Stanford

Charbel Farhat

Vivian Church Hoff Professor of Aircraft Structures and Professor of Aeronautics and Astronautics

Curriculum Vitae available Online   Resume available Online

CONTACT INFORMATION

- **Administrator**

  Grace Fontanilla - Administrative Associate

  Email grace.fontanilla@stanford.edu

  Tel (650) 725-4107

Bio

BIO

Charbel Farhat is the Vivian Church Hoff Professor of Aircraft Structures in the School of Engineering. From 2008 to 2023, he chaired the Department of Aeronautics and Astronautics at Stanford University, and from 2022 to 2023, he chaired this department as the inaugural James and Anna Marie Spilker Chair of Aeronautics and Astronautics. He is also Professor in the Institute for Computational and Mathematical Engineering, and Director of the Stanford-King Abdulaziz City for Science and Technology Center of Excellence for Aeronautics and Astronautics. From 2017 to 2023, he served on the the Space Technology Industry-Government-University Roundtable; from 2015 to 2019, on the United States Air Force Scientific Advisory Board (SAB); from 2008 to 2018, on the United States Bureau of Industry and Security's Emerging Technology and Research Advisory Committee (ETRAC) at the United States Department of Commerce; and from 2007 to 2018, as the Director of the Army High Performance Computing Research Center at Stanford University. He was designated by the US Navy recruiters as a Primary Key-Influencer and flew with the Blue Angels during Fleet Week 2014.

He holds a Ph.D. in Civil Engineering from the University of California at Berkeley. He is a Member of three national academies: the National Academy of Engineering; the Royal Academy of Engineering (UK); and the Lebanese Academy of Sciences. He is a recipient of: a Vannevar Bush Faculty Fellowship from the Department of Defense; and three Docteur Honoris Causa degrees from Ecole Normale Superieure Paris-Saclay, Ecole Centrale de Nantes, and Ecole Nationale Superieure d'Arts et Metiers. He is a designated ISI Highly Cited Author in Engineering by the Institute for Science Information (ISI) Web of Knowledge and a Fellow of seven professional societies: the American Institute of Aeronautics and Astronautics (AIAA); the American Society of Mechanical Engineers (ASME); the International Association of Computational Mechanics (IACM); the Society of Engineering Science (SES); the Society of Industrial and Applied Mathematics (SIAM); the United States Association of Computational Mechanics (USACM); and the World Innovation Foundation (WIF). He was knighted by the Prime Minister of France in the Order of Academic Palms and awarded the Medal of Chevalier dans l'Ordre des Palmes Academiques. He is also a recipient of several other professional and academic distinctions including the Lifetime Achievement Award from the ASME's Computers Information in Engineering Division; the Spirit of St Louis Medal from the ASME's Aerospace Division; the AIAA Ashley Award for Aeroelasticity, the Structures, Structural Dynamics and Materials Award, and the Collier Aerospace HyperX/AIAA Structures Award from the AIAA; the John von Neumann Medal and the Computational and Applied Sciences Award from the USACM; the Grand Prize from the Japan Society for Computational Engineering and Science (JSCES); the Gauss-Newton Medal and the IACM Award from the IACM; the Gordon Bell

Prize and the Sidney Fernbach Award from the Institute of Electrical and Electronics Engineers (IEEE) Computer Society; the Olof B. Widlund Prize from Domain Decomposition Methods; and the Modeling and Simulation Award from the Department of Defense.

Professor Farhat is also Editor-in-Chief of the International Journal for Numerical Methods in Engineering and Editor of the International Journal for Numerical Methods in Fluids. He has been an AGARD lecturer on aeroelasticity and computational mechanics at several distinguished European institutions, and a plenary or keynote speaker at numerous national and international scientific meetings. He is the author of over 650 refereed journal publications on fluid-structure interaction; computational fluid dynamics on moving grids; computational structural mechanics; computational acoustics; supercomputing; parallel processing; model order reduction; and physics-based machine learning.

ACADEMIC APPOINTMENTS

- Professor, Aeronautics and Astronautics

- Member, Institute for Computational and Mathematical Engineering (ICME)

ADMINISTRATIVE APPOINTMENTS

- Chair, Department of Aeronautics and Astronautics, (2008- present)

HONORS AND AWARDS

- 2023 Collier Aerospace HyperX/AIAA Structures Best Paper Award, American Institute of Aeronautics and Astronautics (2024)

- Fellow, Society of Engineering Science (2024)

- The Olof B. Widlund Prize, Domain Decomposition Methods (2024)

- Vannevar Bush Faculty Fellowship, Department of Defense (2023)

- Docteur Honoris Causa, Ecole Nationale Superieure d'Arts et Metiers (2022)

- 2021 AIAA Multidisciplinary Design Optimization Best Paper Award, American Institute of Aeronautics and Astronautics (2021)

- The Commander's Public Service Award, Department of the Air Force (2019)

- The Edison Lecture, University of Notre Dame (2019)

- Appointed to the Space Technology Industry-Government-University Roundtable, National Academies (2017)

- Docteur Honoris Causa, Ecole Centrale de Nantes, France (2017)

- Docteur Honoris Causa, Ecole Normale Superieure Paris-Saclay, France (2017)

- Elected to the Lebanese Academy of Sciences, Lebanese Academy of Sciences (2017)

- Spirit of St Louis Medal, American Society of Mechanical Engineers (2017)

- The AIAA Ashley Award for Aeroelasticity, American Institute of Aeronautics and Astronautics (2017)

- The Grand Prize, The Japan Society for Computational Engineering and Science (2017)

- Elected to the Royal Academy of Engineering (International Fellow), Royal Academy of Engineering (2016)

- The Ted Belytschko Lecture, Northwestern University (2016)

- Appointed to the United States Air Force Scientific Advisory Board (SAB), US Air Force (2015)

- The Liviu Librescu Memorial Lecture, Virginia Tech (2015)

- The MIT Den Hartog Lecture in Mechanics, Massachusetts Institute of Technology (2015)

- Designated Primary Key-Influencer and Flew with the Blue Angels, US Navy (2014)

- The Gauss-Newton Medal, International Association of Computational Mechanics (2014)

- Elected to the National Academy of Engineering, National Academy of Engineering (2013)

- The IACM Award, International Association of Computational Mechanics (2012)

- Fellow, Society of Industrial and Applied Mathematics (2011)

- Knighted by the Prime Minister of France in the Order of Academic Palms, Prime Minister of France (2011)

- Lifetime Achievement Award, American Society of Mechanical Engineers (2011)

- Structures, Structural Dynamics and Materials Award, American Institute of Aeronautics and Astronautics (2010)

- Highly Cited Researcher in Engineering, Institute for Scientific Information (ISI) Highly Cited (2009)

- John von Neumann Medal, US Association of Computational Mechanics (2009)

- Fellow, American Society of Mechanical Engineers (2003)

- The Subaru Educator Spotlight, Subaru (2003)

- Fellow, International Association of Computational Mechanics (2002)

- The Computational Mechanics Award, International Association of Computational Mechanics (2002)

- The Gordon Bell Award, Institute of Electrical and Electronics Engineers (2002)

- 2001 Modeling and Simulation Award, Department of Defense (2001)

- Engineer of the Year (AIAA Rocky Mountain Section), American Institute of Aeronautics and Astronautics (2001)

- Fellow, World Innovation Foundation (2001)

- Fellow, US Association of Computational Mechanics (2001)

- The Computational and Applied Sciences Medal, US Association of Computational Mechanics (2001)

- Fellow, American Institute of Aeronautics and Astronautics (1999)

- Young Investigator Award, International Association of Computational Mechanics (1998)

- The R. H. Gallagher Special Achievement Award for Young Investigators, US Association of Computational Mechanics (1997)

- The Sidney Fernbach Award, Institute of Electrical and Electronics Engineers (1997)

- The College of Engineering and Applied Sciences Research Award, University of Colorado (1996)

- The Sup'Prize Achievement Award, IBM (1995)

- Aerospace Structures and Materials Best Paper Award, American Society of Mechanical Engineers (1994)

- Arch T. Colwell Merit Award, Society of Automotive Engineering (1993)

- FNRS Fellowship, Belgian National Science Foundation (1993)

- Research Featured in Yearbook of Science and the Future, Encyclopaedia Britannica (1992)

- CRAY Research Gigaflop Performance Award, CRAY Research (1990)

- TRW Fellowship, TRW Foundation (1989-1992)

- CRAY Research Award, CRAY Research (1989)

- Presidential Young Investigator Award, National Science Foundation (1989)

- AGARD Lecturer, NATO Research & Technology Organisation (1988, 1991, 1993, 1995)

- PACER Fellowship, Control Data Corporation (1987-1989)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Science Advisory Board Program on Intelligent Modelling for Decision-making in Critical Urban System, DesCartes, CNRS@CREATE (2022 - present)

- Chair, Search Committee for the Editor-in-Chief of the Journal of Aircraft, The American Institute of Aeronautics and Astronautics (2022 - 2022)

- Member, Pendray Award Committee, The American Institute of Aeronautics and Astronautics (2022 - 2022)

- Member, International Scientific and Educational Advisory Board (SEAB), Institute of Aeronautics and Astronautics, Paris-Saclay University, France (2021 - present)

- Judge, Physical Sciences & Engineering Jury for the Blavatnik National Awards for Young Scientists, New-York Academy of Sciences (2021 - 2023)

- Chair, Summerfield Book Award Committee, The American Institute of Aeronautics and Astronautics (2021 - 2021)

- Member, Leadership-Class Computing Facility (LCCF) Review Board, The National Science Foundation (2021 - 2021)

- Member, The American Institute of Aeronautics and Astronautics Publications Ethical Standards Subcommittee, The American Institute of Aeronautics and Astronautics (2018 - present)

- Member, The Space Technology Industry-Government-University Roundtable, The National Academies (2017 - present)

- Member, The United States Air Force Scientific Advisory Board (SAB), United States Air Force (2015 - 2019)

- Chair, Pendray Award Committee, The American Institute of Aeronautics and Astronautics (2015 - 2017)

- Editor-in-Chief, The International Journal for Numerical Methods in Engineering, Wiley (2014 - present)

- Chair, Naval Research Laboratory, Structural Materials Triennial Review Board, The Naval Research Laboratory (2014 - 2014)

- Member, The National Academy of Engineering, The National Academy of Engineering (2013 - present)

- Member, Airbus Fly Your Ideas Panel of Judges, Airbus (2013 - 2013)

- Member, The American Institute of Aeronautics and Astronautics Publications Committee, The American Institute of Aeronautics and Astronautics (2012 - present)

- Editor, The International Journal for Numerical Methods in Fluids, Wiley (2010 - present)

- Member, Board of Advisors of the Department of Aerospace and Mechanical Engineering, University of Southern California (2010 - present)

- Member, Board of Advisors, Association Teratec, Bruyeres-Le-Chatel, France (2010 - 2018)

- Fellow, The Society of Industrial and Applied Mathematics (2009 - present)

- Member, Executive Council, The International Association for Computational Mechanics, The International Association for Computational Mechanics (2009 - present)

- Member, Predictive Engineering Sciences Panel, Sandia National Laboratories (2009 - present)

- Member, Regolith Excavation Challenge Panel of Judges, California Space Authority (2009 - 2009)

- Member, Selection Committee 2009 Theodore von Karman Prize, The Society of Industrial and Applied Mathematics (2009 - 2009)

- Member, The US Bureau of Industry and Security's Emerging Technology and Research Advisory Committee, The United States Department of Commerce (2008 - 2018)

- Member, The American Society of Mechanical Engineers Applied Mechanics Division's Committee on Fluid-Structure Interaction, The American Society of Mechanical Engineers (2008 - 2009)

- Member, High Scientific Council, Office National d' Etudes et de Recherches Aerospatiales (ONERA) (2006 - 2012)

- Corresponding Member, Executive Council, The International Association for Computational Mechanics, The International Association for Computational Mechanics (2006 - 2009)

- Member, The Sandia Science Advisory Board, The Sandia National Laboratories (2006 - 2009)

- Member, Evaluation Committee, Institut Universitaire des Systemes Thermiques Industriels (IUSTI) (2006 - 2006)

- Member, Board of Advisors, Center for Scientific Computing and Optimization in Multidisciplinary Applications (SCOMA), Jyvaskyla, Finland (2005 - 2006)

- Member, Theme NumD Panel of Experts, Institut National de Recherche en Informatique et Automatique (INRIA) (2004 - present)

- Member, Simulation-Based Engineering Sciences Initiative Panel, The National Science Foundation (2004 - 2004)

- Member, Subcommittee on Computational Science, President's Information Technology Advisory Committee (PITAC), US Government (2004 - 2004)

- Fellow, The American Society of Mechanical Engineers (2003 - present)

- Vice-Chair, The Society for Industrial and Applied Mathematics' Activity Group on Supercomputing, The Society for Industrial and Applied Mathematics (2003 - 2006)

- Member, Information Technology Research Review Panel, The National Science Foundation (2003 - 2003)

- Fellow, The International Association of Computational Mechanics (2002 - present)

- Member, The Fourteenth Annual Robert J. Melosh Medal Competition Jury Panel, Duke University (2002 - present)

- Chair, The Engineering Sciences Research Foundation's External Review Panel, The Sandia National Laboratories (2002 - 2009)

- Member, Army Research Laboratory Technical Assessment Board's Panel on Air and Ground Vehicle Technology, The National Research Council (NRC) (2002 - 2007)

- Fellow, The World Innovation Foundation (2001 - present)

- Fellow, The US Association of Computational Mechanics (2001 - present)

- Member, Advanced Computational Research Panel, The National Science Foundation (2001 - present)

- Member, Structures Technical Committee, The American Institute of Aeronautics and Astronautics (2001 - 1996)

- Member, General Council, The International Association for Computational Mechanics, The International Association for Computational Mechanics (2000 - present)

- Member, Dynamic Data-Driven Application Systems Panel, The National Science Foundation (2000 - 2000)

- Fellow, The American Institute of Aeronautics and Astronautics (1999 - present)

- Member, Awards Committee, The Institute of Electrical and Electronics Engineers (1998 - 2004)

- Member, New Strategic Initiative for FY2000 and Beyond, The National Science Foundation (1998 - 1998)

- Member, Engineering Research Center Review Panel, The National Science Foundation (1997 - 1997)

- Member-at-Large, The United States Association for Computational Mechanics, The United States Association for Computational Mechanics (1995 - 2006)

- Member, Computational Aerosciences Review and Planning, NASA Ames Research Center (1994 - 1997)

- Member, MetaCenter Allocations Committee, The National Science Foundation (1994 - 1996)

- Member, The Joint Pittsburgh/Illinois Supercomputing Peer Review Board, Pittsburgh University (1993 - 1996)

- Member, IBM Academy of Science and Technology Study, IBM (1993 - 1993)

- NYI Awards Review Panel, The National Science Foundation (1993 - 1993)

- Member, ASC Postdoctoral Research Associateship Program Review Board, The National Science Foundation (1991 - 1991)

- Member, ASC SBIR Awards Review Panel, The National Science Foundation (1990 - 1990)

PROFESSIONAL EDUCATION

- PhD, The University of California, Berkeley, Civil Engineering (1987)

- MS, The University of California, Berkeley, Electrical Engineering and Computer Sciences (1986)

- MS, The University of California, Berkeley, Structural Engineering and Structural Mechanics (1984)

- MS, Universite de Paris VI, France, Applied Mechanics (1983)

- Diplome d'Ingenieur, Ecole Centrale des Arts et Manufactures, France (1983)

LINKS

- Research and Teaching Site: https://web.stanford.edu/group/frg

- Flying with the Blue Angels: https://www.flickr.com/photos/stanfordeng/sets/72157648134366930/

Research & Scholarship

RESEARCH INTERESTS

- Collaborative Learning

- Data Sciences

- Higher Education

- Leadership and Organization

- Lifelong Learning

- Math Education

- Research Methods

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Charbel Farhat and his Research Group (FRG) develop mathematical models, advanced computational algorithms, and high-performance software for the design, analysis, and digital twinning of complex systems in aerospace, marine, mechanical, and naval engineering. They contribute major advances to Simulation-Based Engineering Science. Current engineering foci in research are on reliable autonomous carrier landing in rough seas; dissipation of vertical landing energies through structural flexibility; nonlinear aeroelasticity of N+3 aircraft with High Aspect Ratio (HAR) wings; pulsation and flutter of a parachute; pendulum motion in main parachute clusters; coupled fluid-structure interaction (FSI) in supersonic inflatable aerodynamic decelerators for Mars landing; flight dynamics of hypersonic systems and their trajectories; and advanced digital twinning. Current theoretical and computational emphases in research are on high-performance, multi-scale modeling for the high-fidelity analysis of multi-component, multi-physics problems; discrete-event-free embedded boundary methods for CFD and FSI; efficient Bayesian optimization using physics-based surrogate models; modeling and quantifying model-form uncertainty; probabilistic, physics-based machine learning; mechanics-informed artificial neural networks for data-driven constitutive modeling; and efficient nonlinear projection-based model order reduction for time-critical applications such as design, active control, and digital twinning.

Teaching

COURSES

2023-24

- Numerical Methods for Compressible Flows: AA 214 (Aut)

2022-23

- Numerical Methods for Compressible Flows: AA 214 (Win)

2021-22

- Aerodynamics of Race Cars: AA 109Q (Spr)
- Numerical Methods for Compressible Flows: AA 214 (Win)

2020-21

- Model Reduction: AA 216, CME 345 (Spr)
- Numerical Methods for Compressible Flows: AA 214 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Trevor Hedges

Postdoctoral Faculty Sponsor

Carlos Gonzalez Hernandez

Doctoral Dissertation Advisor (AC)

Faisal As'ad, Marie-Jo Azzi, Joshua Barnett, Emily Jewell, Ali Lasemi, Clayton Little, Christian Porrello

Master's Program Advisor

Faisal As'ad, Robert Dyro, Roshan Jagani, Jeevesh Konuru, Peter Krenek, Albo Voci

Doctoral Dissertation Co-Advisor (AC)

Joseph Ferguson, Lauren Simitz

Doctoral (Program)

Jeffrey Durrant, Aqib Syed

Publications

PUBLICATIONS

- **A mechanics-informed deep learning framework for data-driven nonlinear viscoelasticity** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*

  As'ad, F., Farhat, C.

  2023; 417

- **Projection-Based Dimensional Reduction of Adaptively Refined Nonlinear Models** *COMMUNICATIONS ON APPLIED MATHEMATICS AND COMPUTATION*

  Little, C., Farhat, C.

  2023

- **Neural-network-augmented projection-based model order reduction for mitigating the Kolmogorov barrier to reducibility** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Barnett, J., Farhat, C., Maday, Y.

  2023; 492

- **Displacement-based partitioned equations of motion for structures: Formulation and proof-of-concept applications** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Park, K. C., Gonzalez, J. A., Park, Y. H., Shin, S. J., Kim, J. G., Maute, K. K., Farhat, C., Felippa, C. A.

  2023

- **Aerodynamic optimization with large shape and topology changes using a differentiable embedded boundary method** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Ho, J., Farhat, C.

  2023; 488

- **Acceleration of a Physics-Based Machine Learning Approach for Modeling and Quantifying Model-Form Uncertainties and Performing Model Updating** *JOURNAL OF COMPUTING AND INFORMATION SCIENCE IN ENGINEERING*

  Azzi, M., Ghnatios, C., Avery, P., Farhat, C.

  2023; 23 (1)

- **Space-local reduced-order bases for accelerating reduced-order models through sparsity** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Anderson, S., White, C., Farhat, C.

  2022

- **Reprint of: Robust and globally efficient reduction of parametric, highly nonlinear computational models and real time online performance** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*

  Tezaur, R., As'ad, F., Farhat, C.

  2022; 402

- **Linear Reduced-Order Model Predictive Control** *IEEE TRANSACTIONS ON AUTOMATIC CONTROL*

  Lorenzetti, J., McClellan, A., Farhat, C., Pavone, M.

  2022; 67 (11): 5980-5995

- **Quadratic approximation manifold for mitigating the Kolmogorov barrier in nonlinear projection-based model order reduction** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Barnett, J., Farhat, C.

  2022; 464

- **Robust and globally efficient reduction of parametric, highly nonlinear computational models and real time online performance** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*

  Tezaur, R., As'ad, F., Farhat, C.

  2022; 399

- **Training a Neural-Network-Based Surrogate Model for Aerodynamic Optimisation Using a Gaussian Process** *INTERNATIONAL JOURNAL OF COMPUTATIONAL FLUID DYNAMICS*

  Ghazi, Y., Alhazmi, N., Tezaur, R., Farhat, C.

2022; 36 (7): 538-554

- **A physics-based digital twin for model predictive control of autonomous unmanned aerial vehicle landing.** *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences*
  McClellan, A., Lorenzetti, J., Pavone, M., Farhat, C.
  2022; 380 (2229): 20210204

- **A mechanics-informed artificial neural network approach in data-driven constitutive modeling** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
  As'ad, F., Avery, P., Farhat, C.
  2022

- **PIECEWISE-GLOBAL NONLINEAR MODEL ORDER REDUCTION FOR PDE-CONSTRAINED OPTIMIZATION IN HIGH-DIMENSIONAL PARAMETER SPACES** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
  Boncoraglio, G., Farhat, C.
  2022; 44 (4): A2176-A2203

- **Active Manifold and Model-Order Reduction to Accelerate Multidisciplinary Analysis and Optimization** *AIAA JOURNAL*
  Boncoraglio, G., Farhat, C.
  2021; 59 (11): 4739-4753

- **Vanguard developments in computational methods for fluid-structure interaction** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
  van Brummelen, E., Farhat, C.
  2021

- **The DGDD method for reduced-order modeling of conservation laws** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Riffaud, S., Bergmann, M., Farhat, C., Grimberg, S., Iollo, A.
  2021; 437

- **Homogenized Flux-Body Force Treatment of Compressible Viscous Porous Wall Boundary Conditions** *AIAA JOURNAL*
  Huang, D. Z., Wong, M., Lele, S. K., Farhat, C.
  2021; 59 (6): 2045-2059

- **A computationally tractable framework for nonlinear dynamic multiscale modeling of membrane woven fabrics** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
  Avery, P., Huang, D. Z., He, W., Ehlers, J., Derkevorkian, A., Farhat, C.
  2021

- **Mesh sampling and weighting for the hyperreduction of nonlinear Petrov-Galerkin reduced-order models with local reduced-order bases** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
  Grimberg, S., Farhat, C., Tezaur, R., Bou-Mosleh, C.
  2021

- **Gradient-based constrained optimization using a database of linear reduced-order models** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Choi, Y., Boncoraglio, G., Anderson, S., Amsallem, D., Farhat, C.
  2020; 423

- **On the stability of projection-based model order reduction for convection-dominated laminar and turbulent flows** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Grimberg, S., Farhat, C., Youkilis, N.
  2020; 419

- **Learning constitutive relations from indirect observations using deep neural networks** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Huang, D. Z., Xu, K., Farhat, C., Darve, E.
  2020; 416

- **In situ adaptive reduction of nonlinear multiscale structural dynamics models** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
  He, W., Avery, P., Farhat, C.
  2020

- **Model Reduction Framework with a New Take on Active Subspaces for Optimization Problems with Linearized Fluid-Structure Interaction Constraints** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Boncoraglio, G., Farhat, C., Bou-Mosleh, C.

  2020

- **Discrete embedded boundary method with smooth dependence on the evolution of a fluid-structure interface** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Ho, J., Farhat, C.

  2020

- **An embedded boundary approach for resolving the contribution of cable subsystems to fully coupled fluid-structure interaction** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Huang, D. Z., Avery, P., Farhat, C.

  2020

- **Feasible Probabilistic Learning Method for Model-Form Uncertainty Quantification in Vibration Analysis**

  Farhat, C., Tezaur, R., Chapman, T., Avery, P., Soize, C.

  AMER INST AERONAUTICS ASTRONAUTICS.2019: 4978–91

- **Mesh adaptation framework for embedded boundary methods for computational fluid dynamics and fluid-structure interaction** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*

  Borker, R., Huang, D., Grimberg, S., Farhat, C., Avery, P., Rabinovitch, J.

  2019; 90 (8): 389–424

- **Fast computation of the wall distance in unsteady Eulerian fluid-structure computations** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*

  Grimberg, S., Farhat, C.

  2019; 89 (4-5): 143–61

- **A multilevel FETI-DP method and its performance for problems with billions of degrees of freedom** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Toivanen, J., Avery, P., Farhat, C.

  2018; 116 (10-11): 661–82

- **A family of position- and orientation-independent embedded boundary methods for viscous flow and fluid-structure interaction problems** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Huang, D. Z., De Santis, D., Farhat, C.

  2018; 365: 74–104

- **Parameterization Framework for the MDAO of Wing Structural Layouts**

  Dubois, A., Farhat, C., Abukhwejah, A. H., Shageer, H.

  AMER INST AERONAUTICS ASTRONAUTICS.2018: 1627–38

- **Modeling and Quantification of Model-Form Uncertainties in Eigenvalue Computations Using a Stochastic Reduced Model** *AIAA JOURNAL*

  Farhat, C., Bos, A., Avery, P., Soize, C.

  2018; 56 (3): 1198–1210

- **A discontinuous Galerkin method with Lagrange multipliers for spatially-dependent advection-diffusion problems** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*

  Borker, R., Farhat, C., Tezaur, R.

  2017; 327: 93–117

- **A multilevel projection-based model order reduction framework for nonlinear dynamic multiscale problems in structural and solid mechanics** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Zahr, M. J., Avery, P., Farhat, C.

  2017; 112 (8): 855–81

- **A high-order discontinuous Galerkin method for unsteady advection-diffusion problems** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Borker, R., Farhat, C., Tezaur, R.

  2017; 332: 520-537

- **Accelerated mesh sampling for the hyper reduction of nonlinear computational models** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Chapman, T., Avery, P., Collins, P., Farhat, C.

  2017; 109 (12): 1623-1654

- **An enhanced FIVER method for multi-material flow problems with second-order convergence rate** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Main, A., Zeng, X., Avery, P., Farhat, C.

  2017; 329: 141-172

- **TOWARDS MODEL ORDER REDUCTION FOR UNCERTAINTY PROPAGATION IN BLAST-INDUCED TRAUMATIC BRAIN INJURY**

  Iliopoulos, A. P., Michopoulos, J. G., Avery, P., Farhat, C., Teferra, K., Qidwal, S., ASME

  AMER SOC MECHANICAL ENGINEERS.2017

- **Real-time solution of linear computational problems using databases of parametric reduced-order models with arbitrary underlying meshes** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Amsallem, D., Tezaur, R., Farhat, C.

  2016; 326: 373-397

- **Projection-based model reduction for contact problems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Balajewicz, M., Amsallem, D., Farhat, C.

  2016; 106 (8): 644-663

- **A Practical Factorization of a Schur Complement for PDE-Constrained Distributed Optimal Control** *JOURNAL OF SCIENTIFIC COMPUTING*

  Choi, Y., Farhat, C., Murray, W., Saunders, M.

  2015; 65 (2): 576-597

- **Progressive construction of a parametric reduced-order model for PDE-constrained optimization** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Zahr, M. J., Farhat, C.

  2015; 102 (5): 1111-1135

- **Structure-preserving, stability, and accuracy properties of the energy-conserving sampling and weighting method for the hyper reduction of nonlinear finite element dynamic models** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Farhat, C., Chapman, T., Avery, P.

  2015; 102 (5): 1077-1110

- **Design optimization using hyper-reduced-order models** *STRUCTURAL AND MULTIDISCIPLINARY OPTIMIZATION*

  Amsallem, D., Zahr, M., Choi, Y., Farhat, C.

  2015; 51 (4): 919-940

- **An embedded boundary framework for compressible turbulent flow and fluid-structure computations on structured and unstructured grids** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*

  Lakshminarayan, V., Farhat, C., Main, A.

  2014; 76 (6): 366-395

- **Reduction of nonlinear embedded boundary models for problems with evolving interfaces** *JOURNAL OF COMPUTATIONAL PHYSICS*

  Balajewicz, M., Farhat, C.

  2014; 274: 489-504

- **A hybrid discontinuous in space and time Galerkin method for wave propagation problems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

  Wang, D., Tezaur, R., Farhat, C.

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