peherstorfer, B., Gunzburger, M. and Willcox, K., Convergence analysis of multifidelity Monte Carlo estimation, *Numerische Mathematik*, published online January 2018.
13. Zimmermann, R., Peherstorfer, B. and Willcox, K., Geometric Subspace Updates with Applications to Online Adaptive Nonlinear Model Reduction, *SIAM Journal on Matrix Analysis and Applications*, Vol. 39, No. 1, pp. 234-261, 2018.

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14. Peherstorfer, B., Willcox, K. and Gunzburger, M., Survey of multifidelity methods in uncertainty propagation, inference, and optimization, *SIAM Review*, Vol. 60, No. 3, 2018.
15. Willcox K. and Huang, L., Network models for mapping educational data, *Design Science*, Vol. 3, e18, 2017.
16. Peherstorfer, B., Gugercin, S. and Willcox, K., Data-driven reduced model construction with time-domain Loewner models, *SIAM Journal on Scientific Computing*, Vol. 39, No. 5, pp. A2152-A2178, 2017.
17. Cook, L., Jarrett, J. and Willcox, K., Extending horsetail matching for optimization under probabilistic, interval and mixed uncertainties, *AIAA Journal*, Vol. 56, No. 2, pp. 849-861, 2018.
18. Chaudhuri, A., Lam, R. and Willcox, K., Multifidelity uncertainty propagation via adaptive surrogates in coupled multidisciplinary systems. *AIAA Journal*, Vol. 56, No. 1, pp. 235-249, 2018.
19. Nguyen V.B., Dou HS., Willcox K., Khoo BC., Model order reduction for reacting flows: laminar Gaussian flame applications. In: Ben-Dor G., Sadot O., Igra O. (eds) *30th International Symposium on Shock Waves*, Springer, 2017.
20. Peherstorfer, B., Kramer, B. and Willcox, K., Combining multiple surrogate models to accelerate failure probability estimation with expensive high-fidelity models, *Journal of Computational Physics*, Vol. 341, pp. 61-75, 2017.
21. Kramer, B., Peherstorfer, B. and Willcox, K., Feedback Control for Systems with Uncertain Parameters Using Online-Adaptive Reduced Models, *SIAM Journal on Applied Dynamical Systems*, Vol. 16, No. 3, pp. 1563-1586, 2017.
22. Qian, E., Grepl, M., Veroy, K., and Willcox, K., A certified trust region reduced basis approach to PDE-constrained optimization, *SIAM Journal on Scientific Computing*, Vol. 39, No. 5 pp. S434-S460, 2017.
23. Singh, V. and Willcox, K., Methodology for Path Planning with Dynamic Data-Driven Flight Capability Estimation, *AIAA Journal*, Vol. 55, No. 8, pp. 2727-2738, 2017.
24. Spantini, A., Cui, T., Willcox, K., Tenorio, L. and Marzouk, Y. Goal-oriented optimal approximations of Bayesian linear inverse problems, *SIAM Journal on Scientific Computing*, Vol. 39, No. 5 pp. S167-S196, 2017.
25. Mainini, L. and Willcox, K., Data to decisions: Real-time structural assessment from sparse measurements affected by uncertainty, *Computers and Structures*, Vol. 182, pp. 296-312, 2017.
26. Peherstorfer, B., Willcox, K. and Gunzburger, M., Optimal model management for multifidelity Monte Carlo estimation, *SIAM Journal on Scientific Computing*, Vol. 38, No. 5, pp. A3163-A3194, 2016.
27. Amaral, S., Allaire, D., Willcox, K. and de la Rosa Blanco, E., A Decomposition-Based Uncertainty Quantification Approach for Environmental Impacts of Aviation Technology and Operation, *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, Volume 31, Issue 3 (Uncertainty Quantification for Engineering Design), pp. 251-264, August 2017.
28. Ulker, F., Allaire, D. and Willcox, K., Sensitivity Guided Decision Making for Wind Farm Micro-Siting, *International Journal for Numerical Methods in Fluids*, Vol. 83, Iss. 1, pp. 52-72, 2017.
29. Amaral, S., Allaire, D. and Willcox, K. Optimal L2-norm Empirical Importance Weights for the Change of Probability Measure, *Statistics and Computing*, 27 (3), 625-643, May 2017.
30. Opgenoord, M., Allaire, D. and Willcox, K., Variance-Based Sensitivity Analysis to Support Simulation-based Design under Uncertainty, *Journal of Mechanical Design*, Vol. 138, No. 11, pp. 111410-111410-12, 2016.
31. Zimmermann, R. and Willcox, K., An Accelerated Greedy Missing Point Estimation Procedure, *SIAM Journal on Scientific Computing*, Vol. 38, Issue 5, pp. A2827-A285, 2016.
32. Peherstorfer, B. and Willcox, K., Data-driven operator inference for nonintrusive projection-based model reduction, *Computer Methods in Applied Mechanics and Engineering*, Vol. 306, pp. 196-215, 2016.
33. Cui, T., Marzouk, Y. and Willcox, K., Scalable posterior approximations for large-scale Bayesian inverse problems via likelihood-informed parameter and state reduction, *Journal of Computational Physics*, available online 29 March 2016.

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34. Peherstorfer, B. and Willcox, K., Dynamic data-driven model reduction: Adapting reduced models from incomplete data, *Advanced Modeling and Simulation in Engineering Sciences*, Vol. 3, Issue 1, 2016.
35. Opgenoord, M. and Willcox, K., Sensitivity Analysis Methods for Uncertainty Budgeting in System Design, *AIAA Journal*, Volume 54, Issue 10, pp. 3134-3148, 2016.
36. Peherstorfer, B., Cui, T., Marzouk, Y. and Willcox, K., Multifidelity importance sampling, *Computer Methods in Applied Mechanics and Engineering*, Vol. 300, pp. 490-509, 2016.
37. Benner, P., Gugercin, S. and Willcox, K., A Survey of Projection-Based Model Reduction Methods for Parametric Dynamical Systems, *SIAM Review*, Vol. 57, No. 4, pp. 483–531, 2015.
38. Peherstorfer, B. and Willcox, K., Online Adaptive Model Reduction for Nonlinear Systems via Low-Rank Updates, *SIAM Journal on Scientific Computing*, Vol. 37, No. 4, pp. A2123-A2150, 2015.
39. Peherstorfer, B. and Willcox, K., Dynamic data-driven reduced-order models, *Computer Methods in Applied Mechanics and Engineering*, Vol. 291, pp. 21-41, 2015.
40. Lecerf, M., Allaire, D. and Willcox, K. Methodology for Dynamic Data-Driven Online Flight Capability Estimation, *AIAA Journal*, Vol. 53, No. 10, pp. 3073-3087, October 2015. (An earlier version of this work appeared in AIAA Paper 2014-1175, January 2014.)
41. Peherstorfer, B. and Willcox, K., Detecting and Adapting to Parameter Changes for Reduced Models of Dynamic Data-driven Application Systems, *Procedia Computer Science*, Vol. 51, pp. 2553-2562, 2015.
42. Ng, L. and Willcox, K. Monte Carlo Information-Reuse Approach to Aircraft Conceptual Design Optimization Under Uncertainty, *Journal of Aircraft*, Vol. 53, No. 2, pp. 427-438, 2016. (An earlier version of this work appeared in AIAA Paper 2014-0802, January 2014.)
43. Mainini, L. and Willcox, K. A surrogate modeling approach to support real-time structural assessment and decision-making, *AIAA Journal*, Vol. 53, No. 6, pp. 1612-1626, 2015. (An earlier version of this work appeared in AIAA Paper 2014-1488, presented at 10th AIAA Multidisciplinary Design Optimization Conference, National Harbor, MD, January 2014.)
44. Liao, Q. and Willcox, K. A domain decomposition approach for uncertainty analysis, *SIAM Journal on Scientific Computing*, Vol. 37, No. 1, pp. A103-A133, 2015.
45. Amaral, S., Allaire, D. and Willcox, K. A decomposition-based approach to uncertainty analysis of feed-forward multicomponent systems, *International Journal for Numerical Methods in Engineering*, Volume 100, Issue 13, pages 982-1005, December 2014.
46. Garg, V., Tenorio, L. and Willcox, K. Minimum local distance density estimation, *Communications in Statistics – Theory and Methods*, published online, February 2016.
47. Ng, L. and Willcox, K. Multifidelity Approaches for Optimization Under Uncertainty, *International Journal for Numerical Methods in Engineering*, Volume 100 Issue 10, pp. 746-772, published online 17 September, 2014, DOI: 10.1002/nme.4761. (An earlier version of this work appeared in AIAA Paper 2012-5602, September 2012.)
48. Cui, T., Marzouk, Y. and Willcox, K. Data-driven model reduction for the Bayesian solution of inverse problems, *International Journal for Numerical Methods in Engineering*, Vol. 102, No. 5, pp. 966-990, published online 15 August, 2014, DOI: 10.1002/nme.4748.
49. Allaire, D. and Willcox, K. Uncertainty assessment of complex models with application to aviation environmental policy-making, *Transport Policy*, Volume 34, July 2014, pp. 109-113. Available online 20 March 2014, ISSN 0967-070X, <http://dx.doi.org/10.1016/j.tranpol.2014.02.022>.
50. Allaire, D., Noel, G., Willcox, K. and Cointin, R. Uncertainty quantification of an aviation environmental toolsuite, *Reliability Engineering and System Safety*, Volume 126, June 2014, pp. 14-24. Available online 15 January 2014.

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51. Nguyen, V.B., Buffoni, M., Willcox, K. and Khoo, B.C. Model reduction for reacting flow applications, *International Journal of Computational Fluid Dynamics*, Volume 28, Issue 3-4, May 2014.
52. Nguyen, N.C., Khoo, B.C. and Willcox, K. Model order reduction for Bayesian approach to inverse problems, *Asia Pacific Journal on Computational Engineering*, Vol. 1, No. 2, April 2014.
53. Lieberman, C. and Willcox, K. Nonlinear Goal-Oriented Bayesian Inference: Application to Carbon Capture and Storage, *SIAM Journal on Scientific Computing*, Vol. 36, No. 3, pp. B427-B449.
54. Peherstorfer, B., Butnaru, D., Willcox, K. and Bungartz, H.-J., Localized discrete empirical interpolation method, *SIAM Journal on Scientific Computing*, Vol. 36, No. 1, pp. A168-A192, 2014.
55. Allaire, D. and Willcox, K. A mathematical and computational framework for multifidelity design and analysis with computer models, *International Journal on Uncertainty Quantification*, Vol. 4, Issue 1, pp. 1-20, January 2014.
56. Burgiel, H., Lieberman, C., Miller, H. and Willcox, K. Interactive applets in calculus and engineering courses, chapter in *Enhancing Mathematics Understanding through Visualization: The Role of Dynamical Software*, S. Habre (Ed.), IGI Global, December 2013.
57. Kaijima, S., Bouffanais, R., Willcox, K. and Naidu, S. Computational fluid dynamics for architectural design, in *Computation Works: The Building of Algorithmic Thought*, *Architectural Design*, X. De Kestelier, B. Peters (eds), March 2013.
58. Lieberman, C. and Willcox, K. Goal-oriented inference: Approach, linear theory, and application to advection-diffusion, *SIAM Review*, Vol. 55, No. 3, pp. 493-519, 2013. (SIGEST award)
59. Lieberman, C., Fidkowski, K., Willcox, K. and van Bloemen Waanders, B. Hessian-based model reduction: Large-scale inversion and prediction, *International Journal of Numerical Methods in Fluids*, Vol. 71, pp. 135-150, January 2013.
60. Lieberman, C. and Willcox, K. Goal-oriented inference: Approach, linear theory, and application to advection-diffusion, *SIAM Journal on Scientific Computing*, Vol. 34, No.4, pp. 1880-1904, 2012.
61. Allaire, D., He, Q., Deyst, J. and Willcox, K. An Information-theoretic Metric of System Complexity with Application to Engineering System Design, *Journal of Mechanical Design*, Vol. 134, Issue 10, October, 2012.
62. March, A. and Willcox, K. A Provably Convergent Multifidelity Optimization Algorithm not Requiring High-Fidelity Derivatives, *AIAA Journal*, Vol. 50, No. 5, pp. 1079-1089, 2012.
63. March, A. and Willcox, K. Constrained multifidelity optimization using model calibration, *Structural and Multidisciplinary Optimization*, Vol. 46, pp. 93-109, 2012.
64. March, A., Wang, Q. and Willcox, K. Gradient-based Multifidelity Optimization for Aircraft Design using Bayesian Model Calibration, *The Aeronautical Journal*, Vol. 115, No. 1174, December, 2011.
65. Allaire, D. and Willcox, K. A Variance-Based Sensitivity Index Function for Factor Prioritization, *Reliability Engineering and System Safety*, Vol. 107, November 2012, pp. 107-114.
66. Allaire, D. and Willcox, K. Distributional Sensitivity Analysis, *Procedia – Social and Behavioral Sciences*, Vol. 2, Issue 6, pp. 7595-7596, 2010.
67. Stirling, L., Willcox, K. and Newman, D., Development of a Computational Model for Astronaut Reorientation, *Journal of Biomechanics*, Vol. 43, Issue 12, pp. 2309-2314, August 2010.
68. Lieberman, C., Willcox, K. and Ghattas, O., Parameter and State Model Reduction for Large-Scale Statistical Inverse Problems, *SIAM Journal on Scientific Computing*, Vol. 32, No.5, pp. 2523-2542, August 2010.
69. Frangos, M., Marzouk, Y., Willcox, K. and van Bloemen Waanders, B., Surrogate and reduced-order modeling: a comparison of approaches for large-scale statistical inverse problems, in *Computational Methods for Large-Scale Inverse Problems and Quantification of Uncertainty*, Biegler et al. (Eds.), Wiley, 2010.

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70. Allaire, D. and Willcox, K., Surrogate Modeling for Uncertainty Assessment with Application to Aviation Environmental System Models, *AIAA Journal*, Vol. 48, No. 8, August 2010.
71. Galbally, D., Fidkowski, K., Willcox, K. and Ghattas, O., Nonlinear Model Reduction for Uncertainty Quantification in Large-Scale Inverse Problems, *International Journal for Numerical Methods in Engineering*, Volume 81, Issue 12, March 2010, pp. 1581-1608.
72. Degroote, J., Vierendeels, J. and Willcox, K., Interpolation among reduced-order matrices to obtain parametrized models for design, optimization and probabilistic analysis, *International Journal for Numerical Methods in Fluids*, Vol. 63, No. 2, pp. 207-230, May 2010.
73. Stirling, L., Ferguson, P., Willcox, K. and Newman, D., Kinetics and Kinematics for Translational Motions in Microgravity During Parabolic Flight. *Journal of Aviation, Space, and Environmental Medicine*, Vol. 80, No. 6, pp 522-531, June 2009.
74. Stirling, L., Newman, D. and Willcox, K., Self-Rotations in Simulated Microgravity: Performance Effects of Strategy Training, *Journal of Aviation, Space and Environmental Medicine*, Vol. 80, No. 1, pp. 5-14, January 2009.
75. Robinson, T., Willcox, K., Eldred, M., and Haimes, R. Multifidelity Optimization for Variable-Complexity Design, *AIAA Journal*, Vol. 46, No. 11, pp. 2814-2822, 2008.
76. Bui-Thanh, T., Willcox, K., and Ghattas, O., Parametric Reduced-Order Models for Probabilistic Analysis of Unsteady Aerodynamic Applications, *AIAA Journal*, Vol. 46, No. 10, pp. 2520-2529, 2008.
77. Bui-Thanh, T., Willcox, K., and Ghattas, O., Model Reduction for Large-Scale Systems with High-Dimensional Parametric Input Space, *SIAM Journal on Scientific Computing*, Vol. 30, No. 6, pp. 3270-3288, 2008.
78. Hovland, S., Gravdahl, J., and Willcox, K., Explicit Model Predictive Control for Large-Scale Systems via Model Reduction, *AIAA Journal for Guidance, Control, and Dynamics*, Vol. 31, No. 4, July-August, 2008.
79. Astrid, P., Weiland, S., Willcox, K., and Backx, T., Missing Point Estimation in Models Described by Proper Orthogonal Decomposition, *IEEE Transactions on Automatic Control*, Vol. 53, Issue 10, pp. 2237-2251, 2008. Also presented at 43rd IEEE Conference on Decision and Control, Paradise Island, Bahamas, December 2004.
80. Bashir, O., Willcox, K., Ghattas, O., van Bloemen Waanders, B., and Hill, J., Hessian-Based Model Reduction for Large-Scale Systems with Initial Condition Inputs, *International Journal for Numerical Methods in Engineering*, Vol. 73, Issue 6, pp. 844-868, 2008.
81. Gugercin, S. and Willcox, K., Krylov Projection Framework for Fourier Model Reduction, *Automatica*, Vol. 44, No. 1, pp. 209-215, 2008.
82. Willcox, K. Model Reduction for Large-Scale Applications in Computational Fluid Dynamics, in *Real-Time PDE-Constrained Optimization*, Biegler, L., Ghattas, O., Heinkenschloss, M., Keyes, D., and van Bloemen Waanders, B. (Eds.), SIAM Book Series, pp. 217-233, 2007.
83. Bui-Thanh, T., Willcox, K., Ghattas, O., and van Bloemen Waanders, B., Goal-Oriented, Model-Constrained Optimization for Reduction of Large-Scale Systems, *Journal of Computational Physics*, Vol. 224, No. 2, pp. 880-896, June 2007.
84. My-Ha, D., Lim, K.M., Khoo, B.C. and Willcox, K., Real-Time Optimization Using Proper Orthogonal Decomposition: Free Surface Shape Prediction due to Underwater Bubble Dynamics, *Computers and Fluids*, Vol. 36, No. 3, March 2007, pp. 499-512.
85. Peoples, R. and Willcox, K., Value-Based Multidisciplinary Optimization for Commercial Aircraft Design and Business Risk Assessment, *Journal of Aircraft*, Vol. 43, No. 4, July-August, 2006, pp. 913-921.
86. Willcox, K., Unsteady Flow Sensing and Estimation via the Gappy Proper Orthogonal Decomposition, *Computers and Fluids*, Volume 35, Issue 2, February 2006, pp. 208-226.



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87. Willcox, K. and Lassaux, G., Model Reduction of an Actively Controlled Supersonic Diffuser, in *Dimension Reduction of Large-Scale Systems*, Springer Series on Lecture Notes in Computational Science and Engineering, Vol. 45, Benner, P. Mehrmann, V. and Sorensen, D. (Eds.), 2005, pp. 357-361.
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