

ROGER GHANEM
254C KAP Hall
University of Southern California
Los Angeles, CA 90039
(213) 740-9528 (W) (213) 740-2037 (FAX)
e-mail: ghanem@usc.edu

CURRICULUM VITAE

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November 23, 2021

EDUCATION

Ph.D in Civil Engineering

RICE UNIVERSITY, 1989

Master of Civil Engineering

RICE UNIVERSITY, 1985

B.E. in Civil Engineering

AMERICAN UNIVERSITY OF BEIRUT, 1984

PROFESSIONAL EXPERIENCE

- . Visiting faculty, Google LLC., 2022.
- . Gordon S. Marshall Professor of Engineering Technology, University of Southern California, 2011-
- . Professor, University of Southern California, 2005-present
- . Professor, The Johns Hopkins University, 2002-2004
- . Director, Institute for Uncertainty Analysis and Management, Johns Hopkins University, 1998-2004
- . Associate Professor, The Johns Hopkins University, 1998-2002
- . Assistant Professor, The Johns Hopkins University, 1995-1998
- . Assistant Professor, State University of New York, 1992-1995
- . Visiting Faculty, Google., 2022
- . Visiting Professor, Tongji University, Shanghai, China, 2014-2017
- . Visiting Professor, École Normale Supérieure de Cachan, France, 2002
- . Visiting Professor, Université Marne la Vallée, France, 2003, 2004
- . Visiting Faculty, Sandia National Laboratories, July-August 2002, 2003 and 2004
- . Visiting Scientist, Kyoto University, 2000
- . Post-Doctoral Research Associate, Rice University, 1988-1991
- . Research Assistant, Rice University, 1985-1988

AWARDS AND HONORS

- . Fellow of the Society for Industrial and Applied Mathematics (SIAM), 2019
- . Fellow of the International Association for Computational Mechanics (IACM), 2018
- . Fellow of the American Association for the Advancement of Science (AAAS), 2016
- . Fellow of the Engineering Mechanics Institute of ASCE, 2013
- . International Association for Structural Safety and Reliability (IASSAR) Senior Research Award, 2009
- . Computational Structural Mechanics Award, U.S. Association for Computational Mechanics, 2009
- . Fellow of the U.S. Association on Computational Mechanics (USACM), 2007
- . ASCE Walter L. Huber Civil Engineering Research Prize, 2000
- . Distinguished Faculty Award for Excellence in Undergraduate Education, Johns Hopkins, 1996
- . IASSAR Junior Research Award, 1993

RESEARCH INTERESTS

Predictive science; Probabilistic modeling and stochastic systems; Data assimilation and propagation of uncertainty in complex systems; Probabilistic multi-scale modeling and analysis.

PUBLICATIONS

Books:

1. Ghanem, R., Higdon, D., and Owhadi, H., *Handbook of Uncertainty Quantification*, Springer-Verlag, 2017.
2. Ghanem, R., and Spanos, P., *Stochastic Finite Elements: A Spectral Approach*, Springer Verlag, 1991. (reissued by Dover Publications, 2003.)

Papers in Refereed Journals:

1. Soize, C. and Ghanem, R., “Probabilistic Learning on Manifolds (PLoM) with partition,” *International Journal for Numerical Methods in Engineering*, (2021) (DOI: 10.1002/nme.6856).
2. Wang, A. and Ghanem, R., “An extended polynomial chaos expansion for PDF characterization and variation with aleatory and epistemic uncertainties,” *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.113854, 382, 113854 (2021).
3. Soize, C. and Ghanem, R., “Probabilistic learning on manifolds constrained by nonlinear partial differential equations for small datasets,” *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.113777, 380, 113777 (2021).
4. Zhang, R. and Ghanem, R., “Normal-bundle bootstrap,” *SIAM Journal on Mathematics of Data Science (SIMODS)* Vol. 3, No. 2, pp. 573–592, 2021.
5. Ezvan, O., Zeng, X., Ghanem, R. and Gencturk, B., “Dominant substructural vibration modes for fully-loaded spent nuclear fuel canisters” *Computational Mechanics*, Vol. 67, pp: 365-384, 2021.
6. Ezvan, O., Zeng, X., Ghanem, R. and Gencturk, B., “Multiscale modal analysis of fully-loaded spent nuclear fuel canisters,” *Computer Methods in Applied Mechanics and Engineering*, Vol. 367, 2020 (DOI:10.1016/j.cma.2020.113072).
7. Zeng, X. and Ghanem, R. “Dynamics identification and forecasting of COVID-19 by switching Kalman filters,” *Computational Mechanics* Vol. 66, No, 5, pp. 1179-1193, 2020.
8. Ghanem R., Soize, C., Mehrez, L., Aitharaju, V., “Probabilistic learning and updating of a digital twin for composite material systems,” *International Journal of Numerical Methods in Engineering*, 2020 (DOI: 10.1002/nme.6430).
9. Marmarelis, M. and Ghanem, R. “Data-driven stochastic optimization on manifolds for additive manufacturing,” *Computational Materials Science*, Vol. 181, 109750, 2020.
10. Liang, X., Wang, R., and Ghanem, R., “Uncertainty Quantification of Detonation through Adapted Polynomial Chaos,” *International Journal for Uncertainty Quantification*, Vol. 10, No. 1, 2020.
11. Zhang, R. and Ghanem, R. “Demand, supply, and performance of street-hail taxi,” *IEEE Transactions on Intelligent Transportation Systems*, Vol. 21, No. 10, pp. 4123-4132, 2020.
12. C. Soize, R. Ghanem and C. Descelliers, “Sampling of Bayesian posteriors with a non-Gaussian probabilistic learning on manifolds from a small dataset”, *Journal Statistics and Computing*, Vol. 30, No. 5, pp. 1433-1457, 2020.

13. Soize, C. and Ghanem, R., "Physics-constrained non-Gaussian learning on manifolds," *International Journal of Numerical Methods in Engineering*, Vol. 121, No. 1, pp. 110-145 2020.
14. Ghanem, R., Soize, C., Safta, C., Huan, X., Lacaze, G., Oefelin, J. and Najm, H., "Design optimization of a scramjet under uncertainty using probabilistic learning on manifolds," *Journal of Computational Physics*, Vol. 399, 2019.
15. Soize, C., Ghanem, R., Safta, C., Huan, X., Vane, Z., Oefelin, J., Lacaze, G., Najm, N. "Enhancing Model Predictability for a Scramjet Using Probabilistic Learning on Manifolds," *AIAA Journal*, Vol. 57, No. 1, pp. 365-378, 2019.
16. Ghauch, Z., Aitharaju, V., Rodgers, W., Papusuleti, P., Dereims, A., and Ghanem, R., "Integrated stochastic analysis of fiber composites manufacturing using adapted polynomial chaos expansions," *Composites Part A: Applied Science and Manufacturing*, Vol. 118, pp. 179-193, 2019.
17. Soize, C., Ghanem, R., Safta, C., Huan, X., Vane, Z., Oefelin, J., Lacaze, G., Najm, H., Tang, Q., and Chen, X., "Entropy-based closure for probabilistic learning on manifolds," *Journal of Computational Physics*, Vol. 388, pp. 518-533, 2019.
18. Tsilifis, P., Huan, X., Safta, C., Sargsyan, K., Lacaze, G., Oefelin, J. Najm, H., and Ghanem, R., "Compressive sensing adaptation for polynomial chaos expansions," *Journal of Computational Physics*, Vol. 380, No. 1, pp. 29-47, 2019.
19. Ezvan, O., Zeng, X., Ghanem, R., and Gencturk, B., "Dominant vibration modes for broadband frequency analysis of multiscale structures with numerous local vibration modes," *International Journal for Numerical Methods in Engineering*, Vol. 117, No. 6., pp 644-692, 2019.
20. Tsilifis, P. and Ghanem, R., "Bayesian adaptation of chaos representations using variational inference and sampling on geodesics", *Proceedings of the Royal Society, A: Mathematical, Physical and Engineering Sciences*, Vol. 474, No. 2217, 2018.
21. Khalil, I., Pratt, Q., Schmachtenberger, H., and Ghanem, R., "Heat Transfer Modeling of Spent Nuclear Fuel Using Uncertainty Quantification and Polynomial Chaos Expansion," *Journal of Heat Transfer, Transactions of the ASME*, Vol. 140, No. 2. 2018.
22. Thimmisetty, C., Aminzadeh, F., Rose, K., and Ghanem, R., "Multiscale Stochastic Representations using Polynomial Chaos Expansions with Gaussian Process Coefficients", *Data-Enabled Discovery and Applications*, Vol. 2, No.3, 2018.
23. Ghanem, R., Soize, C., and Thimmisetty, C., "Optimal well-placement using probabilistic learning," *Data-Enabled Discovery and Applications*, Vol. 2, No.4, 2018.
24. Tsilifis, P., Browning, W., Wood, T., Newton, P. and Ghanem, R., "The stochastic quasi-chemical model for bacterial growth: Variational Bayesian parameter update," *Journal of Nonlinear Science*, Vol. 28, pp. 371-393, 2018.
25. Mehrez, L., Fish, J., Aitharaju, V., Rodgers, Will and Ghanem, R., "A PCE-based multiscale framework for the characterization of uncertainties in complex systems," *Computational Mechanics*, Vol. 61, No. 1-2, pp. 219-236, 2018.
26. Ghanem, R. and Soize, C., "Probabilistic Non-convex Constrained Optimization with Fixed Number of Function Evaluations," *International Journal for Numerical Methods in Engineering*, Vol. 113, pages 719-741, 2018 (DOI: 10.1002/nme.5632).

27. Thimmisetty, C., Ghanem, R., White, J., and Chen, X., "High-dimensional intrinsic interpolation using Gaussian process regression and diffusion maps," *Mathematical Geosciences*, Vol. 50, pp. 77-96, 2018.
28. Bassamzadeh, N. and Ghanem, R., "Probabilistic Data-Driven Prediction of Wellbore Signatures in High-Dimensional Data Using Bayesian Networks", *SPE Journal*, Vol. 23, No 4, pp. 1090-1104, 2018.
29. Thimmisetty, C., Tsilifis, P., and Ghanem, R., "Homogeneous chaos basis adaptation for design optimization under uncertainty: Application to the oil well placement problem," *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, Vol .31, No. 3, pp. 265-276, 2017.
30. Tsilifis, P. and Ghanem, R., "Reduced Wiener Chaos representation of random fields via basis adaptation and projection," *Journal of Computational Physics*, Vol. 341, pp. 102-120, 2017.
31. Bassamzadeh, N. and Ghanem, R., "Multiscale stochastic prediction of electricity demand in smart grids using Bayesian networks," *Applied Energy*, Vol. 193, pp. 369-380, 2017.
32. Soize, C. and Ghanem, R. "Polynomial chaos representations of databases on manifolds," *Journal of Computational Physics*, Vol. 335, pp, 201-221, 2017.
33. Tsilifis, P., Ghanem, R. and Hajali, P., "Efficient Bayesian experimentation using an expected information gain lower bound," *SIAM/ASA Journal of Uncertainty Quantification*, Vol. 5, pp. 30-62, 2017.
34. Xiao, H., Wang, J., and Ghanem, R. "A random matrix approach for quantifying model-form uncertainties in turbulence modeling," *Computer Methods in Applied Mechanics and Engineering*, Vol. 313, No. 1, pp. 941-965, 2017.
35. Soize, C. and Ghanem, R. "Data-driven probability concentration and sampling on manifold," *Journal of Computational Physics*, Vol. 321, pp. 242-258, 2016.
36. Meidani, H. and Ghanem, R., "Random Markov decision processes for sustainable infrastructure systems," *Structure and Infrastructure Engineering*, Vol. 11, No. 5, pp. 655-667, 2015.
37. Sargsyan, K, Najm, H. and Ghanem, R., "On the statistical calibration of physical models," *International Journal of Chemical Kinetics*, Vol. 47, No. 4, pp. 246-276, 2015.
38. Ghanem, R. and Soize, C., "Remarks on stochastic properties of materials through finite deformations," *International Journal for Multiscale Computational Engineering*, Vol. 13, No. 4, pp. 367-374, 2015.
39. Ghanem, R., Yadegaran, I., Thimmisetty, C., Keshavarzadeh, V., Masri, S., Red-Horse, J., Moser, R., Oliver, T., Spanos, P., and Aldraihem, O., "A Probabilistic Approach to the NASA Langley Multidisciplinary Uncertainty Quantification Challenge Problem," *AIAA Journal of Aerospace Information Systems*, Vol. 12, pp. 170-188, 2015 .
40. Bassamzadeh, N., Ghanem, R., Lu, S. and Kazemitabar, J., "Robust scheduling of smart appliances with uncertain electricity prices in a heterogeneous population," *Energy and Buildings*, Vol. 84, pp. 537-547, 2014.
41. Comboul, M. and Ghanem, R., "Multiscale Modeling for Stochastic Forest Dynamics," *International Journal for Multiscale Computational Engineering*, Vol. 12, No. 4, pp. 319-329, 2014.

42. Lakeland, D., Rechenmacher, A. and Ghanem, R., "Towards a complete model of soil liquefaction: The importance of fluid flow and grain motion," *Proceedings of the Royal Society, A*, Vol. 470, No, 2165, 2014.
43. Meidani, H. and Ghanem, R., "Spectral power iterations for the random eigenvalue problem," *AIAA Journal*, Vol. 52, No. 5, pp. 912-925, 2014.
44. Sousedik, B. and Ghanem, R., "Truncated hierarchical preconditioning for the stochastic Galerkin FEM," *International Journal on Uncertainty Quantification*, Vol. 4, No. 4, pp. 333-348, 2014.
45. Tipireddy, R. and Ghanem, R. "Adaptation in homogeneous chaos spaces," *Journal of Computational Physics*, Vol. 259, pp. 304-317, 2014.
46. V. Keshavarzzadeh, R. Ghanem, S. Masri and O. Aldraihem, "Convergence acceleration of polynomial chaos solutions via sequence transformation," *Computer Methods in Applied Mechanics and Engineering*, Vol. 271, No. 1, pp. 167-184, 2014.
47. Sousedik, B., Ghanem, R., and Phipps, E., "Hierarchical Schur complement preconditioner for the stochastic Galerkin finite element methods," *Numerical Linear Algebra with Applications*, Vol. 21, No. 1, pp. 136-151, 2014.
48. Arnst, M., Ghanem, R., Phipps, E., and Red-Horse, J., "Reduced chaos expansions with random coefficients in reduced-dimensional stochastic modeling of coupled problems," *International Journal for Numerical Methods in Engineering*, Vol. 97, No.5., pp. 352-376, 2014.
49. Comboul, M. and Ghanem, R., "The value of information in the design of resilient water distribution sensor networks," *ASCE's Journal of Water Resources Planning and Management*, Vol. 139, No. 4, pp. 449-455, 2013.
50. Arnst, M., Soize, C., and Ghanem, R., "Hybrid sampling/spectral method for solving stochastic coupled problems," *SIAM/ASA Journal on Uncertainty Quantification*, Vol. 1, No. 1, pp. 218-243, 2013.
51. Tipireddy, R., Ghanem, R., Ghosh, S. and Paquet, D., "High resolution micrograph synthesis using a parametric texture model and a particle filter," (doi:10.1186/2193-9772-2-2) *Integrating Materials and Manufacturing Innovation*, Vol. 2, No. 2, 2013.
52. Torrens, P., Kevrekidis, Y., Ghanem, R., and Zou, Y., "Simple urban simulation atop complicated models: multi-scale Equation Free computing of sprawl using geographic automata," *Entropy*, Vol. 15, No. 7, pp. 2606-2634, 2013.
53. Meidani, H. and Ghanem, R., "Multiscale Markov models with random transitions for energy demand management," *Energy and Buildings*, Vol. 61, p. 267-274, 2013.
54. Noshadravan, A. and Ghanem, R., "A probabilistic mesoscale damage detection in polycrystals using a random matrix approach," *Journal of Intelligent Material Systems and Structures*, Vol. 24, No. 8, pp. 1007-1017, 2013.
55. Peng, Y.-B., Ghanem, R., and Li, J., "Generalized optimal control policy for stochastic optimal control of structures," *Structural Control and Health Monitoring*, Vol. 20, No. 2, pp. 67-89, 2013.
56. Noshadravan, A., Ghanem, R., Guillemot, J., Atodaria, I., and Peralta, P., "Validation of a Probabilistic Model for Mesoscale Elasticity Tensor of Random Polycrystals," *International Journal for Uncertainty Quantification*, Vol. 3, No. 1, pp. 73-100, 2013.

57. Meidani, H. and Ghanem, R., "Uncertainty quantification for Markov chain models," *Chaos*, Vol. 22, No. 4, 2012.
58. Zou, Y. Kevrekidis, I., Torrens, P., and Ghanem, R., "Accelerating agent-based computation of complex urban systems," *International Journal of Geographical Information Science*, Vol. 26, No. 10, pp. 1917-1937, 2012.
59. Arnst, M., Ghanem, R., Phipps, E., and Red-Horse, J., "Measure transformation and efficient quadrature in reduced-dimensional stochastic modeling of coupled problems," *International Journal for Numerical Methods in Engineering*, Vol. 92, No. 12, pp. 1044-1080, 2012.
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61. Guillemintot, J., Soize, C., and Ghanem, R., "Stochastic representation for anisotropic permeability tensor random fields," *International Journal for Numerical and Analytical Methods in Geomechanics*, Vol. 36, No. 13, pp. 1592-1608, 2012.
62. Ghosh, D., and Ghanem, R., "An invariant subspace-based approach to the random eigenvalue problem of systems with clustered spectrum," *International Journal for Numerical Methods in Engineering*, Vol. 91, No. 4, pp. 378-396, 2012.
63. Peng Y.B., Ghanem R., Li J., "Investigations of Microstructured Behaviors of Magnetorheological Suspensions," *Journal of Intelligent Material Systems and Structures*, Vol. 23, No. 12, pp. 1351-1370, 2012.
64. Arnst, M. and Ghanem, R., "A variational-inequality approach to stochastic boundary value problems with inequality constraints and its application to contact and elastoplasticity," *International Journal for Numerical Methods in Engineering*, Vol. 89, No. 13, pp. 1665-1690, 2012.
65. Bal, G., Ghanem, R., and Langmore, I., "Large deviation theory for a homogenized and 'corrected' elliptic ODE," *Journal of Differential Equations*, Vol. 251, No. 7, pp. 1864-1902, 2011.
66. Guillemintot, J., Noshadravan, A., Soize, C., and Ghanem, R., "A probabilistic model for bounded elasticity tensor random fields with application to polycrystalline microstructures," *Computer Methods in Applied Mechanics and Engineering*, Vol. 200, No. 17-20, pp. 1637-1648, 2011.
67. Arnst, M., Ghanem, R. and Masri, S., "Maximum entropy approach to the identification of stochastic reduced-order models of nonlinear dynamical systems," *The Aeronautical Journal*, Vol. 114, No. 1160, pp. 637-650, 2010.
68. Hernandez-Garcia M.R., Masri, S.F., Ghanem R., Figueiredo E., Farrar C.R., "A structural decomposition approach for detecting, locating, and quantifying nonlinearities in chain-like systems," *Structural Control & Health Monitoring*, Vol. 17, No. 7, pp. 761-777, 2010.
69. Peng Y.B., Ghanem R., Li J., "Polynomial chaos expansions for optimal control of nonlinear random oscillator," *Journal of Sound and Vibration*, Vol. 329, No. 18, pp. 3660-3678, 2010.
70. Hernandez-Garcia M.R., Masri, S.F., Ghanem R., Figueiredo E., Farrar C.R., "An experimental investigation of change detection in uncertain chain-like systems," *Journal of Sound and Vibration*, Vol. 329, No. 12, pp. 2395-2409, 2010.
71. Arnst M., Ghanem R., Soize C., "Identification of Bayesian posteriors for coefficients of chaos expansions," *Journal of Computational Physics*, Vol. 229, No. 9, pp. 3134-3154, 2010.

72. Das, S., Spall, J., and Ghanem, R., "Efficient Monte Carlo computation of Fisher information matrix using prior information," *Computational Statistics and Data Analysis*, Vol. 54, pp. 272-289, 2010.
73. Masri S.F., Ghanem R., Arrate F., and Caffrey, J.P., "A data-based procedure for analyzing the response of uncertain nonlinear systems," *Structural Control & Health Monitoring*, Vol. 16, No. 7-8, pp. 724-750, 2009.
74. Ghanem, R., "Introduction to special section on uncertainty quantification in nanoscale modeling" *Journal of Computational and Theoretical Nanoscience*, Vol. 6, No. 10, pp. 2255-2255, 2009.
75. Arnst, M. and Ghanem, R., "Probabilistic electromechanical modeling of nanostructures with random geometry" *Journal of Computational and Theoretical Nanoscience*, Vol. 6, No. 10, pp. 2256-2272, 2009.
76. Das, S. and Ghanem, R. "A Bounded random matrix approach for stochastic upscaling," *SIAM Journal on Multiscale Modeling & Simulation*, Vol. 8, No. 1, pp. 296-325, 2009.
77. Das, S., Ghanem, R., and Finette, S., "Polynomial Chaos representation of spatio-temporal random fields from experimental measurements," *Journal of Computational Physics*, Vol. 228, No. 23, pp. 8726-8751, 2009.
78. Ghanem, R., "Uncertainty quantification in computational and prediction science," *International Journal for Numerical Methods in Engineering*, Vol. 80, No. 6-7, pp: 671-672, 2009.
79. Red-Horse, J., and Ghanem, R., "Elements of a functional analytic approach to probability," *International Journal for Numerical Methods in Engineering*, Vol. 80, No. 6-7, pp: 689-716, 2009.
80. Soize, C. and Ghanem, R. "Reduced Chaos decomposition with random coefficients of vector-valued random variables and random fields," *Computer Methods in Applied Mechanics and Engineering*, Vol. 198, No. 21-26, pp. 1926-1934, 2009.
81. Saad, G. and Ghanem, R., "Characterization of reservoir simulation models using a polynomial chaos-based ensemble Kalman filter ," *Water Resources Research*, Vol. 45, Art.Num. W04417, Apr 21 2009.
82. Ghanem, R. and Das, S., "Hybrid Representations of Coupled Nonparametric and Parametric Models for Dynamic Systems," *AIAA Journal*, Vol. 47, No. 4, pp. 1035-1044, 2009.
83. Sarkar, A. Benabbou, N. and Ghanem, R., "Domain Decomposition Of Stochastic PDEs: Theoretical Formulations" *International Journal for Numerical Methods in Engineering*, Vol. 77, No. 5, pp. 689-701, 2009.
84. Chen J., Ghanem R. and Li J., "Partition of the probability-assigned space in probability density evolution analysis of nonlinear stochastic structures," *Probabilistic Engineering Mechanics*, Vol. 24, No. 1, pp. 27-42, 2009.
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90. Ghanem, R., Doostan, A. and Red-Horse, J., "A probabilistic construction of model validation," *Computer Methods in Applied Mechanics and Engineering*, Vol. 197, No. 29-32, pp. 2585-2595, 2008.
91. Ghosh, D. and Ghanem, R., "Stochastic convergence acceleration through basis enrichment of polynomial chaos expansions" *International Journal of Numerical methods in Engineering*, Vol. 73, No. 2, pp. 162-184, 2008.
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30. Li, J. and Ghanem, R., "Stochastic variational inequalities with polynomial chaos," *The 8th International Congress on Industrial and Applied Mathematics*, Beijing, China, August 10-14 2015.
31. Li, J. and Ghanem, R.. "Two Approaches for Solving Stochastic Variational Inequality Problems in the Framework of Polynomial Chaos Expansions," *13th US National Congress on Computational Mechanics*, LaJolla, CA, July 26-30 2015.
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Book Chapters:

1. R Zhang, P Wingo, R Duran, K Rose, J Bauer, R Ghanem, "Environmental Economics and Uncertainty: Review and a Machine Learning Outlook," *Oxford Encyclopedia of Environmental Economics*, 2020.
2. Ghanem, R., D. Higdon, and H. Owhadi, "Introduction to Uncertainty Quantification," in *Handbook on Uncertainty Quantification*, Springer, 2017.
3. Ghanem, R. and Red-Horse, J., "Polynomial Chaos: Modeling, Estimation, and Approximation," in *Handbook on Uncertainty Quantification*, Springer, 2017.
4. Das, S. and Ghanem, R., "Stochastic upscaling for inelastic material behavior from limited experimental data," *Computational Methods for Microstructure-Property Relationships*, pp. 443-368, Edited by S. Ghosh and D. Dimiduk, Springer-Verlag, 2010.
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Technical Reports:

1. NRC Committee on Mathematical Foundations of Verification, Validation, and Uncertainty Quantification “Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation, and Uncertainty Quantification,” *NRC Board on Mathematical Sciences and Their Applications Division on Engineering and Physical Sciences*, 2012.
2. Ghanem, R. “A Report to NSF on Opportunities and Challenges in Uncertainty Quantification for Complex Interacting Systems,” 2010.
3. Najm, H., Reagan, M., Knio, O., Ghanem, R., and LeMaitre, O. “Uncertainty Quantification in Reacting Flow Modelling,” *Sandia Report: SAND2003-8598*, 2003.
4. Ghanem, R., *Computer-Aided Design of Electro-Rheological Fluids*, Report to Daikin Corporation, Sakai, Japan, May 1997.
5. Ghanem, R., and Bujakov, M., *Nonlinear Control Techniques for Dynamical Systems with Uncertain Parameters*, National Center for Earthquake Engineering Research, Technical Report No NCEER-96-0007, May 1996.
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INVITED LECTURES

Keynote Addresses:

1. “Probabilistic Machine Learning with Physics,” *Third Annual MLSE Conference: Mechanical Engineering, Engineering Mechanics, and Civil Engineering tracks*, Columbia University, NYC, June 1-3 2020.
2. “Probabilistic Modeling for Complex Design and Decisions” *SoCal First Mechanics Symposium*, UCSD, LaJolla, CA, January 18 2020.
3. “Learning to adapt: UQ at extreme scale,” *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering*, 24-26 June 2019, Crete, Greece.
4. “Physics-Constrained Data Science: Adaptation for Large-Scale Inference” *International Workshop on Data Science in Civil Engineering*, Tongji University, Shanghai, June 8-9, 2019.
5. “Advances in stochastic dynamics: uncertainty, learning, and physics,” *The Wei-Qiu Zhu Lecture at the 11th China National Conference on Theory and Application of Random Vibration*, October 12-14, 2018, Yichang, Hubei, China.
6. “Modeling and Algorithmic Aspects of UQ for Material with Multiscale Behavior,” *Plenary talk at the SAMSI Workshop on Model Uncertainty: Mathematical and Statistical*, Durham, NC August 22 2018.
7. “Data-driven science: A paradigm for design and optimization,” *World Congress on Computational Mechanics*, NYC, NY July 22-27, 2018.

8. "Physics, Structure, and Uncertainty: Probabilistic Learning for Risk Mitigation" *ASCE Engineering Mechanics Institute Conference*, MIT, Boston, MA, May 29-June 2018.
9. "Machine learning for Uncertainty Quantification", *DOE/ASCR Scientific Machine Learning Workshop*, North Bethesda, MD January 30- February 1, 2018.
10. "Uncertainty modeling for materials with multiscale and multiphysics interactions," *ECCOMAS: Computational Modelling of Multi-Uncertainty and Multi-Scale Problems*, Porto, Portugal, September 12-14, 2017.
11. "Uncertainty Quantification for Complex Interacting Systems," *6th Asian Pacific Symposium on Structural Reliability and its Applications*, Shanghai, China, May 28-30 2016.
12. "Uncertainty Modeling and Quantification for Complex Decisions," (keynote) *First International Conference on the Quantification of Uncertainty in Engineering, Science and Technology (QUEST)*, Beihang University, Beijing, China, October 19-23, 2015.
13. "Risk Assessment for Complex Systems," *ASCE Engineering Mechanics Institute Inaugural International Conference*, Hong-Kong Polytechnic University, January 7-9 2015.
14. "Stochastic Reduced Models," *EURODYN 2014, The Ninth International Conference on Structural Dynamics*, Porto, Portugal, June 30 - July 2 2014.
15. "Stochastic Model Reduction with Basis and Measure Adaptation," *Aachen Conference on Computational Engineering Science*, Aachen, Germany, September 9 2013.
16. "Reduced Predictive Models with Uncertainty Quantification," *Opening Session for ICERM Program on Uncertainty Quantification*, Brown University, Providence, RI, Sep 7 2012.
17. "Model reduction in uncertainty quantification: An interplay between basis and measure adaptation," (semi-plenary) *12th World Congress on Computational Mechanics*, Sao-Paulo, Brazil, July 8-13, 2012.
18. "UQ in Computational Science and Engineering," *Fourth International Conference on Scientific Computing and Partial Differential Equations (SCPDE11)*, Hong Kong, China, December 5-9, 2011.
19. "V&V or a Psycho-Analysis of Predictions," *European Conference on Computational Mechanics*, (semi-plenary) Paris, France, May 16-21, 2010.
20. "Uncertainty Management in Predictive Simulations," *Workshop on Quantification on CFD Uncertainties*, at the Vrije Universiteit Brussel, Belgium, October 29-30, 2009.
21. "Data Assimilation for Updating Parameter and Model Uncertainty," *Inaugural Conference on Computational Methods in Energy and Environmental Research*, Peking University, Beijing, China, July 9-12, 2007.
22. "Polynomial Chaos in Uncertainty Quantification and Management: A Consistent Paradigm for Predictive Science," *AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, April 2007, Honolulu, HI.
23. "Predictive Science: A Confluence of Verification, Validation and Uncertainty Quantification," *12th International Symposium on Dynamic Problems of Mechanics*, Feb 26-Mar 2, 2007, Ilhabela, Sao Paulo, Brazil.

24. “Eléments finis stochastiques: Développements récents et mise en œuvre,” *Mécanique Probabiliste des Matériaux et des Structures, Commission Scientifique de l’Association Française de Mécanique*, Marne-la-Vallée, France, January 9-10, 2006.
25. “Hybrid representations for complex dynamical stochastic systems: coupled non-parametric and parametric models,” (semi-plenary) *Sixth European Conference on Structural Dynamics*, Eurodyn 2005, Paris, France, September 4-7, 2005.
26. “Towards a rational integration of uncertainty into model-based predictions,” *5^{eme} Colloque National en Calcul des Structures*, Giens, France, May 15-19 2001.
27. “Uncertainty in Mechanics: Mechanics of Uncertainty,” *14th ASCE Engineering Mechanics Conference*, The University of Texas, Austin, May 21-24 2000.

Departmental Seminars

1. “Physics, Structure and Uncertainty”, *Department of Civil Engineering, Johns Hopkins University*, April 1 2021.
2. “Physics-Informed Probabilistic Learning,” *Department of Industrial and Systems Engineering, USC*, March 30 2021.
3. “Back of the envelope calculations on supercomputers,” *Jet Propulsion Laboratory, Pasadena, CA*, July 24 2020.
4. “Advances in High Performance Uncertainty Quantification,” *Google Inc.*, February 4 2019.
5. “Design Optimization under Uncertainty in Large Scale Computational Models,” *SpaceX, Torrance, CA* Nov 14 2018.
6. “Adapted stochastic inference for large scale computational models,” *GE Global Research Center, Niskayuna, NY*, May 29 2018.
7. “Advances in Stochastic Model Reduction,” *Workshop Honoring the contributions of Carlos Felippa and KC Park to the field of multi-physics modeling University of Colorado, Boulder*, April 23-24, 2018.
8. “Statistical Sampling on Manifolds for Expensive Computational Models,” *Plenary talk at CDSE Days, SUNY, Buffalo, NY*, April 9-13 2018.
9. “Multiscale probabilistic models for manufacturing, performance and failure of composites,” *Iffstar, Cité Descartes, Marne-la-Vallée, France*, December 20 2017.
10. “Data-Driven Prediction and Optimization of Complex Systems,” *ENSTA, Paris, France*, December 19 2017.
11. “Probabilistic models for inference and design in complicated problems,” *ICES, The University of Texas at Austin*, April 27 2017.
12. “Uncertainty quantification at the interface of computing and everything else” *AMS/ME Colloquium, Colorado School of Mines*, January 13 2017.
13. “Probabilistic methods for dealing with expensive computational models,” *Atmospheric, Earth and Energy Division, Lawrence Livermore National Laboratory*, December, 5 2016.
14. “Basis Adaptation with Gaussian Isometries,” *CSRI, Sandia National Laboratories, Albuquerque, NM*, August 2-3, 2016.

15. "Uncertainty Quantification in the Age of High Fidelity Sensors, Multiscale Models, and High-Performance Computing," *Department of Mathematics, Shanghai Normal University*, June 3, 2016.
16. "Probabilistic Models for Inference and Design in Complicated Problems," *Department of Civil & Environmental Engineering, University of Illinois, Urbana-Champaign, IL*, April 25 2016.
17. "Probabilistic Models for Worth of Information," *The Wenyuan Forum Lecture, Tongji University, Shanghai, China*, May 7 2015.
18. "Introduction to Polynomial Chaos Representations for Uncertainty Quantification and Management," *National Energy Technology Laboratory, Albany, OR*, August 19 2014.
19. "Uncertainty Quantification in Systems with Coupled Physics," *Computational and Applied Math Seminar, Arizona State University, Tempe, AZ*, February 19 2014.
20. "Recent Developments in Polynomial Chaos Formalism to UQ," *Department of Civil and Environmental Engineering, Vanderbilt University, Nashville, TN*, February 10, 2014.
21. "Hierarchical Interpolation for Risk Assessment in Reservoir Evaluation," *EXPEC-ARC Group, ARAMCO, Dhahran, Kingdom of Saudi Arabia*, January 11 2014.
22. "New Class of Reduced Models in Uncertainty Quantification," *LaMCoS: Laboratoire de la Mécanique des Contacts et des Structures - INSA de Lyon, France* December 10 2013.
23. "Polynomial Chaos Decompositions for Uncertainty Characterization and Management" *Business Analytics and Mathematical Sciences Department, IBM T J Watson Research Center, Yorktown Heights, NY*, June 18 2013.
24. "Uncertainty Quantification at the Intersection of Engineering, Science and Technology," *Department of Civil Engineering and Engineering Mechanics, Columbia University, NYC*, May 30 2013.
25. "Model Reduction for the Characterization and Analysis of Complex Systems," *Department of Civil Engineering, Duke University, Durham, NC*, February 11 2013.
26. "Model Reduction in the Mechanics of Random Media," *Department of Civil Engineering, The University of Texas at Austin*, December 5 2012.
27. "Stochastic representations of model-based predictions and associated data assimilation," *Institute for Computational Engineering and Science (ICES), The University of Texas at Austin*, September 13 2012.
28. "Upscaling and Dimension Reduction for Stochastic Flows," *Department of Mechanical and Aerospace Engineering, UCSD*, October 29 2012.
29. "A Perspective on Uncertainty Quantification and Model Validation," *Princeton University*, April 9 2012.
30. "V&V or the Schizophrenia of Prediction Science: from Diagnosis to Therapy ," *MIT Distinguished Speaker Series in Computational Science and Engineering*, Cambridge, March 7 2012.
31. "V&V in Predictive Models," *Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor*, April 7 2011.
32. "A Computable Approach to Validation" *Frontiers in Computational & Information Sciences Seminar Series, Pacific Northwest National Laboratory, Richland, WA*, August 16 2010.

33. "V&V or Investigation on the Multiple Personalities of Predictions," *ICeS: Institute for Computational Engineering and Science*, University of Texas, Austin, March 27-April 1, 2010.
34. "V&V or a Psychology of Models," *Department of Mathematics, University of California, Berkeley, March 4, 2010*.
35. "Back of the Envelope Calculations: When and How Big ?" Institute for Computational and Mathematical Engineering, Stanford University, November 16 2009.
36. "Verification and Validation: A Paradigm for Trustworthy Predictions," *CAMS Colloquium, USC, October 19, 2009*.
37. "An Approximation Theory for Model Validation," University of California Santa Barbara, CA, January 16 2009.
38. "Mathematical Formulation for the Validation Problem," Lawrence Livermore National Laboratory, Livermore, CA, December 17, 2008.
39. "Model Construction and Model Validation with Polynomial Chaos Expansions," *Technical University of Munich and Siemens AG, July 3rd 2008*.
40. "Stochastic Predictive Methods," Wright Patterson Air Force Base, Materials Directorate, April 30 2008.
41. "Data Assimilation for Prediction of Multiphase Flow in Random Porous Media," Department of Mechanical Engineering, University of California, Berkeley, April 23 ,2008.
42. "Prediction and Validation in Multiscale Mechanics," Department of Civil and Environmental Engineering, University of Minnesota, March 28, 2008.
43. "Probabilistic Methods in Component Life Assessment," Bettis Nuclear Power Laboratory, Pittsburgh, PA, March 6 2008.
44. "Validation and Prediction in Multiscale Mechanics," Department of Mechanical Engineering, Northwestern University, Nov 8, 2007.
45. "Uncertainty quantification and management in prediction science," Department of Energy Resources Engineering, Stanford University, Oct 9, 2007.
46. "Stochastic methods in computational mechanics," presentation at MSC-NASTRAN, Santa Ana, CA, March 5th 2007.
47. "Uncertainty Quantification, Model Validation, and Prediction Science," Department of Civil and Mechanical Engineering, University of California, Irvine, February 8 2007.
48. "Research in Structural Health Monitoring and Prediction at USC," Department of Building Engineering, Tongji University, Shanghai, China, January 16, 2007.
49. "Elements of Prediction Science and Uncertainty Quantification," Department of Aerospace and Mechanical Engineering, Ohio State University, January 12 2007.
50. "A Review of Uncertainty Quantification and Prediction Science," Department of Civil and Mechanical Engineering, University of California, Los Angeles, November 7th, 2006.
51. "UQ and V&V aspects of the proposed Center for Materials Integrity in Satellite Microsystems," *Sandia National Laboratories, Albuquerque, NM* September 7 2006.

52. "Recent Development in Stochastic Predictions and Model Validation," ONERA, Paris, France, May 9th 2006.
53. "Vistas in Computational Stochastic Mechanics," Department of Mechanical Engineering, University of California, Berkeley, October 25, 2004.
54. "Orthogonal Expansions For Stochastic Systems: Applications to Uncertainty Quantification and Management," Department of Systems Engineering & Operations Research, George Mason University, November 2004.
55. "Essential Ingredients for Quantifiable Predictions: The Case for Uncertainty Quantification and Management," AFOSR, Arlington, VA, September 20, 2004.
56. "Stochastic Parameterization and Extensions," ANSYS Inc., Pittsburgh, PA, August 16 2004.
57. "Stochastic Computing," Pacific Northwest National Laboratory, Richland, WA, June 10, 2004.
58. "Ingredients in Validated Predictive Modeling," Department of Mechanical Engineering, University of Southern California, April 26 2004.
59. "Uncertainty Quantification and Management: New Frontier in Scientific Computing," Department of Civil Engineering, Caltech, March 29 2004.
60. "Computational Stochastic Mechanics : New Frontier in Scientific Computing," Department of Civil Engineering, University of Southern California, March 12 2004.
61. "Multiscale and Stochastic Modeling in Mechanics," Department of Civil Engineering and Geological Sciences, University of Notre Dame, March 16 2004.
62. "Perspectives on Computational Stochastic Mechanics," Distinguished Lecture Series, Scientific Computing and Imaging Institute, Department of Computer Science, University of Utah, Salt Lake City, Utah, February 20, 2004.
63. "Error Budgets for the Validation of Predictive Models," Linbeck Distinguished Lecture, Department of Civil Engineering and Geological Sciences, University of Notre Dame, October 31 2003.
64. "Nonlocal Modeling of Materials with Random Microstructure," Séminaire Descartes, École Normales des Ponts et Chaussées, France, January 15 2004.
65. "Error budgets for the validation of predictive models," University of California, Irvine, April 11, 2003.
66. "Error budgets for the validation of complex predictive models," Columbia University, March 20, 2003.
67. "A Theoretical Framework for the Analysis and Refinement of Uncertain Systems," Séminaire Descartes, École Normales des Ponts et Chaussées, France, January 9 2003.
68. "Some Recent Advances in Computational Stochastic Mechanics," Center for Aerospace Structures Seminar, The University of Colorado, Boulder, CO, October 14, 2002.
69. "Computational Aspects in the Representation, Propagation, and Management of Uncertainty in Model-Based Predictions," Mechanical, Aerospace, and Nuclear Engineering Colloquium, Rensselaer Polytechnic Institute, Troy, NY October 1, 2002.

70. "Propagation and Management of Uncertainty in Mechanics-Based Models," Department of Mechanical and Aerospace Engineering, Arizona State University, Phoenix, AZ, October 9 2001.
71. "Characterization and Computation of the State of Stochastic Systems," Department of Mathematics, Colorado University in Denver, February 26, 2001.
72. "Research in Stochastic Mechanics at Johns Hopkins University," École Central de Paris, October 26, 2000.
73. "Propagation and Management of Uncertainty in Mechanics-Based Models," Brown University, Division of Applied Mathematics, October 5, 2000.
74. "Mechanics of Uncertainty," École Centrale de Paris. November 25 1999.
75. "The Formulation of a General Purpose Stochastic Finite Element Method," Texas A&M University, Fall 1997.
76. "Theoretical Foundation of the Stochastic Finite Element Method," Texas Institute for Computational and Applied Mechanics (TICAM) at the University of Texas, Austin, Fall 1997.
77. "System Identification using Wavelet Approximations of Dynamical Systems," Rice University, Fall 1997.
78. "Recent Developments in Non-Deterministic Computational Mechanics," Sandia laboratories, December 1996.
79. "Recent Developments in Stochastic Finite Elements," Columbia University, October 22, 1996.
80. "Developments in Computational Stochastic Mechanics," Brooklyn Polytechnic Institute, March 16, 1996.

Short Courses

1. "Probabilistic Modeling in Geosciences," (3 hours) *SIAM Conference on Geosciences*, March 11-14, 2019, Houston, TX.
2. "Introduction to Polynomial Chaos Models," (3 hours) *UQ Summer School*, University of Southern California, Los Angeles, CA August 8-10, 2018.
3. "Short Course on UQ," (4 hours) *Tongji University*, Shanghai, China, May 13-14 2015.
4. "Uncertainty Quantification," (40 hours) *ARAMCO Research*, Dhahran, Saudi Arabia, February 1-5 2015.
5. "Stochastic Representations," (3 hours) *UQ Summer School*, University of Southern California, Los Angeles, CA August 22-24, 2012.
6. "Stochastic Computational Science," (6 hours) *SIAM Conference on Uncertainty Quantification*, Raleigh, NC, April 1 2012.
7. "Stochastic Representations of Model-Based Predictions and Associated Data Assimilation," (6 hours) *CIMPA UNESCO School in Applied Mathematics*, KAUST, Saudi Arabia, Spring 2012.
8. "Uncertainty Quantification in Geosciences," (2 hours) *SIAM Conference on Geosciences*, Long Beach, California, March 21-24, 2011.

9. "Uncertainty Quantification in Mechanics: Theoretical and Computational Aspects," (6 hours) *10th US National Congress on Computational Mechanics* (with C. Soize), San Francisco, CA, July 22nd, 2007, and the *10th USNCM* in Columbus, OH, July 15, 2009, and the *11th USNCM* in Minneapolis, MN, July 24, 2011.
10. "Stochastic Finite Elements," (6 hours) *UNICAMP*, Campanis, Brazil, March 2nd 2007.
11. "Uncertainty Quantification," (6 hours) *SIAM 2nd Conference on Computational Science and Engineering*, San Diego, February 9th 2003.
12. "Quantification of Confidence in Model-Based predictions," (6 hours) *Wright Patterson Air Force Base*, Dayton, OH, September 2001.

Workshops

1. "Hierarchy and intrinsic structure for a more credible validation," *Institute for Mathematical and Statistical Innovation: Workshop on Verification, Validation, and Uncertainty Quantification Across Disciplines*, Online, May 14 2021.
2. "Prediction and adaptation as constrained statistical inference," *The Center for Advanced Mathematics for Energy Research Applications (LBNL): Workshop on Autonomous Discovery in Science and Engineering*, Online, April 20 2021.
3. "Stochastic Reduced Models: L_2 projections and L_1 approximations," invited talk at the *ICERM Workshop on Algorithms for Dimension and Complexity Reduction*, March 25 2020.
4. "Probabilistic frameworks for multiscale simulations of brittle failure," invited talk at *Workshop on Mathematics Challenges Associated with Failure of Brittle Materials*, Johns Hopkins University, Baltimore, MD 20-21, 2019.
5. "Probabilistic Learning in Scientific Computing", *International Workshop on Data-Centric Engineering*, MIT Cambridge, MA, Dec 9-12 2019 (<https://www.dceworkshop.org>)
6. "Risk and Computational Science", *NSF Computational Mechanics Vision Workshop*, University of Michigan, Ann Arbor, MI October 31-Nov 2 2019. (<https://micde.umich.edu/nsf-compmech-workshop-2019/agenda/>)
7. "Stochastic Simulations," *ARO Workshop Mathematical Challenges Associated with Failure of Brittle Materials*, Johns Hopkins University, Maryland, May 20-21 2019.
8. "Probabilistic learning for prediction and optimization of complex systems," *Workshop at the Interface of Scientific Machine Learning and UQ*, USC, Los Angeles, CA June 4-6, 2018.
9. "Multiscale probabilistic models for manufacturing, performance and failure of composites" *Workshop on Uncertainty Quantification for Stochastic Systems and Applications*, IPAM, UCLA, Los Angeles, November 13-17, 2017.
10. "Uncertainty modeling for optimization," *EPTEK: Excellence in Education and Research: An Adaptive and Integrative Approach for E&P*, Oct. 15-17, 2017, College of Petroleum Engineering & Geosciences, KFUPM Dhahran, Kingdom of Saudi Arabia.
11. "Data-Driven Sampling and Prediction on Manifolds," *USACM Workshop on Uncertainty Quantification and Data-Driven Modeling*, Austin, TX, March 23-24, 2017.
12. "Stochastic Modeling for Performance and Design Across Scales," *IUTAM Symposium on Materials under Extremes* June 20-22, 2016.

13. "Reliability in the Age of High Fidelity Sensors, Multiscale Models, and High-Performance Computing," *International Workshop on Engineering Reliability and Stochastic Mechanics (IWERSM 2016)*, Tongji University, Shanghai, June 1st 2016.
14. "Multiscale modeling in support of product design," *IMA Special Workshop on Optimization and Uncertainty Quantification in Energy and Industrial Applications*, Institute of Mathematics and Its Applications, February 22-24, 2016, University of Minnesota, Minneapolis, MN.
15. "Probabilistic Treatment of Multiscale Problems," *Workshop on Uncertainty Quantification in Multiscale Problems*, IPAM, UCLA, Los Angeles, January 19-22, 2016.
16. "Building Probabilistic Models, One Constraint at a Time," *Workshop on Predictive Multiscale Materials Modeling*, Isaac Newton Institute, Cambridge University, December 1-4 2015.
17. "Polynomial Chaos as a Comprehensive Modeling Tool for Complex Systems," *Workshop on Sensitivity, Error and Uncertainty Quantification for Atomic, Plasma, and Material Data*, Institute for Advanced Computational Science, Stony Brook University, New York, November 7-9, 2015.
18. "Decision Engineering: From Engineering Phenomena to Value," *NSF Workshop on Decision Engineering*, Arlington, VA October 30 2015.
19. "Introduction to Uncertainty Quantification," *Workshop on Uncertainty Quantification*, Beihang University, Beijing, China, August 6-18, 2015.
20. "Uncertainty Quantification for Complex Systems," Keynote lecture at *INFORM Roundtable Summer Meeting*, Jackson Hole Lodge, Moran, WY, July 19-20 2015.
21. "Uncertainty Quantification at the Interface of Modeling, Simulation, Manufacturing and Risk," *Workshop on the Synergy in Manufacturing and Computational Mechanics*, Hannover, Germany, July 13-14 2015.
22. "Building Stochastic Models, One Constraint at a Time," *AFOSR/DARPA/NCI Strategic Workshop: Convergence of Physical Sciences for Biomedical Applications: Phase Transition and Network Dynamics in Living and Non-Living Systems*, Arlington, VA, August 28 2014.
23. "Uncertainty Propagation for High-Performance Computing," *Spatial Statistics and Uncertainty Quantification on Supercomputers*, University of Bath, Bath, UK, May 19-21 2014.
24. "Hierarchical Probabilistic Models for High-Dimensional Data," *1st International Workshop on Data-Enabled Science*, May Shenzhen, Guangdong Province, China, May 14-17, 2014.
25. "Stochastic Dimension Reductions and Cross-scale Representations," *2014 Albany User Group Meeting*, CSRI, Sandia National Laboratories, January 14-16 2014.
26. "Model Reduction and Synthesis for UQ," *Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2014)*, KAUST, January 6-10 2014.
27. "Uncertainty Quantification for Predictive Modeling of Materials," *ARO Workshop on Challenges in Integrated Computational Structure-Material Modeling of High Strain-Rate Deformation and Failure in Heterogeneous Materials*, Johns Hopkins University, Baltimore, MD September, 5-6 2013.
28. "Stochastic Models for Coupled Physics," *3rd International Workshop on Moisture-Induced Damage in Asphalt Mixtures*, Doha, Qatar, April 16-19 2013.

29. “New directions in stochastic multiscale modeling,” *Interplay of Theory and Numerics for Deterministic and Stochastic Homogenization*, Mathematisches Forschungsinstitut Oberwolfach, Germany, March 1-23, 2013.
30. “Uncertainty Quantification,” *Scientific Workflows for Scattering Science*, Caltech, Pasadena, CA January 31-February 2, 2013.
31. “Stochastic modeling and prediction for the design and management of interacting complex systems,” *NSF Workshop on Building Engineering Complex Systems*, Arlington, VA, January 24-25, 2013.
32. “Linear solvers for tensorized spaces,” *IMA Annual Program Year Workshop on Theory and Applications of Stochastic PDEs*, the Institute for Mathematics and Its Applications (IMA), University of Minnesota, January 14-18, 2013.
33. “Reduced models for risk assessment of urban systems,” *3^d International Symposium on Advances in Urban Safety (SAUS2012)*, Nanjing, China, November 24-26, 2012.
34. “Random field representations and approximations for fixed point iterations,” *Computational and Theoretical Challenges in Interdisciplinary Predictive Modeling Over Random Fields*, Texas Tech University, Lubbock, TX, October 26, 2012.
35. “Focus on objectives resolves the curse of dimensionality” *NASPDE12 (Numerical Solution of Stochastic PDEs)*, Warwick, UK, June 11-12, 2012.
36. “Uncertainty in Reduced Order Models : A blessing or a curse ?” at *Workshop on Reduced Basis, POD and PGD Model Reduction Techniques: a Breakthrough in Computational Engineering ?* Cachan, France, November 16-17-18, 2011.
37. “Uncertain Handshaking,” *von Neumann Symposium on Multimodel and Multialgorithm Coupling for Multiscale Problems*, organized by the American Mathematical Society, Snowbird, Utah, July 4-7, 2011.
38. “Uncertainty Quantification in Industrial Problems,” *IMA Workshop on Quantification of Uncertainty in Industrial Problems and Energy Applications*, the Institute for Mathematics and Its Applications (IMA), University of Minnesota, June 2-4, 2011.
39. “Uncertainty Quantification in Inverse Problems,” *IMA Workshop on Large-scale Inverse Problems and Quantification of Uncertainty*, the Institute for Mathematics and Its Applications (IMA), University of Minnesota, June 6-10, 2011.
40. “From deterministic to stochastic multi-scaling and uncertainty analysis,” *NSF Workshop on Challenges in Computational Multiscale Materials Modeling (CCMMM)*, Arlington, VA, May 4 2011.
41. “Dimension reduction and measure transformation in stochastic multiphysics modeling,” BIRS Workshop on Stochastic Multiscale Methods, Banff, Canada, March 27-April 1 2011.
42. “Data-Driven Stochastic Modeling and Simulation”, I. Yadegaran and R. Ghanem, *Workshop on Uncertainty Quantification for Multiphysics and Multiscale Systems*, USC, Los Angeles, CA, March 8, 2011.
43. “Comboul M. and Ghanem R., Stochastic models for natural and urban systems,” *Workshop on Uncertainty Quantification for Multiphysics and Multiscale Systems*, USC, Los Angeles, CA, March 8, 2011.

44. "Uncertainty Characterization for Markov Chain's Transition Probabilities," H. Meidani, R.G. Ghanem, *Workshop on Uncertainty Quantification for Multiphysics and Multiscale Systems*, USC, Los Angeles, CA, March 8, 2011.
45. "Stochastic upscaling for waves in polycrystalline materials," *IPAM Workshop on Random Media: Homogenization and Beyond*, UCLA, Los Angeles, CA, January 24-29, 2011.
46. The Los Alamos National Laboratory workshop on *Mapping Out Future Directions for Uncertainty Quantification in Scientific Inference*, Santa Fe, November 4 2010.
47. "Uncertainty Challenges for SmartGrid," *Mathematics Challenges for SmartGrid*, Pacific Northwest National Laboratory, Richland, WA, August 17 2010.
48. Plenary talk: "Construction and Identification of Stochastic Models," *SICON'09, University of Rome - La Sapienza*, September 23 2009.
49. Comboul M., Ghanem R. and Becker T., "Crustal surface deformation time series analysis for transient detection," *SCEC annual meeting: transient detection exercise*, Palm Springs (California), September 2010.
50. "Information-Driven Predictions for Urban Sustainability," *THU-USC Faculty Forum on Green and Smart for Sustainable Future*, Davidson Center, USC, April 3 2010.
51. Invited participants at the AFOSR/AFRL "Multi-Scale Modeling Planning Workshop," Dayton, OH, December 9-10, 2009.
52. "Ubiquitous Sustainable Cities," invited presentation to the *Second SmartGrid Symposium*, USC, October 6, 2009.
53. *Mathematics for Analysis of Petascale Data (MAPD)*, Sponsored by U.S. Department of Energy, Office of Advanced Scientific Computing Research, Rockville, MD, Nov 6-8, 2008.
54. "Rational Model Validation Under Uncertainty with Application to Aeroelasticity," *AFRL/AFSEO/IHAAA Workshop on Aircraft-Stores Clearance and Related Aeroelastic Phenomena*, Sedona, AZ, October 27-28 2008.
55. *Uncertainty Analysis in Complex, MultiPhysics Applications*, Sponsored by the PSAAP University Alliance Center at Stanford, Stanford, CA, July 25-26, 2008.
56. *Workshop on Modeling Uncertainty in Integrated Assessment Models*, Sponsored by the U.S. Department of Energy, Office of Science and Argonne National Laboratory, Chicago, IL, July 21-22, 2008.
57. *PSAAP Predictive Science Alliance Academic Program Workshop*, a DOE Workshop, Albuquerque, NM July 8-9, 2008.
58. *SPE Applied Technology Workshop: Nanotechnology in Upstream E&P: Nano-Scale Revolutions to Mega-Scale Challenges ?* Dubai, UAE, 3-6 February 2008.
59. "Sustainability by Design: Prediction and mitigation of complex interactions in the urban landscape," National Science Foundation, WTEC Technology Assessment Workshop, Nov 1, 2007.
60. "An Overview of an Approximation Approach to Validation," *Sandia CSRI Workshop on Mathematical Methods for Validation*, New Mexico, August 14-16, 2007.

61. Ghanem, R. and Doostan, A., "Structural dynamics validation problem: An approximation-theoretic approach," *Validation Challenge Workshop*, Sandia National Laboratories, Albuquerque, NM, May 22-23, 2007.
62. "Integration of Polynomial Chaos Representations with the EnKF," *Workshop about Ensemble Kalman filter for updating of reservoir simulation models*, Hotel Edvard Grieg, Bergen Norway, 18-20 June 2007.
63. "Prediction Science, Uncertainty Quantification and Management," *AME Advisory Board*, January 31, 2007.
64. "Multiscale Analysis, Stochastic Analysis, and Model Validation: A Unifying Perspective through Polynomial Chaos Decomposition," Invited talk to *Advances and Challenges in the Solution of Stochastic Partial Differential Equations* October 20-22, 2006, Brown University.
65. Plenary talk: *Stochastic Modeling Conference*, Center for Applied Mathematics, University of Notre Dame, IN, March 23-26, 2006.
66. "Error Budgets for the Validation of Predictive Models," invited participant and speaker at the *AFRL/AFSEO/IHAAA Workshop on Aircraft-Stores Clearance and Related Aeroelastic Phenomena*, Fountain Hills, AZ, May 16-17 2006.
67. Invited participant and speaker at the *Validation Methodology Workshop* at Sandia National Laboratories, Albuquerque NM May 22-23 2006.
68. Invited speaker at the *Workshop on Challenges in Computational Mechanics*, LMT-Cachan, France, May 10-12, 2006.
69. "Mechanics of uncertainty- the new interface of science and technology," Invited lecture at the *Mini-Symposium of Civil Engineering Research in 21st Century*, honoring the retirement of Professor Tadanobu Sato of Kyoto University, August 26, 2005, Tokyo Forum, Tokyo, Japan.
70. "Error Budgets: A Path from Uncertainty Quantification to Model Validation," *Advanced Simulation and Computing Workshop: Error Estimation, Uncertainty Quantification, and Reliability in Numerical Simulations*, Aug 22-23, 2005, Stanford University, Palo Alto, CA.
71. "Some contributions of stochastic analysis to multiscale modeling in mechanics," invited lecture at the *Workshop on Integrative Multiscale Modeling and Simulation in Materials Science, Fluids and Environmental Science*, CRM, Université de Montreal, Canada, May 11-15, 2005.
72. "Aspects of Stochastic Modeling in Multiscale Analysis," Invited participant and speaker at the *International Workshops on Advances in Computational Mechanics: Multiscale Problems and Related Computational Methods*, Tokyo, Japan, November 4-6, 2004.
73. Invited participants and speaker at the *Foundations'04 Workshop on Verification and Validation and Accreditation*, Tempe AZ, 13-15 October 2004.
74. "Uncertainty modeling and multiscale analysis: Opportunities. Challenges and Applications," Invited participant and speaker at the *Third DOE Workshop on Multiscale Mathematics*, Portland, OR, September 21-23, 2004.
75. Invited participant and speaker at the *Second DOE Workshop on Multiscale Mathematics*, Broomfield, CO, July 20-22, 2004.
76. Invited participant and organizer at the *First DOE Multiscale Mathematics Workshop*, Alexandria, VA, May 3-5, 2004.

77. "Inverse Analysis for Multiscale Stochastic Models," *Workshop in Inverse Problems in Solid Mechanics*, Rensselaer Polytechnic Institute, Troy, NY, March 28 2004.
78. "New methods for stochastic inverse analysis," Sandia Workshop on Optimization Under Uncertainty, Sandia National Laboratories, Albuquerque, NM, January 26-27, 2004.
79. "Research in Stochastic Predictive Models," NSF-Sandia Workshop on Life Cycle Engineering, Sandia National Laboratories, Albuquerque, NM, January 28-29, 2004.
80. Invited speaker at the *CIMMS-DARPA Workshop on Uncertainty Analysis in the Design of Dynamical Systems*, Caltech, Pasadena, CA October 17-18 2003.
81. Invited participant in the workshop *SCaleS: Science Case for Large-scale Simulation* organized by the Department of Energy, Arlington, VA June 24-25 2003.
82. "A Mathematical Framework for the Validation of Predictive Models," DOE-NSF-SIAM Workshop on Predictability of Complex Phenomena, Santa Fe, NM, December 17, 2002.
83. "Uncertainty Analysis and Management with PCORE-3D and PBORE-3D," Poromechanics Institute: Industrial Consortium Meeting, The University of Oklahoma, October 24, 2002
84. "Data Refinement for Confidence Management in Model-Based Predictions" AFOSR Program Review in Structural Mechanics. Arlington, VA, September 25, 2002.
85. "Stochastic modeling of materials for multi-scale applications," *Workshop on Multiscale Computational Mechanics for Materials and Structures*, September 18-20, 2002, Cachan, France.
86. "Fiabilité et Approches Stochastiques en Mécanique des Structures" *Workshop: Validation des Modeles de l'Ingenieur: Enjeux et Perspectives* Laboratoire de Mécanique et de Technologie, École Normale Supérieure de Cachan, France, June 7 2002.
87. "Computational Model Reduction and Probabilistic Model Synthesis for Uncertainty Quantification," ONR: Computational Mechanics and Structural Acoustics Program Review, Arlington, VA, April 15, 2002.
88. "The Worth of Information in Probabilistic Predictive Models," ONR: Program Review in Hull Assurance Program. Carderock, MD, April 02, 2002
89. "Quantifying and Managing Uncertainty in Model-Based Predictions," Invited presentation at the DARPA Workshop on Uncertainty in Accelerated Insertion of Materials, Annapolis, MD, August 27-28 2001.
90. "Probabilistic Modeling of Uncertainty," a short course taught at Sandia National Laboratories, Albuquerque, NM, July-August 2001.
91. "Error Estimation for the Certification of Model-Based Predictions," Invited presentation to the Air Force workshop on "Uncertainty in Model Prediction," Albuquerque, NM, March 20-21 2001.
92. Invited participant to the US-Japan Workshop on Soil-Structure Interaction, Tsukuba, Japan, March 6-8, 2001.
93. Invited participant to the NRC panel on *Predictability and Limits of Prediction in Hydrological Sciences*, Boulder, CO, September 21-22, 2000.
94. Invited speaker at the Industrial Consortium Meeting for the Rock Mechanics Institute, the University of Oklahoma, Rock Mechanics Institute, "Reservoir Characterization Based on a Novel Representation of the Scales of Heterogeneity and its Application to Decision Support in Oil Recovery Processes," July 27 2000.

95. Invited by the Disaster Prevention Research Institute at the University of Kyoto to deliver a series of lectures at Japanese Universities and Research Institutes in Japan, January 5-22, 2000.
96. Invited Lecture at the *Third Annual DOE/MICS Workshop, Predictability of Complex Phenomena*, Los Alamos, December 6-8, 1999.
97. Invited participant to the *Workshop on Smart Materials and New Technologies for Improvement of Seismic Performance of Urban Structures*, Kyoto and Tokyo, February 16-20, 1999.
98. Invited participant to the *US-Japan Natural Resources Development Program (UJNR) workshop on Soil-Structure Interaction*, Menlo Park, CA, September 21-22, 1998.
99. Invited participant at the panel on *Prospects for Integrating Deterministic and Stochastic Finite Element Methods*, at the 12th EMD Conference in La Jolla, CA, May 17-20, 1998.
100. Invited participant and speaker at the *US-Japan Workshop-Seminar on Infrastructural and Environmental Risk Assessment and Rehabilitation*, Kyoto, Japan, November 22-23 1997.
101. Invited participant at the NSF-sponsored *Second US-Japan Workshop on Mitigation of Urban Earthquake Disaster*, February 27-March 1 1997, Tokyo. Japan.
102. Invited participant at the *NRC Panel on High Performance Computing and Crisis Management*, June 13-15 1995, Newport Beach, CA.
103. Invited speaker at the *Panel on System Identification* at the ICOSAR'93, *Adaptive Control of Uncertain Dynamical Systems*. Innsbruck, Austria, August 9-13, 1993.
104. Invited speaker at the *Workshop on Reliability Methods* at the ICOSAR'93 in Innsbruck, *Expansion Techniques for Response Surface Approximation and Reliability Calculations*, Innsbruck, Austria, August 9-13 1993.

FUNDED RESEARCH

1. 2021-2026 *Discovering & Modeling Turbulence and Chemistry Interactions in High Speed Reactive Flows*, Funded by ONR, (\$1,238,000).
2. 2021-2024 *Development of Tailored Fiber Placement, Multi-Functional, High-Performance Composite Material Systems for High Volume Manufacture of Structural Battery Enclosure*, Funded by DOE with GM as prime (\$937,500).
3. 2021-2023 *Risk-informed condition assessment of spent nuclear fuel canisters using experimental measurements and high-fidelity computational models*, Funded by NRC, (\$323,000).
4. 2020-2023 *Multiscale Stochastic Modeling, Conditioning, and Simulation of rare events*, Funded by AFOSR, (\$1,391,586).
5. 2020-2023 *FASTMATH: SciDAC5*, Funded by the Department of Energy (\$265,000) (part of a DOE SciDAC Institute).
6. 2020-2022 *Unsupervised Learning Algorithms for Autonomous Trajectory Analysis*, Funded by Sandia (\$174,000).
7. 2018-2020 *Physics Informed Research Assistant for Theory Extraction (PIRATE)*, Funded by DARPA (\$1,000,000).

8. 2017-2020 *FASTMATH: SciDAC4*, Funded by the Department of Energy (\$265,000) (part of a DOE SciDAC Institute).
9. 2018 *Algorithms for machine learning under uncertainty*, Funded by Lawrence Livermore National Laboratory (\$30,000).
10. 2017-2018 *Risk-Based Unmanned Air System (UAS) Mission Path Planning Capability*, Funded by Navy STTR to ACTA-Inc. (\$67,500).
11. 2017-2020 *Surge, and Tsunami Overland Hazard, Loading and Structural Response for Developed Shorelines*, Funded by NSF (PI is Pat Lynett). (\$300,000)
12. 2016-2020 *Cask Mis-Loads Evaluation Techniques*, Funded by NUEP (PI is Bora Gencturk). (\$400,000).
13. 2016-2019 *Reduced Stochastic Models for Design Optimization of a Scramjet*, Funded by DARPA. (\$490,000).
14. 2015-2017 *Near Real-Time Quantification of Stochastic Model Parameters*, Funded by Applied Mathematics, Inc. (\$300,000).
15. 2015-2019 *Development and Integration of Predictive Models for Manufacturing and Structural Performance of Carbon Fiber Composites in Automotive Applications*, Funded by General Motors LLC (\$1,058,000).
16. 2014-2016 *RIPS Type 1: Human Geography Motifs to evaluate Infrastructure Resilience*, Funded by NSF (\$ 100,000).
17. 2013-2014 *Confident Predictions of Reservoir and Well Bore Flow using Reduced Models and Data*, Funded by the National Energy Technology Lab (NETL) (\$ 300,000).
18. 2012-2014 *Environmental Sustainability and the Global Economy*, Funded by the USC Provost Office (\$50,000).
19. 2011-2016 *Quantifications of Uncertainty in Extreme Scale Computations (QUEST): SciDAC*, Funded by the Department of Energy (\$ 750,000) (part of a \$7M DOE SciDAC Institute).
20. 2010-2012 *Validation of Predictive Models for the Ablation of Re-Entry Vehicles*, Funded by The University of Texas at Austin (\$ 220,000) (part of a DOE PSAAP Center).
21. 2010-2012 *Stochastic Prediction for Design and Management of Interacting Complex Systems*, Funded by NSF (\$310,000).
22. 2009-2011 *EAGER: Accelerating Innovation in Agent-Based Simulations: Applications to Complex Socio-Behavioral Phenomena*, Funded by NSF (\$90,000).
23. 2009-2012 *Uncertainty Quantification for Petascale Simulation of Carbon Sequestration Through Fast Ultra-Scalable Stochastic Finite Element Methods*, Funded by NSF, (\$1,200,000).
24. 2009-2012 *Analysis and Reduction of Complex Networks Under Uncertainty*, Funded by DoE, (\$300,000).
25. 2009-2012 *Mathematical and Computational Tools for Predictive Simulation of Complex Coupled Systems Under Uncertainty*, Funded by DoE, (\$625,000).
26. 2009 *Workshop on Stochastic Multiscale Methods*, Funded by NSF, (\$25,000.)

27. 2009 *Workshop on the Quantification of Uncertainty in Complex Interacting Systems*, Funded by NSF, (\$75,000.)
28. 2007 *Effect of Climate Change on Transportation System in Los Angeles*, Funded by METTRANS, (\$90,000.)
29. 2007-2010 *Integrated computational system for probability based multi-scale model (PMM) of ductile fracture in heterogeneous materials*, Funded by NSF, (\$165,000.)
30. 2007 *Path for integrating Polynomial Chaos into Sandia analysis tools*, Funded by Sandia National Laboratories, Albuquerque, NM, (\$87,000.)
31. 2006-2009 *Collaborative Research: CMG-Stochastic Quantization for Modeling the Dynamics of Regional Seismicity*, Funded by NSF, (\$317,978.)
32. 2006-2011 *MURI: A Multidisciplinary Approach to Health Monitoring and Materials Damage Prognosis for Metallic Aerospace Systems*, Funded by AFOSR, (\$623,767.)
33. 2005-2008 *Computational Algorithms and Reduced Order Models for Stochastic PDEs*, Funded by NSF, (\$250,000.)
34. 2003 *Workshop on Uncertainty Quantification and Error Estimation*, Funded by NSF, (\$25,000.)
35. 2002-2005 *Uncertainty Joints for Validating UNDEX Models*, Funded by the Office of Naval Research, (\$365,000.)
36. 2002-2005 *Stochastic Optimization using Polynomial Chaos Decompositions with Applications to Obstacle Identification and Material Characterization*, Funded by the Office of Naval Research, (\$365,000.)
37. 2002-2004 *Optimal Structural System Design for Catastrophic Unforeseen Events* Funded by NSF, (\$100,000).
38. 2001-2004 *Data Refinement for Confidence Management in Model-Based Predictions with Application to Boundary Interfaces and Uncertainties in Structural Joints*, Funded by the AFOSR, (\$180,000.)
39. 2001-2006 *Instrumentation to Measure the Emission and Transport of Biological Aerosols into the Atmosphere: Linking Across Scales from Microns to Kilometers*, co-PI with Drs. Marc Parlange, Charles Meneveau, Joe Katz, Grace Brush, and Shiyi Chen, Funded by the National Science Foundation, (\$2,500,000.)
40. 2001 *Uncertainty Propagation in Models of Thermo-Fluid Systems*, co-PI with Dr. Omar Knio, Funded by Sandia National Laboratories, Livermore, (\$40,000.)
41. 2000-2005 *Implementation of Chaos Expansions into Analysis Software*, Funded by Sandia National Laboratories, Albuquerque (\$ 450,000.)
42. 2000-2003 *Mine Detection Modeling and Simulation in a Random Environment*, Funded by the Office of Naval Research (\$455,651.)
43. 2000-2003 *Quantitative Uncertainty Assessment and Numerical Simulation of Micro-Fluid Systems*, co-PI with Drs. Omar Knio and Habib Najm, Funded by DARPA, (\$1,000,000.)
44. 1999-2002 *Monitoring and Classification of Emissions from Structure-Fluid Interaction in the Medium Frequency Range Using Statistical Inference*, Funded by the Office of Naval Research (\$295,000.)

45. 1999-2002 *A Method to Quantify the Worth of Information with Applications to the Monitoring and Inspection of Ship Structures*, Funded by the Office of Naval Research (\$295,000.)
46. 2000-2001 *REU Supplement*, Funded by the National Science Foundation, (\$13,750.)
47. 1999-2000 *REU Supplement*, Funded by the National Science Foundation, (\$13,750.)
48. 1998-2001 *Decision Support for Flow in Porous Media: Optimal Sampling for Data Assimilation*, Funded by the National Science Foundation, (\$209,621.)
49. 1998-2001 *A General Framework for Propagating Uncertainty in Physical Systems with Application to Thermal Transport in a Random Porous Medium*, Funded by Sandia Laboratories, Albuquerque (\$275,481).
50. 1997-1999 *Reliability of Civil Infrastructure Systems: Risk Reduction Using Advanced Sensor Technology*, Taisei Corporation, Japan (\$40,000.)
51. 1996-1997 *A Stochastic Finite Element Program for Dynamic Soil-Structure Interaction*, SBIR-Phase 1, The National Science Foundation, (\$ 100,000), Jointly with Stevenson and Associates, Cleveland, OH.
52. 1996-1997 *Development of a Computational Laboratory for the Analysis and Design of Electro- and Magneto-Rheological Fluids*, The School of Engineering, The Johns Hopkins University (\$18,000.)
53. 1995 *State of the Art and State of the Practice for Retrofit, Repair, Maintenance, and Renewal Engineering of Civil Structures*. Funded by Shimizu Corporation, Japan (\$9,000.)
54. 1996-1998 *Stochastic Finite Element Analysis of Contaminant Transport in Porous Media: REU Supplement* Funded by the National Science Foundation (\$11,000.)
55. 1994-1997 *Stochastic Finite Element Analysis of Contaminant Transport in Porous Media*. Funded by the National Science Foundation (\$210,000.)
56. 1994-1995 *Energy Dissipation Systems, Hybrid Control Systems, and Elastomeric Isolation Systems*. Funded by NCEER (\$28,500.)
57. 1992-1994 *Novel Nonlinear Method for Dynamic Analysis of Pile Foundations*, Co-PI with George Gazetas. Funded by Shimizu Corporation (\$95,000.)
58. 1992-1993 *Energy Dissipation Systems, Hybrid Control Systems, and Elastomeric Isolation Systems*. Funded by NCEER (\$25,000.)
59. 1992-1993 *GIS Applications in Hydrological and Geotechnical Studies*. Funded by the CIRD (\$20,000.)
60. 1992-1993 *Adaptive System Identification and Control for Underground Tunneling*. Funded by the CIRD (\$10,000.)
61. 1992-1993 *Software Acquisition for Stochastic Analysis of Crude Oil Spills*. Funded by NCEER (\$3,000.)
62. 1992-1994 *Stochastic Finite Element Analysis of Ground Water Flow and Contaminant Transport*. Funded by Takenaka Corporation, Japan (\$30,000.)

SUPERVISED STUDENTS**Postdoctoral Associates and Visiting Scholars:**

1. Mehrdad Aghagholizadeh (Ph.D. SMU), 2021-
2. Xiaohui Tu (Ph.D. JHU), 2021-
3. Ziad Ghauch (Ph.D. USC), 2019.
4. Ruda Zhang (Ph.D. USC), 2018.
5. Xiao Liang (Associate Professor, Shandong University of Science, and Technology, Qingdao, China), 2017-2018.
6. Olivier Ezvan (Ph.D. Paris-Est), 2017-2020.
7. Panagiotis Tsilifis (Ph.D. USC), 2016-2017.
8. Charanraj Thimmisetty (Ph.D. USC), 2016.
9. Jing Chen (Professor, Hohai University, China) 2016.
10. Loujaine Mehrez (Ph.D. U Southampton, UK), 2015-2020.
11. Jianyu Li (Associate Professor at Tianjin University of Science and Technology, China), 2014.
12. Hadi Meidani (Ph.D. USC), 2012-2013.
13. Evangelia Kalligiannaki (Ph.D. Crete, Greece), 2012-2013.
14. Bedrich Susedik (Ph.D. CU Denver, CO), 2011-2013.
15. Johann Guilleminot (Assistant Professor at Université Paris-Est), 2010.
16. Maarten Arnst (Ph.D. ECP, France), 2007-2011.
17. Sonjoy Das (Ph.D. USC), 2008-2010.
18. Yongbo Peng (Ph.D. Tongji University), 2007-2008.
19. Jianbing Chen (Associate Professor at Tongji University, Shanghai, China), 2006-2007.
20. Alireza Doostan (Ph.D. Johns Hopkins), 2006.
21. Steve Wojtkiewicz (Ph.D. UIUC), 2005.
22. Alain Matta (Ph.D. Johns Hopkins), 2004.
23. Jianxu Shi (Ph.D. Johns Hopkins), 2003-2004.
24. Beatrice Faverjon (Ph.D. CNAM, France), 2003.
25. Bernard Hayek (Ph.D. Johns Hopkins), 2001-2003.
26. Riki Honda (Ph.D. Kyoto University), 2002-2003.
27. Mohamed Jardak (Ph.D. École Polytechnique de Montreal), 2001-2003.
28. Hayder Saeed (Ph.D. University of Rome, La Sapienza), 2001-2002.

29. Abhijit Sarkar (Ph.D. Oxford University), 1999-2000.
30. Shigehiro Sakamoto (Ph.D. Tokyo University, Engineer at Taisei Corporation), 1997-1999.

Doctoral Students:

1. Nidhi Thanki (2021-present): Modeling and learning for spent nuclear fuel containment
2. Anna Arcaro (2021-present): Prognostics for spent nuclear fuel containment
3. Zhengtao Yao (2021-present): AI/ML for fiber-reinforced composites
4. Zheming Gou (2020-present): Predictive models for rare events
5. Kelli McCoy (2020-present): Decision under uncertainty
6. Philippe Hawi (2018-present): Probabilistic learning for prognostics and design
7. Zhiheng Wang (2017-present): Stochastic modeling and hazard maps for ocean surge.
8. Xiaoshu Zeng (2016-present): Stochastic multiphysics models for lifecycle assessment.
9. Ziad Ghauch, Ph.D. 2018 *Comprehensive uncertainty quantification in composites manufacturing processes*. (postdoc at UC Berkeley)
10. Ruda Zhang, Ph.D. 2018 *Multidisciplinary models for urban sustainability*. (postdoc at SAMSI)
11. Panos Tsilifis, Ph.D. 2016, *Design, adaptation and variational methods in uncertainty quantification*. (GE Research Center)
12. Charan Thimmisetty, Ph.D. 2016, *Risk Assessment, Intrinsic Interpolation and Computationally Efficient Models for Systems under Uncertainty*. (CISCO)
13. Nastaran Bassam Zadeh, Ph.D. 2016, *Probabilistic Data-Driven Predictive Models for Energy Applications*.
14. Shivang Desai, Ph.D. 2016, *Stochastic perydynamics and Upscaling*. (postdoc ASU)
15. Vahid Keshavarzzadeh, Ph.D. 2014, *Design Optimization under Uncertainty for Rotor Blades of Horizontal Axis Wind Turbines*. (postdoc Mech Eng UIUC)
16. Daniel Lakeland, Ph.D. 2013, *Continuum Modeling Techniques and Their Application to the Physics of Soil Liquefaction and Dissipative Vibrations*. (co-advised with Amy Rechenmacher).
17. Hamed Haddad Zadegan, Ph.D. 2013, *Data Worth Analysis in Geostatistics and Spatial Prediction*. (Engineer, LADWP)
18. Ramakrishna Tipireddy, Ph.D. 2013, *Algorithms for Stochastic Galerkin Projections: Solvers, Basis Adaptation and Multiscale Modeling and Reduction*. (PNNL.)
19. Hadi Meidani, Ph.D. 2012, *Uncertainty Management for Complex Systems of Systems*. (Assistant Professor, Civil Engineering at UIUC.)
20. Maud Comboul, Ph.D. 2012, *Stochastic and Multiscale Models for Urban and Natural Ecology*. (postdoc, Earth Sciences, USC.)
21. Arash Noshadravan, Ph.D. 2011, *Stochastic Characterization, Realization and Upscaling of Polycrystalline Materials*. (postdoc Civil Eng MIT.)

22. Sonjoy Das, Ph.D. 2008, *Modeling, Identification & Analysis of Complex Stochastic Systems: Applications in Stochastic Partial Differential Equations and Multiscale Mechanics*. (Assistant Professor of Mechanical Engineering at SUNY Buffalo.)
23. George Saad, Ph.D. 2006, *Stochastic Data Assimilation with Application to Multi-Physics and Health Monitoring Problems*. (Assistant Professor of Civil Engineering at the American University of Beirut.)
24. Alireza Doostan, Ph.D. 2006, *Probabilistic Construction and Numerical Analysis of Model Verification and Validation*. (Associate Professor of Aerospace Engineering at CU Boulder.)
25. Zenon Medina-Cetina co-advised with Amy Rechenmacher, Ph.D. 2006 *Probabilistic Calibration of a Soil Model*. (Assistant Professor of Civil Engineering at Texas A&M.)
26. Debraj Ghosh, Ph.D. 2005 *On the Characterization and Analysis of the Random Eigenvalue Problem*. (Assistant Professor of Civil Engineering at Indian Institute of Science, Bangalore.)
27. Zou Yu Ph.D. 2005 *Equation-Free Particle-Based Computations in Multiple Dimensions and Multiscale Data Assimilations with the Ensemble Kalman Filter*. (CitiGroup.)
28. Carol El-Hayek, Ph.D. 2005 *Portfolio Optimization and Value of Information for Catastrophe Insurance*.
29. Jianxu Shi, Ph.D. 2003 *Stochastic Modeling of Materials with Complex Microstructure*.
30. Alain Matta, Ph.D. 2003 *Numerical Simulation and Uncertainty Quantification in Microfluidic Systems*. (Assistant Professor of Civil Engineering, Notre Dame University, Lebanon).
31. Manuel Pellissetti, Ph.D., 2003 *On Estimating the Error in Stochastic Model-Based Predictions*. (AREVA Nuclear Power, Germany).
32. Bernard Hayek, Ph.D., 2001 *Resource Allocation for Complex Systems in the Presence of Uncertainty*. (Partner, Dar Al-Handassah Group).
33. Zhou Wang: Ph.D., 2001 *Computational Model of Interacting Suspensions at Low Reynolds Number in the Presence of External Fields*.
34. Chris Pettit, Ph.D., 1998 *Wavelet Analysis and Multi-Scale Pattern Classification in Wind Engineering*, co-advised with Nick Jones (Associate Professor at the U.S. Naval Academy.)
35. Maged El-Mestkawy: Ph.D., 1998, *Discrete Element Simulation of Soil Liquefaction under Cyclic Loading*.
36. Samar Dham: Ph.D., 1998, *Computational Methods for Multiphase Flow in Heterogeneous Porous Media*.

Masters Students:

1. Dubar Kamara, M.S. 2002 *Computational Stochastic Modeling of Ocean Circulation*.
2. Julie McGlosson, M.S. 2001 *Sampling Techniques for Uncertainty Quantification*.
3. Francesco Romeo: M.S., 1997, *Structural Health Monitoring and Dynamical Systems Analysis using Wavelets*.
4. Bernard Hayek: M.S., 1996, *Hydrodynamic Circulation Models for Ocean Currents*.
5. Konson Wang: M.S., 1995, *Finite Element Modeling of Vehicle Crashworthiness and Handling*.

6. Kandasamy Rathinasamy: M.S., 1993, *Visualization Tools and Database Models for Computational Mechanics*.
7. Mark Green: M.S., 1994, *Stochastic Sensitivity Analysis of Ground Water Flow and its Implementation in a Distributed Computing Environment*.
8. Ren-Fen Li: M.S., 1994 *First Passage Problem in Nonlinear Random Vibration*.
9. LanFan Kong: M.S., 1994, *System Identification of Pile Group Impedance*.
10. Maxim Bujakov: M.S., 1994, *Robust Dynamic Control with Applications to Electro-Rheological Materials*.
11. Robert Kruger: M.S., 1994, *Efficient Solution Techniques for Spectral Stochastic Finite Element*.
12. Imad Dana: M.S., 1994, *Implementation of GIS for Environmental Impact Assessment*.

Undergraduate Students:

1. Argin Dermegerdichian: 2021-present (Topic: Scientific workflows for integrated manufacturing processes).
2. Meghna Kiran: 2020-present (Topic: LSDYNA models for vehicle crash analysis).
3. Charlie Neuenschwander: 2021-present (Topic: Data sources and ML for socio-economic impact of oil spills in the Gulf of Mexico).
4. Kathryn Huang: 2020-2021 (Topic: Machine Learning for assessing COVID-19 spread).
5. Wenwen Tang: 2020 (Topic: Data analytics for risk assessment.)
6. Salamah Haddad: summer 2012 (Topic: Physics of fuel cells.)
7. Maxime Colombe: 2011-2012 (Topic: Entropy-based models for Los Angeles.)
8. Reid Kawamoto: 2012 (Topic: Input-Output models for Southern California.)
9. Brian Adams: 2010 (Topic: Uncertainties in early-stage design and relation to life-cycle management.)
10. Aritra Chatterjee: summer 2010 (Topic: Review of performance-based design methodologies.)
11. Katie Hickey: 2007-2008 (Topic: review of climate change effects on Los Angeles).
12. Nabil Katicha: summer 2007 (Topic: CAD models for heterogeneous subsurface models.)
13. Brian Kannard: 2005-2007 (Topic: Computer Model of a Human Liver.)
14. Nathan Racklyeft: summer 2006 (Topic: Computer Model of a Human Liver.)
15. Christie Ferguson: summer 2006 (Topic: GIS Integration for Natural Resources.)
16. Reuben Brewer: 2003-2004 (Topic: Modeling tools in computational mechanics.)
17. Ken Loh: spring 2001-2003 (Topic: Compile electromagnetic properties for material used in infrastructure.)
18. Jennifer Abras: 2001-2003 (Topic: Computational Modeling of Uncertain Systems.)
19. Mark Staley: 2001-2003 (Topic: Computational Modeling of Uncertain Systems.)

20. Dubar Kamara: 1999-2001 (Topic: The Development of a Java-Based Tool for the Simulation of Stochastic Processes.)
21. Samar Malek: 1998-2003 (Topics: Review of Data Formats for Natural Resources Applications; Simulation of SAR Cross-Sections for Urban Areas; Stochastic Finite Elements; FEM for Joints.)
22. Marta Alonso: 1999-2000 (Topics: GIS for Natural Resource Management; CAD Models for Urban Areas.)
23. Matt Hayden: 1998-1999, (Topic: Finite Element Analysis for Damage Detection.)
24. Handler Gregor: 1997-1998, (Topic: A Review of the Interaction Mechanisms of Wind with Cable-Suspended Bridges.)
25. Jane Raba: 1997-1999 (Topics: Internet-Based Frame Analysis Program Using Java; Data Formats for GIS and Environmental Sustainability.)
26. Arnab Gupta: 1997 (Topic: Solid Mechanics Applied to the Human Body.)
27. Maria Rivera: 1997 (Topic: Basic Interactions in Electro Rheological Fluids.)
28. Andrew Clemens: 1997 (Topic: Computer Visualization of Granular Flows.)
29. Mark Green: 1993 (Topic: Flow Characterization in Heterogeneous Porous Media.)

TEACHING

- | | |
|--|-----------------------------------|
| . Advanced Mathematics for Engineers | . Random Vibrations |
| . Finite Element Methods | . Advanced Finite Elements |
| . Probabilistic Methods For Engineers | . Reliability |
| . Electrodynamics of Continuous Media | . Theory of Structures |
| . Engineering Graphics and Design | . Discrete-Time Dynamical Systems |
| . Theoretical Methods in Computational Mechanics | . Dynamics |
| . Statics | . Wave Propagation |
| . Structural Mechanics | . Transport in Porous Media |
| . Stochastic Optimization | . Multiscale Methods |
| . Entropy Methods in Mechanics | . Uncertainty Quantification |

PROFESSIONAL ACTIVITIES

University Services:

University of Southern California

- Provost Committee for Data Infrastructure (2021-present)
- VSoE Faculty Council (2021-present)
- VSoE APT Committee (2017-2019)
- CEE Faculty Search Committee (2018, 2019, 2020)
- CEE Merit Review Committee (2018)
- CEE Structures Curriculum Committee (2014-present)

- AME Merit Review Committee (2014-2015)
- AME and CEE Promotions Committee (2014-2015)
- AME PhD Admissions Committee (2012-2015)
- Applied Mathematics Task Force (2009-2011)
- Advisory Board Committee, Department of Aerospace and Mechanical Engineering (2008-2011)
- USC Committee on Faculty Rights and Responsibilities (2009-present)
- USC Committee on Academic Policies and Procedures (2008-present)
- Graduate School Committee on Fellowships, Prizes and Awards (2008-present)
- Member of the interview panel for the Trustee and Presidential Scholarships (2007-2009)
- Viterbi School of Engineering (VSoE) Energy Initiative (2007-2010)

Johns Hopkins University

- University Communication Networks and Computing Committee
- The School of Engineering Curriculum Committee
- Civil Engineering Department Computing Committee

Editorial Services:

1. Executive Editor, *Data Centric Engineering*, (published by Cambridge U Press), 2019-present.
2. Associate Editor, *AIAA Journal*, 2012-2020.
3. Associated Editor, *Foundations of Data Science*, (published by American Institute for Mathematical Sciences) 2019-present.
4. Associate Editor *Advanced Modeling and Simulation in Engineering Sciences*, (published by Springer) 2020-present.
5. Associate Editor, *SIAM Journal on Uncertainty Quantification* (published by SIAM), 2012-present.
6. Associate Editor, *SIAM Journal on Multiscale Modeling and Simulation* (published by SIAM), 2011-present.
7. Editorial Board, *Data-Enabled Discovery and Analysis*, (published by Springer) 2012-2017.
8. Editorial Board, *Mechanics of Advanced Materials and Structures Journal (MAMS)* (published by Taylor and Francis), 2011-present.
9. Advisory Board, *Computational Mechanics* (published by Springer), 2014-present.
10. Editorial Board, *Computer Methods in Applied Mechanics and Engineering* (published by Elsevier), 2011-present.
11. Editorial Board, *International Journal of Uncertainty Quantification* (published by Begell House), 2009-present.

12. Editorial Board, *Probabilistic Engineering Mechanics* (published by Elsevier), 1998-present.
13. Advisory Board, *Journal of Multiscale Computational Engineering* (published by Begell House), 2002-present.
14. Editorial Board, *Structure and Infrastructure Engineering* (published by Taylor and Francis), 2007-present.
15. Guest Editor, special issue on “Uncertainty Quantification,” in *AI EDAM - Artificial Intelligence for Engineering Design Analysis and Manufacturing*, Volumes 31 and 32, 2017.
16. Guest Editor, special issue on “Structural Health Monitoring and Prognosis of Aerospace Structures,” in the *Journal of Intelligent Material Systems and Structures*, 2012.
17. Guest Editor, special issue on “Uncertainty Quantification” in the *Journal of Theoretical and Computational Nanoscience*, Vol. 6, No. 10, 2009.
18. Guest Editor, special issue on “Uncertainty Quantification” in the *International Journal for Numerical Methods in Engineering*, Vol. 80, No. 6-7, 2009.
19. Guest Editor, special issue on “Uncertainty Quantification” of the *SIAM Journal on Scientific Computing*, Vol 26, No. 2, 2005.
20. Guest Editor, special issue on Structural Health Monitoring of the *Journal of Engineering Mechanics*, July 2000.
21. Associate Editor, *ASCE, Journal of Engineering Mechanics*, 2000-2004.

Professional Services:

1. Elected Chair of the *SIAM Activity Group (SIAG) on Uncertainty Quantification*, January 2017-2019.
2. Member of the NRC Review Panel on Ballistics Science and Engineering at the Army Research Laboratory, 2015-2019, 2020-present.
3. Member of the NRC Review Panel on Assessment and Analysis at the Army Research Laboratory, 2016.
4. Elected Member *U.S. National Committee for Theoretical and Applied Mechanics*, 2014-2017.
5. Elected Member of the *USACM Executive Council*, 2014-2018.
6. Elected President of the Engineering Mechanics Institute of ASCE, 2011-2013.
7. Founding Chairman, *USACM Committee on Uncertainty Quantification*, 2011-2015.
8. Program Director, *SIAM Activity Group (SIAG) on Uncertainty Quantification*, 2010-2012.
9. Member, *U.S. National Research Council Committee on Mathematical Foundations of Validation, Verification, and Uncertainty Quantification*, 2010-2012.
10. Chartered Member of the *European Association of Structural Dynamics (EASD)*.
11. Member of the *Board of Governors of the ASCE Engineering Mechanics Institute*, 2003-2013.
12. Chairman, Dynamics Committee, *ASCE Engineering Mechanics Division*, 2001-2003.

13. Chairman, Programs Committee, ASCE Engineering Mechanics Division, 1999-2003.
14. Chairman, Task Group on Frontiers of Mechanics in Civil Engineering, ASCE Engineering Mechanics Division, 2001-present.
15. Chairman, Probabilistic Mechanics Committee, ASCE Engineering Mechanics Division, 2003-2005.
16. News Correspondent, ASCE Engineering Mechanics Division, 1993-1999.
17. College of Reviewers for the Canada Research Chairs program, 2003-present.
18. Technical reviewer for many professional journals across science and engineering.
19. Thesis reviewer and Habilitation Committees at Brown University, the Universities of Tokyo and Kyoto, Université de Lille, L'École Centrale de Paris, L'École Centrale de Lyon, Conservatoire National des Arts et Métiers, University of Rome "La Sapienza", and National University of Singapore, Université Paris Est, Bergische Universität Wuppertal, Université de Nantes, Université Pierre et Marie Curie.
20. Organized hundreds of technical sessions at various national and international conferences in civil, mechanical and aerospace engineering and applied mechanics and mathematics.

Organized Conferences and Workshops:

1. Organizer of the *Summer School on Uncertainty Quantification*, USC, Los Angeles, CA August 22-24, 2012, August 12-14 2013, August 9-11 2014, August 19-21, 2015, August 15-17, 2016, August 8-10, 2018, Aug 14-16, 2019, Aug 12-14, 2020.
2. Co-Organizer of the Workshop on *Machine Learning and Uncertainty Quantification*, MLUQ, USC, Los Angeles, CA, June 6-9, 2018, July 25-26, 2019, June 2020.
3. Co-Organizer of the workshop on *Data-Science in Civil Engineering*, Shanghai, China, June 7-9, 2019.
4. Co-Organizer of the *Workshop on Research Challenges and Opportunities at the interface of Machine Learning and Uncertainty Quantification*, University of Southern California, Los Angeles, June 4-6, 2018.
5. Co-Organizer of the *BIRS Workshop on Computational Methods for Uncertainty Quantification*, Banff, Canada, October 8-13 2017.
6. Co-organizer of the *ICERM (Institute for Computational and Experimental Research in Mathematics) Semester Program on "Computational Challenges in Probability"*, September 5, 2012 - December 7, 2012.
7. Co-organizer of the *SAMSI (Statistical and Applied Mathematical Sciences Institute) Uncertainty Quantification Program*, 2011-2012.
8. Co-organizer of the *BIRS Workshop on Stochastic Multiscale Methods*, Banff, Canada, March 27-April 1 2011.
9. Organizer of *Uncertainty Quantification for Multiphysics and Multiscale Systems*, University of Southern California, Los Angeles, CA, March 8 2011.

10. Co-organizer of the Los Alamos National Laboratory workshop on *Mapping Out Future Directions for Uncertainty Quantification in Scientific Inference*, Santa Fe, November 4 2010.
11. Co-chairman of EMI2010, the Engineering Mechanics Institute Annual Conference, Los Angeles, CA , August 8-11, 2010.
12. Organizer of the NSF workshop on *Stochastic Multiscale Methods*, University of Southern California, August 9-10, 2009.
13. Organizer of the NSF workshop on : *Uncertainty Quantification in Complex Interacting Systems*, University of Southern California, April 11-13, 2009.
14. Organizer of the workshop on : *Opportunities and Challenges in the Development of Polynomial Chaos Methods*, University of Southern California, August 21-22, 2008.
15. Co-chairman of the 9th *ASCE Specialty Conference on Probabilistic Mechanics*, Albuquerque, NM, July 26-28 2004.
16. Organizer of the workshop on : *Elements of Predictability*, Johns Hopkins University, November 13-14 2003.
17. Organizer of the workshop on : *Uncertainty Analysis and Management: Setting a Research Agenda*, Johns Hopkins University, August 16-18 1999.
18. Co-chairman, 13th *ASCE Engineering Mechanics Conference*, The Johns Hopkins University, Baltimore, June 1999.

PATENTS:

1. US Patent Number: 10717244: Roger G Ghanem, Venkateshwar R Aitharaju, Hamid G Kia, *Manufacturing control systems and logic for prognosis of defects in composite materials*, 2020.

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

1. Member: AIAA, SIAM, USACM, WCCM, AAAS, EMI.