





Charbel Farhat

Vivian Church Hoff Professor of Aircraft Structures, Professor of Mechanical Engineering and Director of the Army High Performance Computing Research Center
Aeronautics and Astronautics

 Curriculum Vitae available Online

 Resume available Online

CONTACT INFORMATION

- **Administrator**

Grace Fontanilla - Administrative Associate

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Bio

BIO

Charbel Farhat is the Vivian Church Hoff Professor of Aircraft Structures at Stanford University, where he is also Chairman of the Department of Aeronautics and Astronautics, Professor of Mechanical Engineering, Professor in the Institute of Computational and Mathematical Engineering, and Director of the King Abdulaziz City for Science and Technology Center of Excellence for Aeronautics and Astronautics. He currently serves on the the Space Technology Industry-Government-University Roundtable. From 2007 to 2018, he served as the Director of the Army High Performance Computing Research Center at Stanford University, and from 2015 to 2019, on the United States Air Force Scientific Advisory Board (SAB). He has also previously served on the technical assessment boards of several national research councils and foundations, and on the United States Bureau of Industry and Security's Emerging Technology and Research Advisory Committee (ETRAC) at the United States Department of Commerce. He was designated by the US Navy recruiters as a Primary Key-Influencer and flew with the Blue Angels during Fleet Week 2014.

He is a Member of the National Academy of Engineering, a Member of the Royal Academy of Engineering (UK), a Member of the Lebanese Academy of Sciences, a Docteur Honoris Causa of Ecole Normale Supérieure Paris-Saclay, a Docteur Honoris Causa of Ecole Centrale de Nantes, a designated ISI Highly Cited Author in Engineering, and a Fellow of six professional societies: the Society of Industrial and Applied Mathematics (SIAM), the American Society of Mechanical Engineers (ASME), the International Association of Computational Mechanics (IACM), the World Innovation Foundation (WIF), the United States Association of Computational Mechanics (USACM), and the American Institute of Aeronautics and Astronautics (AIAA). 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 Académiques. He is the 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 and the Structures, Structural Dynamics and Materials 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, the IACM Award and the Computational Mechanics Award from the IACM, the Gordon Bell Prize and the Sidney Fernbach Award from the Institute of Electrical and Electronics Engineers (IEEE) Computer Society, and the Modeling and Simulation Award from the Department of Defense.

He is also Editor-in-Chief of the International Journal for Numerical Methods in Engineering, Editor of the International Journal for Numerical Methods in Fluids, and a member of the editorial boards of nine other international scientific journals. 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 400 refereed journal publications on fluid-structure interaction, computational fluid dynamics on moving grids, computational structural mechanics, computational acoustics, supercomputing, parallel processing, and model order reduction as well as other approaches for physics-based machine learning.

ACADEMIC APPOINTMENTS

- Professor, Aeronautics and Astronautics
- Professor, Mechanical Engineering
- Member, Institute for Computational and Mathematical Engineering (ICME)

ADMINISTRATIVE APPOINTMENTS

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

HONORS AND AWARDS

- 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 Normale Supérieure Paris-Saclay, France (2017)
- Docteur Honoris Causa, Ecole Centrale de Nantes, 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, US Association of Computational Mechanics (2001)
- Fellow, World Innovation Foundation (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, The Space Technology Industry-Government-University Roundtable, The National Academies (2017 - present)
- Chair, Pendray Award Committee, The American Institute of Aeronautics and Astronautics (2015 - present)
- Member, The United States Air Force Scientific Advisory Board (SAB), United States Air Force (2015 - present)
- 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, Association Teratec (2010 - present)
- 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 - 2018)
- 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 - present)
- Member, High Scientific Council, Office National d' Etudes et de Recherches Aerospatiales (ONERA) (2006 - 2012)

- Member, The Sandia Science Advisory Board, The Sandia National Laboratories (2006 - 2009)
- 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)
- Fellow, The International Association of Computational Mechanics (2002 - present)
- Chair, The Engineering Sciences Research Foundation's External Review Panel, The Sandia National Laboratories (2002 - 2009)
- Fellow, The World Innovation Foundation (2001 - present)
- Fellow, The US Association of Computational Mechanics (2001 - present)
- Member, General Council, The International Association for Computational Mechanics, The International Association for Computational Mechanics (2000 - present)
- Fellow, The American Institute of Aeronautics and Astronautics (1999 - present)
- Member-at-Large, The United States Association for Computational Mechanics, The United States Association for Computational Mechanics (1995 - 2006)

PROFESSIONAL EDUCATION

- Diplome d'Ingenieur, Ecole Centrale des Arts et Manufactures, France (1983)
- MS, Universite de Paris VI, France, Applied Mechanics (1983)
- MS, The University of California, Berkeley, Structural Engineering and Structural Mechanics (1984)
- MS, The University of California, Berkeley, Electrical Engineering and Computer Sciences (1986)
- PhD, The University of California, Berkeley, Civil Engineering (1987)

LINKS

- Research and Teaching Site: <http://www.stanford.edu/group/frg>
- Flying with the Blue Angels: <https://www.flickr.com/photos/stanfordeng/sets/72157648134366930/>

Research & Scholarship

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 and analysis 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 the nonlinear aeroelasticity and flight dynamics of Micro Aerial Vehicles (MAVs) with flexible flapping wings and N+3 aircraft with High Aspect Ratio (HAR) wings, layout optimization and additive manufacturing of wing structures, supersonic inflatable aerodynamic decelerators for Mars landing, and the reliable automated carrier landing via model predictive control. Current theoretical and computational emphases in research are on high-performance, multi-scale modeling for the high-fidelity analysis of multi-physics problems, high-order embedded boundary methods, uncertainty quantification, probabilistic machine learning, and efficient projection-based model order reduction as well as other forms of physics-based machine learning for time-critical applications such as design, active control, and digital twins.

Teaching

COURSES

2019-20

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

2018-19

- Mechanical Vibrations: AA 242B, ME 242B (Spr)
- Numerical Methods for Compressible Flows: AA 214B (Win)

2017-18

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

2016-17

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

STANFORD ADVISEES

Albo Voci

Doctoral Dissertation Reader (AC)

Ashley Coates, Jessie Lauzon

Doctoral Dissertation Advisor (AC)

Spenser Anderson, Joshua Barnett, Gabriele Boncoraglio, Sebastian Grimberg, Wanli He, Jonathan Ho, Daniel Zhengyu Huang, Andrew McClellan, Tina White

Master's Program Advisor

Faisal As'ad, Reid Bassette, Gabriele Boncoraglio, Robert Dyro, Zach Sermarini, Wouter Van Gijsegem, Noah Youkilis, Jean de Becdelievre

Doctoral Dissertation Co-Advisor (AC)

Matthew Willis

Publications

PUBLICATIONS

- **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
- **Nonlinear Model Order Reduction Based on Local Reduced-Order Bases**
Amsallem, D., Zahr, M., Farhat, C.
- **Design of a Data-Driven Environment for Multiphysics and Multi-Domain Applications** *Dynamic Data Driven Applications Systems*
Michopoulos, J., Tsompanopoulou, P., Houstis, E., Farhat, C., Lesoinne, M., Rice, J.
edited by Darema, F.
Kluwer Academic Publishers, Netherlands, (in press).
- **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*

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- 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.
2014; 99 (4): 263-289
 - **Dimensional reduction of nonlinear finite element dynamic models with finite rotations and energy-based mesh sampling and weighting for computational efficiency** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Farhat, C., Avery, P., Chapman, T., Cortial, J.
2014; 98 (9): 625-662
 - **An ALE formulation of embedded boundary methods for tracking boundary layers in turbulent fluid-structure interaction problems** *JOURNAL OF COMPUTATIONAL PHYSICS*
Farhat, C., Lakshminarayan, V. K.
2014; 263: 53-70
 - **A second-order time-accurate implicit finite volume method with exact two-phase Riemann problems for compressible multi-phase fluid and fluid-structure problems** *JOURNAL OF COMPUTATIONAL PHYSICS*
Main, A., Farhat, C.
2014; 258: 613-633
 - **The discontinuous enrichment method for medium-frequency Helmholtz problems with a spatially variable wavenumber** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*
Tezaur, R., Kalashnikova, I., Farhat, C.
2014; 268: 126-140
 - **On the Stability of Reduced-Order Linearized Computational Fluid Dynamics Models Based on POD and Galerkin Projection: Descriptor vs Non-Descriptor Forms** *Workshop on Reduced Basis, POD and Reduced Order Methods for Model and Computational Reduction: towards Real-time Computing and Visualization*
Amsallem, D., Farhat, C.
SPRINGER INT PUBLISHING AG.2014: 215–233
 - **Dynamic implosion of underwater cylindrical shells: Experiments and Computations** *INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES*
Farhat, C., Wang, K. G., Main, A., Kyriakides, S., Lee, L., Ravi-Chandar, K., Belytschko, T.
2013; 50 (19): 2943-2961
 - **A high-order discontinuous Galerkin method with Lagrange multipliers for advection-diffusion problems** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*
Brogniez, S., Farhat, C., Hachem, E.
2013; 264: 49-66
 - **Modeling of Fuel Sloshing and its Physical Effects on Flutter** *AIAA JOURNAL*
Farhat, C., Chiu, E. K., Amsallem, D., Schotte, J., Ohayon, R.
2013; 51 (9): 2252-2265
 - **The GNAT method for nonlinear model reduction: Effective implementation and application to computational fluid dynamics and turbulent flows** *JOURNAL OF COMPUTATIONAL PHYSICS*
-

- Carlberg, K., Farhat, C., Cortial, J., Amsallem, D.
2013; 242: 623-647
- **An adaptive scheme for a class of interpolatory model reduction methods for frequency response problems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Hetmaniuk, U., Tezaur, R., Farhat, C.
2013; 93 (10): 1109-1124
 - **Multiphysics simulations: Challenges and opportunities** *INTERNATIONAL JOURNAL OF HIGH PERFORMANCE COMPUTING APPLICATIONS*
Keyes, D. E., McInnes, L. C., Woodward, C., Gropp, W., Myra, E., Pernice, M., Bell, J., Brown, J., Clo, A., Connors, J., Constantinescu, E., Estep, D., Evans, et al
2013; 27 (1): 4-83
 - **RECENT DEVELOPMENTS IN HIGH-PERFORMANCE COMPUTATIONAL VIBRO-ACOUSTICS IN THE MEDIUM FREQUENCY REGIME** *Internoise/ASME 2012 Noise Control and Acoustics Division Conference*
Farhat, C., Tezaur, R., Hetmaniuk, U.
AMER SOC MECHANICAL ENGINEERS.2013: 137-145
 - **Nonlinear model order reduction based on local reduced-order bases** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Amsallem, D., Zahr, M. J., Farhat, C.
2012; 92 (10): 891-916
 - **Computational algorithms for tracking dynamic fluid-structure interfaces in embedded boundary methods** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*
Wang, K., Gretarsson, J., Main, A., Farhat, C.
2012; 70 (4): 515-535
 - **FIVER: A finite volume method based on exact two-phase Riemann problems and sparse grids for multi-material flows with large density jumps** *JOURNAL OF COMPUTATIONAL PHYSICS*
Farhat, C., Gerbeau, J., Rallu, A.
2012; 231 (19): 6360-6379
 - **Stabilization of projection-based reduced-order models** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Amsallem, D., Farhat, C.
2012; 91 (4): 358-377
 - **Provably stable and time-accurate extensions of Runge-Kutta schemes for CFD computations on moving grids** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*
Brogniez, S., Rajasekharan, A., Farhat, C.
2012; 69 (7): 1249-1270
 - **Review and assessment of interpolatory model order reduction methods for frequency response structural dynamics and acoustics problems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Hetmaniuk, U., Tezaur, R., Farhat, C.
2012; 90 (13): 1636-1662
 - **A hybrid discontinuous Galerkin method for computing the ground state solution of Bose-Einstein condensates** *JOURNAL OF COMPUTATIONAL PHYSICS*
Farhat, C., Toivanen, J.
2012; 231 (14): 4709-4722
 - **A systematic approach for constructing higher-order immersed boundary and ghost fluid methods for fluid-structure interaction problems** *JOURNAL OF COMPUTATIONAL PHYSICS*
Zeng, X., Farhat, C.
2012; 231 (7): 2892-2923
 - **Overview of the discontinuous enrichment method, the ultra-weak variational formulation, and the partition of unity method for acoustic scattering in the medium frequency regime and performance comparisons** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Wang, D., Tezaur, R., Toivanen, J., Farhat, C.
2012; 89 (4): 403-417
 - **A dual-primal FETI method for solving a class of fluid-structure interaction problems in the frequency domain** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*

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- Li, J., Farhat, C., Avery, P., Tezaur, R.
2012; 89 (4): 418-437
- **Nonlinear Model Order Reduction With Local Reduced-Order Bases for Hyper-Reduction**
Amsallem, D., Zahr, M., Farhat, C.
2012
 - **Real-Time CFD-Based Fluid-Structure Predictions Using a Database of Parameterized Reduced-Order Models**
Amsallem, D., Farhat, C., Zahr, M.
2012
 - **A Systematic Approach for Constructing Higher-Order Immersed Boundary and Ghost Fluid Methods for Fluid and Fluid-Structure Interaction Problems** *Journal of Computational Physics*
Zeng, X., Farhat, C.
2012; 231: 2892-2923
 - **FIVER: A Higher-Order Embedded Boundary Method for Multi-Material Compressible Flow and Flow-Structure Problems**
Farhat, C.
2012
 - **Efficient Structure-Preserving Model Reduction for Nonlinear Mechanical Systems with Application to Structural Dynamics**
Carlberg, K., Cortial, J., Farhat, C.
2012
 - **A Second-Order Immersed Boundary Method for Three-Dimensional Compressible Fluid-Structure Interaction Problems**
Zeng, X., Wang, K., Farhat, C.
2012
 - **An Embedded Boundary Method for Multi-Material Fluid-Structure Interaction Problems with Large Deformations and Crack Propagation**
Wang, K., Farhat, C., Lea, P., Belytschko, T.
2012
 - **A Hyper-Reduction Method for Nonlinear Structural Dynamics Reduced-Order Models**
Farhat, C., Cortial, J., Chapman, T.
2012
 - **Nonlinear Model Reduction for CFD Problems Using Local Reduced Order Base**
Washabaugh, K., Amsallem, D., Zahr, M., Farhat, C.
2012
 - **FIVER: A Finite Volume Method Based on Exact Two-Phase Riemann Problems and Sparse Grids for Multi-Material Flows with Large Density Jump**
Farhat, C., Gerbeau, J., -F., Rallu, A.
2012
 - **An Embedded Boundary Method for Viscous Fluid/Structure Interaction Problems and Application to Flexible Flapping Wings**
Farhat, C., Larat, A., Main, A., Avery, P., Wang, K., Saint-Jalm, C.
2012
 - **A Computational Framework for Multi-Material Fluid-Structure Interaction with Crack Propagation**
Wang, K., Farhat, C., Lea, P., Belytschko, T.
2012
 - **Parametric Model Order Reduction Using Stabilized Consistent Interpolation on Matrix Manifolds**
Amsallem, D., Farhat, C.
2012
 - **On the Stability of Projection-Based Reduced-Order Models: Descriptor vs Non-Descriptor Forms**
Farhat, C., Amsallem, D.
2012

- **On the Stability of Linearized Reduced-Order Models: Descriptor vs Non-Descriptor Form and Application to Fluid-Structure Interaction**
Amsallem, D., Farhat, C.
2012
- **Algorithms for interface treatment and load computation in embedded boundary methods for fluid and fluid-structure interaction problems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN FLUIDS*
Wang, K., Rallu, A., Gerbeau, J., Farhat, C.
2011; 67 (9): 1175-1206
- **A discontinuous enrichment method for variable-coefficient advection-diffusion at high Peclet number** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Kalashnikova, I., Tezaur, R., Farhat, C.
2011; 87 (1-5): 309-335
- **A low-cost, goal-oriented 'compact proper orthogonal decomposition' basis for model reduction of static systems** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Carlberg, K., Farhat, C.
2011; 86 (3): 381-402
- **Efficient non-linear model reduction via a least-squares Petrov-Galerkin projection and compressive tensor approximations** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*
Carlberg, K., Bou-Mosleh, C., Farhat, C.
2011; 86 (2): 155-181
- **A Hybrid Kirchhoff Migration Direction-of-Arrival Method for Underwater Imaging of Complex Objects Using Sparse Sensor Arrays** *30th International Acoustical Imaging Symposium*
Dord, J., Farhat, C.
SPRINGER.2011: 231–239
- **The GNAT Nonlinear Model Reduction Method and its Application to Fluid Dynamics Problems**
Carlberg, K., Cortial, J., Amsallem, D., Zahr, M., Farhat, C.
2011
- **Efficient Model Reduction of Large-Scale Nonlinear Systems in Fluid Dynamics**
Carlberg, K., Amsallem, D., Bou-Mosleh, C., Farhat, C.
2011
- **A Computational Study of the Effects of Fuel Slosh on Flutter**
Chiu, E., Farhat, C., Schotte, J., Ohayon, R.
2011
- **The Discontinuous Enrichment Method and its Domain Decomposition Solver for the Helmholtz Equation**
Tezaur, R., Farhat, C.
2011
- **Real-Time Parametric Adaptation of Reduced-Order Models by Consistent Interpolation on a Manifold**
Amsallem, D., Farhat, C.
2011
- **Comparison of Model Reduction Techniques on High-Fidelity Linear and Nonlinear Electrical, Mechanical, and Biological System**
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