

CURRICULUM VITAE – November 2023

Name and Academic Rank

Harry R. Millwater Jr.
Samuel G. Dawson Endowed Professor
Mechanical Engineering
The University of Texas at San Antonio
One UTSA Circle, San Antonio, TX 78249
harry.millwater@utsa.edu
210-458-4481
<https://ceid.utsa.edu/mechanical/team/harry-r-millwater-jr-ph-d/>
US Citizen



Degrees with fields, institution, and date

Ph.D.	Engineering Mechanics	Univ. of Texas at Austin, 1997
M.S.	Engineering Mechanics	Univ. of Texas at Austin, 1984
B.S.	Mechanical Engineering	Rice University, 1981

Professional Chronology

Samuel G. Dawson Endowed Professorship	2016-Present
Associate Dean for Research, College of Engineering The University of Texas at San Antonio	2014- 2017
Department Chair, Zachry Endowed Chair The University of Texas at San Antonio	2012-2014
Interim Department Chair The University of Texas at San Antonio	2011-2012
Professor, Mechanical Engineering, The University of Texas at San Antonio	2011-present
Associate Professor, Mechanical Engineering, The University of Texas at San Antonio	2006-2011
Interim Assistant Department Chair The University of Texas at San Antonio	2006-2007
Assistant Professor, Mechanical Engineering, The University of Texas at San Antonio	2001-2006
Principal Engineer, Structural Integrity and Reliability, Southwest Research Institute	1998-2001
Senior Research Engineer, Aerospace & Reliability Engineering Department, Southwest Research Institute	1994-1998
Senior Research Engineer, Structural Engineering Department, Southwest Research Institute	1992-1994
Senior Research Engineer, Materials and Mechanics Department, Southwest Research Institute	1988-1992
Research Engineer, Materials and Mechanics Department, Southwest Research Institute	1987-1988

Research Engineer, General Dynamics, Electric Boat Division Applied Mechanics Department	1984-1987
Research Assistant, Univ. of Texas at Austin, Austin, TX Applied Physics Lab	1982-1984
Design Engineer, National Supply Co.	1981-1982

Journal Publications (*indicates student)

(Google Scholar link: https://scholar.google.com/citations?user=Kf4_UdcAAAAJ&hl=en)

1. M. Balcer, M. Aristizabal, J. S. Rincon-Tabares, A. Montoya, D. Restrepo, and **H. Millwater**, "HYPAD-UQ: A Derivative-based Uncertainty Quantification Method Using a Hypercomplex Finite Element Method," ASME journal of verification, validation, and uncertainty quantification, June 2023, Vol.8 / 021002-1 <https://doi.org/10.1115/1.4062459>.
2. M. Aristizabal Cano, J.L. Hernández-Estrada, M. Garcia, **H. Millwater**, "Solution and Sensitivity Analysis of Nonlinear Equations using a Hypercomplex-Variable Newton-Raphson Method," Applied Mathematics and Computation 451 (2023) 127981 <https://doi.org/10.1016/j.amc.2023.127981>
3. A. Aguirre-Mesa*, S. Restrepo-Velasquez*, D. Ramirez-Tamayo, A. Montoya and **H. Millwater**, "Computation of two dimensional mixed-mode stress intensity factor rates using a complex-variable interaction integral," 277 (2023) Engineering Fracture Mechanics, <https://doi.org/10.1016/j.engfracmech.2022.108981>
4. A. Rios*, J.-S. Rincon-Tabares*, A. Montoya, D. Restrepo, and **H. Millwater**, "Transient Thermomechanical Sensitivity Analysis using a Complex-variable Finite Element Method", (2022) Journal of Thermal Stresses, V 45, No. 5, 341–374, <https://doi.org/10.1080/01495739.2022.2049022>
5. D. Ramirez-Tamayo, A. Soulami, V. Gupta, D. Restrepo, A. Montoya, E. Nickerson, T. Roosendaal, K. Simmons, G. Petrossian, and **H. Millwater**, "A Complex-variable Finite Element Method-based Inverse Methodology to Extract Constitutive Parameters using Experimental Data," (2022) International Journal of Solids and Structures, V 243, 2022, 111545, ISSN 0020-7683, <https://doi.org/10.1016/j.ijsolstr.2022.111545>
6. J.-S. Rincon-Tabares*, J.C. Velasquez-Gonzalez*, D. Ramirez-Tamayo, Arturo Montoya, **H. Millwater**, and D. Restrepo, "Sensitivity Analysis for Transient Thermal Problems using the Complex-Variable Finite Element Method," *Appl. Sci.* (2022), 12, 2738. <https://doi.org/10.3390/app12052738>
7. E. Ytuarte*, A.M. Aguirre-Mesa*, D. Ramirez-Tamayo, D. Avila*, **H. Millwater**, D. Restrepo, and A. Montoya, "Tearing Energy Calculation in Hyperelastic Fracture Mechanics using the Local and Global Complex-Variable Finite Element Method," *Int. J. Solids and Structures*, 111425, Volume 239-240, (2022), <https://doi.org/10.1016/j.ijsolstr.2022.111425>
8. J.D. Navarro*, **H. Millwater**, A. Montoya, and D. Restrepo. "Arbitrary-order sensitivity analysis in Phononic metamaterials using the multicomplex Taylor series expansion method coupled with Bloch's theorem." *Journal of Applied Mechanics* 89, no. 2 (2021): 021007, <https://doi.org/10.1115/1.4052830>

9. Aguirre-Mesa*, M.J. Garcia-Ruiz, M. Aristizabal, D. Wagner, D. Ramirez-Tamayo*, A. Montoya, and **H. Millwater**, "A block forward substitution method for solving the hypercomplex finite element system of equations," *Computer Methods in Applied Mechanics and Engineering*, Volume 387, (2021), 114195, ISSN 0045-7825, <https://doi.org/10.1016/j.cma.2021.114195>.
10. D. Ramirez-Tamayo*, A. Soulami, V. Gupta, D. Restrepo, A. Montoya, **H.R. Millwater**, "A Complex-variable Cohesive Finite Element Subroutine to Enable Efficient Determination of Interfacial Cohesive Material Parameters" *Engineering Fracture Mechanics* 247 (2021) 107638 <https://doi.org/10.1016/j.engfracmech.2021.107638>
11. M.R. Balcer*, **H.R. Millwater**, and J.A. Favorite, "Multidual Sensitivity Method in Ray-Tracing Transport Simulations," *Nuclear Science and Engineering*, July 1, 2021. <https://doi.org/10.1080/00295639.2021.1883949>
12. D. Ramirez-Tamayo*, M. Balcer*, A. Montoya, and **H.R. Millwater**, "Mixed-mode stress intensity factors computation in functionally graded materials using a hypercomplex-variable finite element formulation", *Int J Fract* (2020) 226:219-232. <https://doi.org/10.1007/s10704-020-00489-5>
13. A.M. Aguirre-Mesa*, M.J. Garcia, and **H.R. Millwater**, "MultiZ: A library for computation of high order derivatives using multicomplex or multidual numbers," *ACM Trans. Math. Softw.* 46, 3, Article 23 (July 2020), 30 pages, <https://doi.org/10.1145/3378538>
14. **H.R. Millwater**, J.D. Ocampo, N. Crosby*, "Probabilistic Methods for Risk Assessment of Airframe Digital Twin Structures," *Engineering Fracture Mechanics*, 221 (2019) 106674 <https://doi.org/10.1016/j.engfracmech.2019.106674>
15. A.M. Aguirre-Mesa*, D. Ramirez-Tamayo*, M.J. Garcia, A. Montoya, and **H.R. Millwater**, "A Stiffness Derivative Local Hypercomplex-Variable Finite Element Method for Computing of the Energy Release Rate," *Engineering Fracture Mechanics*, 218 (2019) 106581 <https://doi.org/10.1016/j.engfracmech.2019.106581>
16. C. Hegde, **H.R. Millwater**, M. Pyrcz, H. Daigle, and K. Gray, "Rate of penetration (ROP) optimization in drilling with vibration control", *Journal of Natural Gas Science and Engineering*, 67 (2019): 71-81, <https://doi.org/10.1016/j.jngse.2019.04.017>
17. M. Aristizabal, D. Ramirez-Tamayo*, M. Garcia, A. Aguirre-Mesa*, A. Montoya, **H.R. Millwater**, "Quaternion and octonion-based finite element analysis methods for computing multiple first order derivatives," *J. Comput. Phys.*, 397 (2019) <https://doi.org/10.1016/j.jcp.2019.07.030>
18. D. Wagner*, M. Garcia, A. Montoya, **H.R. Millwater**, "A Finite Element-based Adaptive Energy Response Function Method for 2D Curvilinear Progressive Fracture," *Int. J Fatigue* 127 (2019) 229-245 <https://doi.org/10.1016/j.ijfatigue.2019.05.036>
19. R. Fielder*, **H.R. Millwater**, A. Montoya, P. Golden, "Efficient Estimate of Residual Stress Variance Using Complex Variable Finite Element Methods," *International Journal of Pressure Vessels and Piping*, 173 (2019) 101-113 <https://doi.org/10.1016/j.ijpvp.2019.05.004>
20. C. Hegde, M. Pyrcz, **H.R. Millwater**, H. Daigle, and K. Gray, "Classification of drilling stick slip severity using machine learning", *J. Petrol. Science and Engineering*, 179 (2019) 1023-1036 <https://doi.org/10.1016/j.petrol.2019.05.021>

21. A. Montoya, D. Ramirez Tamayo*, **H.R. Millwater**, and M. Kirby*, “A Complex-Variable Virtual Crack Extension Finite Element Method for Elastic-Plastic Fracture Mechanics, Engineering Fracture Mechanics”, 202 (2018) 242-258
<https://doi.org/10.1016/j.engfracmech.2018.09.023>
22. D. Ramirez Tamayo*, A. Montoya, **H.R. Millwater**, “Application of the Complex-variable Finite Element Method to Mixed Mode Fracture and Interface Cracks”, AIAA Journal, V 56, No. 11 (2018), <https://arc.aiaa.org/doi/abs/10.2514/1.J057231>
23. D. Ramirez Tamayo*, A. Montoya, **H.R. Millwater**, “A Virtual Crack Extension Method for Thermoelastic Fracture Using a Complex-Variable Finite Element Method”, Engineering Fracture Mechanics 192 (2018) 328-342, <https://doi.org/10.1016/j.engfracmech.2017.12.013>
24. C. Hegde, H. Daigle, **H.R. Millwater**, K. Gray, “Analysis of Rate of Penetration (ROP) Prediction in Drilling using Physics-based and Data-driven Models,” Journal of Petroleum Science and Engineering 159 (2017) 295–306, <https://doi.org/10.1016/j.petrol.2017.09.020>
25. R. Fielder*, A. Montoya, **H.R. Millwater** and P. Golden, “Residual Stress Sensitivity Analysis using a Complex Variable Finite Element Method,” International Journal of Mechanical Sciences 133 (2017) 112–120, <http://dx.doi.org/10.1016/j.ijmecsci.2017.08.035>
26. J.F. Monsalvo, M.J. Garcia, **H.R. Millwater**, Y. Feng, “Sensitivity Analysis for Radiofrequency Induced Thermal Therapies using the Complex Finite Element Method”, Finite Elements in Analysis and Design 135 (2017) 11–21, <http://dx.doi.org/10.1016/j.finel.2017.07.001>
27. A. Montoya and **H.R. Millwater**, “Sensitivity Analysis in Thermoelastic Problems using the Complex Finite Element Method,” J. of Thermal Stresses, 40:3 (2017) 302-321
<https://dx.doi.org/10.1080/01495739.2016.1264871>
28. **H.R. Millwater**, D. Wagner*, A. Baines*, and A. Montoya, “A Virtual Crack Extension Method to Compute Energy Release Rates using a Complex Variable Finite Element Method,” Engineering Fracture Mechanics 162 (2016) 95–111,
<https://dx.doi.org/10.1016/j.engfracmech.2016.04.002>
29. J. Garza* and **H.R. Millwater**, “Probabilistic Sensitivity Analysis of the Probability-of-Failure to Probability of Detection Curve Regions,” Int. J. of Pressure Vessels and Piping, 141 (2016) 26-39, <https://dx.doi.org/10.1016/j.ijpvp.2016.03.012>
30. J. Garza* and **H.R. Millwater**, “Higher-Order Probabilistic Sensitivity Calculations Using the Multicomplex Score Function Method,” Probabilistic Engineering Mechanics, 45 (2016) 1-12,
<https://dx.doi.org/10.1016/j.probengmech.2015.12.001>
31. S. Shirinkam, A. Aleaddini, and **H.R. Millwater**, “On the Application of Multicomplex Algebras in Numerical Integration”, Appl. Math. Inf. Sci. 10, NO. 1, 1-9 (2016),
<https://dx.doi.org/10.18576/amis/100101>
32. A. Gomez-Farias*, A. Montoya, **H.R. Millwater**, “Complex Finite Element Sensitivity Method for Creep Analysis,” International Journal of Pressure Vessels and Piping (2015), V 132-133, 27-42, <http://dx.doi.org/10.1016/j.ijpvp.2015.05.006>
33. A. Kibria*, K.K. Castillo-Villar, and **H.R. Millwater**, (2015), “Minimizing the Discrepancy between Simulated and Historical Failures in Turbine Engines: A Simulated Annealing-based Optimization Method,” Mathematical Problems in Engineering, Special Issue on Mathematical

Applications to Reliability and Maintenance Problems in Engineering Systems, V 2015, pp 11, Article ID 813565, <https://dx.doi.org/10.1155/2015/813565>

34. J. Garza* and **H. Millwater**, "Multicomplex Newmark-Beta Time Integration Method for Sensitivity Analysis in Structural Dynamics", AIAA Journal, Vol. 53, No. 5 (2015), pp. 1188-1198, <http://arc.aiaa.org/doi/abs/10.2514/1.J0532821>
35. A. Montoya, R. Fielder*, A. Gomez-Farias*, **H. Millwater**, "Finite Element Sensitivity for Plasticity using Complex Variable Methods," J. Eng. Mech. 141 2 (2014), <https://ascelibrary.org/doi/abs/10.1061/%28ASCE%29EM.1943-7889.0000837>.
36. C. Quintana*, **H. R. Millwater**, G. Singh, P. Golden, "Optimal Allocation of Testing Resources for Statistical Simulation," Engineering Optimization, (2015), Vol. 47, No. 7, 979-993, <https://dx.doi.org/10.1080/0305215X.2014.933824>
37. **H.R. Millwater** and S. Shirinkam, "Multicomplex Taylor Series Expansion for Computing High Order Derivatives", International Journal of Applied Mathematics, Vol. 27, No 4 (2014), <https://dx.doi.org/10.12732/ijam.v27i4.2>
38. T. Rahman*, **H.R. Millwater**, and H. Shipley, "Modeling and Sensitivity Analysis on the Transport of Aluminum Oxide Nanoparticles in Saturated Sand: Effects of Ionic Strength, Flow Rate, and Nanoparticle Concentration," Science of the Total Environment 499, 2014, 402-412, <https://doi.org/10.1016/j.scitotenv.2014.08.073>
39. M.D. Brothers*, J.T. Foster, **H.R. Millwater**, "A comparison of different methods for calculating tangent-stiffness matrices in a massively parallel computational peridynamics code," Comput. Methods Appl. Mech. Engrg. 279 (2014) 247–267, <https://doi.org/10.1016/j.cma.2014.06.034>
40. **H.R. Millwater**, D. Wagner*, A. Baines*, K. Lovelady*, "Improved WCTSE Method for the Generation of 2D Weight Functions through Implementation into a Commercial Finite Element Code," Engng Fract Mech, 109 (2013) 302-309, <https://dx.doi.org/10.1016/j.engfracmech.2013.07.012>
41. D.S. Sparkman* and **H.R. Millwater**, S. Ghosh, "Probabilistic Sensitivity Analysis of Dwell-Fatigue Crack Initiation Life for a 2-grain Microstructural Model," Fatigue and Fracture of Engineering Materials and Structures, (2013) 36, 994-1008, <https://doi.org/10.1111/ffe.12052>
42. G. Singh, M. Cortina*, **H.R. Millwater**, and A. Clauer. "Probabilistic Sensitivity Analysis of a Laser Peening Fatigue Life Enhancement Process," International Journal of Structural Integrity 3, no. 3 (2012): 210-235, <https://doi.org/10.1108/17579861211264352>
43. G. Singh, J. Ocampo*, **H.R. Millwater**, A. Clauer, (2012), "Simulation-Based Crack Growth Mitigation Through Optimum Laser Peened Residual Stress," Int. J. Structural Integrity, Vol. 3 Iss: 3 pp. 236 – 259, <https://doi.org/10.1108/17579861211264361>
44. D. Wagner*, and **H.R. Millwater**, "2D Weight Function Development using a Complex Taylor Series Expansion Method," Engng Fract Mech 86 (2012), 23-37, 210- <https://doi.org/10.1016/j.engfracmech.2012.02.006>
45. L. Domyancic*, **H.R. Millwater**, "Advances in Bounding Techniques for Aircraft Structures," AIAA Journal, 50, 6, (2012), 1307-1313, <https://doi.org/10.2514/1.J051403>

46. A. Voorhees*, **H.R. Millwater**, R. Bagley, P. Golden, "Fatigue Sensitivity Analysis Using Complex Variable Methods," *Int J Fatigue* 40 (2012) 61-73, <https://doi.org/10.1016/j.ijfatigue.2012.01.016>
47. J. Garza*, **H.R. Millwater**, "Sensitivity of Probability-of-Failure Estimates with respect to Probability of Detection Curve Parameters," *International Journal of Pressure Vessels and Piping* 92 (2012) 84-95, <https://doi.org/10.1016/j.ijpvp.2011.11.009>
48. J.D. Ocampo*, **H.R. Millwater**, G. Singh, H. Smith, F. Abali, M. Nuss, M. Reyer, M. Shiao, "Development of a Probabilistic Linear Damage Methodology for Small Aircraft," *AIAA J. Aircraft*. 48, 6 (2011), 2090-2106, <https://doi.org/10.2514/1.C031463>
49. A. Voorhees*, **H.R. Millwater**, R.L. Bagley, "Complex Variable Methods for Shape Sensitivity of Finite Element Models," *Finite Elem. Anal. Des.*, 47 (2011) 1146–1156, <https://doi.org/10.1016/j.finel.2011.05.003>
50. **H.R. Millwater**, G. Singh, M. Cortina*, "Development of a Localized Probabilistic Sensitivity Method to Determine Random Variable Regional Importance," *Reliability Engineering & System Safety*. (2011) <https://doi.org/10.1016/j.res.2011.04.003>
51. **H.R. Millwater** and Y. Feng, "Probabilistic Sensitivity Analysis with respect to Bounds of Truncated Random Variables," *ASME J. Mech. Des.* 133, 061001 (2011), <https://doi.org/10.1115/1.4003819>
52. **H.R. Millwater**, A. Bates*, E. Vazquez*, "Probabilistic Sensitivity Methods for Correlated Normal Variables," *Int. J. of Reliability and Safety*, 5, No. 1, pp. 1-20 (2011), <https://doi.org/10.1504/IJRS.2011.037344>
53. X.N. Dong, Q. Luo, D.M. Sparkman*, **H.R. Millwater**, and X. Wang, "Random Field Assessment of Nanoscopic Inhomogeneity of Bone," *Bone* 47 (2010) 1080–1084, <https://doi.org/10.1016/j.bone.2010.08.021>
54. **H.R. Millwater**, "A Simple and Accurate Method for Computing Stress Intensity Factors of Collinear Interacting Cracks," *Aerospace Science and Technology* 14 (2010) 542–550, <https://doi.org/10.1016/j.ast.2010.04.003>
55. P. Golden, **H.R. Millwater**, X. Yang*, "Probabilistic Fretting Fatigue Life Prediction of Ti-6Al-4V," *Int. J. Fatigue* 32 (2010) 1937–1947, <https://doi.org/10.1016/j.ijfatigue.2010.06.007>
56. F.N. Momin*, **H.R. Millwater**, R.W. Osborn*, M.P. Enright, "A Non-Intrusive Method to Add Finite Element-Based Random Variables to a Probabilistic Design Code," *Finite Elements in Analysis and Design* 46 (2010) 280–287. <https://doi.org/10.1016/j.finel.2009.10.004>
57. **H.R. Millwater** and D. Wieland, "Probabilistic Sensitivity-based Ranking of Damage Tolerance Analysis Elements," *AIAA J. Aircraft*, (2010) V47 1 161-71, <https://doi.org/10.2514/1.44498>
58. S. Jha, **H.R. Millwater**, and J. Larsen, "Probabilistic Sensitivity Analysis in Life-Prediction of an $\alpha+\beta$ Titanium Alloy," *Fatigue and Fracture of Engineering Materials and Structures*, 32(6), 493 – 504, <https://doi.org/10.1111/j.1460-2695.2009.01352.x>
59. **H.R. Millwater**, "Universal Properties of Kernel Functions for Probabilistic Sensitivity Analysis," *Probabilistic Engineering Mechanics* 24 (2009) 89–99, <https://doi.org/10.1016/j.probenmech.2008.01.005>

60. X.N. Dong, T. Guda*, **H.R. Millwater**, X. Wang, "Probabilistic Failure Analysis of Bone Using a Finite Element Model of Mineral-Collagen Composites," *Journal of Biomechanics* (2008), <https://doi.org/10.1016/j.jbiomech.2008.10.022>
61. B.D. Shook*, **H.R. Millwater**, M.P. Enright, S.J. Hudak, Jr., W.L. Francis, "Simulation of Recurring Automated Inspections on Probability-of-Fracture Estimates," *Structural Health Monitoring*, 2008 7: 293-307. <https://doi.org/10.1177/1475921708091169>
62. T. Guda*, T. Ross*, **H.R. Millwater**, L. Lang, "Probabilistic Analysis of Preload in the Abutment Screw of a Dental Implant Complex" *The Journal of Prosthetic Dentistry*, V100 3 pp 183-193, 2008. [https://doi.org/10.1016/S0022-3913\(08\)60177-8](https://doi.org/10.1016/S0022-3913(08)60177-8)
63. **H.R. Millwater**, J. Larsen, R. John, "Effects of Residual Stresses on Probabilistic Lifting of Engine Disk Materials," *Materials Science and Engineering, Materials Science and Engineering: A*, Volumes 468-470, 15 November 2007, Pages 129-136, <https://doi.org/10.1016/j.msea.2006.10.169>
64. **H.R. Millwater**, M.P. Enright, and S.H.K. Fitch, "A Convergent Zone-Refinement Method for Risk Assessment of Gas Turbine Disks Subject to Low-Frequency Metallurgical Defects," *Journal of Engineering for Gas Turbines and Power*, 2007, Volume 129, Issue 3, pp. 827-835. <https://doi.org/10.1115/1.2431393>
65. **H.R. Millwater** and R. W. Osborn*, "Probabilistic Sensitivities for Fatigue Analysis of Turbine Engine Disks," *International Journal of Rotating Machinery*, vol. 2006, Article ID 28487, 12 pages, 2006. <https://doi.org/10.1155/IJRM/2006/28487>
66. M.P. Enright, **H.R. Millwater**, and L. Huyse, "Adaptive Optimal Sampling Methodology for Reliability Prediction of Series Systems," *AIAA J.* Vol. 33, No. 3, March, 2006. <https://doi.org/10.2514/1.11290>
67. M.P. Enright, S.J. Hudak, R.C. McClung, and **H.R. Millwater**, "Application of Probabilistic Fracture Mechanics to Prognosis of Aircraft Engine Components," *AIAA J.* Vol. 44, No. 2, February, 2006. <https://doi.org/10.2514/1.13142>
68. G.R. Leverant, **H.R. Millwater**, R.C. McClung, M.P. Enright, "A New Tool for Design and Certification of Aircraft Turbine Rotors," *Journal of Engineering for Gas Turbines and Power*, Vol. 126, No. 1, pp. 155-159, 2004. <https://doi.org/10.1115/1.1622409>
69. Y.-T. Wu, M. P. Enright, **H.R. Millwater**, "Probabilistic Methods for Design Assessment of Reliability with Inspection", *AIAA Journal*, V40, No. 5, pp 937-946, 2002. <https://doi.org/10.2514/2.1730>
70. S. R. Runnels, R. A. Page, M.P. Enright, **H.R. Millwater**, "Advanced Experimental and Computational Tools for Robust Evaluation of On-Chip Interconnect Reliability," *IEEE Transactions on Semiconductor Manufacturing*, Vol. 15, No. 3, Aug. 2002. <https://doi.org/10.1109/TSM.2002.801394>
71. G.G. Chell, C.J. Kuhlman, **H.R. Millwater**, and D.S. Riha, "Application of Reference Stress and Probabilistic Methodologies to Assessing Creep Crack Growth," *ASTM Special Technical Publication*, v 1297, 1997, p 54-73

72. A.J. Smalley, R.M. Baldwin, D.A. Mauney, and **H.R. Millwater**, "Towards Risk Based Criteria for Rotor Vibration," *IMechE*, No. C500/081/96, pp. 517-527, 1996.
73. **H.R. Millwater**, Y.-T. Wu, J. W. Cardinal, and G. G. Chell, "Application of Advanced Probabilistic Fracture Mechanics to Life Evaluation of Turbine Rotor Blade Attachments," *Journal of Engineering for Gas Turbines and Power*, Vol. 118, No. 2, pp. 394-398, April 1996.
74. D.S. Riha, **H.R. Millwater**, and B.H. Thacker, "Probabilistic Structural Analysis using a General Purpose Finite Element Program," *Finite Elements in Analysis and Design*, Vol. 11, No. 3, July 1992, p 201-211
75. C.T. Dyka, A.M. Remondi, and **H.R. Millwater**, "3D Boundary Elements and the Integration of Strong Singularities," *Computers & Structures*, Vol. 39, No. 5, pp. 513-524, 1991.
76. Y.-T. Wu, **H.R. Millwater**, T.A. Cruse, "Advanced Probabilistic Structural Analysis Method for Implicit Performance Functions," *AIAA Journal*, Vol. 28, No. 9, pp. 1663-1669, September 1990.
<https://doi.org/10.2514/3.25266>
77. C.T. Dyka and **H.R. Millwater**, "Formulation and Integration of Continuous and Discontinuous Quadratic Boundary Elements for Two Dimensional Potential and Elastostatics," *Computers & Structures*, Vol. 31, No. 4, pp. 495-504, 1989.
78. M. Stern, A. Bedford, and **H.R. Millwater**, "Wave Reflection from a Sediment Layer with Depth-dependent Properties," *J. Acoust. Soc. Am.*, Vol. 77, No. 5, pp. 1781-1788, May 1985.
<https://doi.org/10.1121/1.391927>

Book Chapters

1. **H.R. Millwater**, P. Wirsching - "Analysis Methods for Probabilistic Life Assessment", *American Society of Metals Failure Analysis Handbook*, V 11, 2003, pp. 250-268
2. S. J. Hudak, Jr., B. R. Lanning, G. M. Light, J. M. Major, J. A. Moryl, M. P. Enright, R. C. McClung, and **H.R. Millwater**, in: J.M. Larsen, L. Christodoulou, J.R. Calcatererra, M.L. Dent, M.M. Derriso, W.J. Hardman, J.W. Jones, S.M. Russ, (Eds.) *Materials Damage Prognosis*, "The Influence of Uncertainty in Usage and Fatigue Damage Sensing on Turbine Engine Prognosis," *The Minerals, Metals, & Materials Society*, 2005, 157-166.
3. R.C. McClung, M.P. Enright, **H.R. Millwater**, G.R. Leverant, S.J. Hudak, Jr., (2004) "A Software Framework for Probabilistic Fatigue Life Assessment of Gas Turbine Engine Rotors," STP 1450, Probabilistic Aspects of Life Prediction, ASTM

Peer-reviewed Conference Papers

1. **H. Millwater**, J. Ocampo, N. Crosby, S. Mottaghi, and M. Reyer, "Probabilistic Methods for Risk Assessment of Airframe Digital Twin Structures," 52nd Applied Vehicle Technology Panel Business Meeting Week, NATO AVT-369 Research Symposium "Digital Twin Technology Development and application for Tri-Service Platforms and Systems", Bastad, Sweden, 10-12 October 2023
2. J. Ocampo, **H. Millwater**, N. Crosby, B. Gamble, C. Hurst, M. Nuss, M. Reyer, S. Mottaghi "Probabilistic Damage Tolerance Analysis Using Adaptive Multiple Importance Sampling" International Conference on Aeronautical Fatigue - ICAF, Delft, Netherlands, June 2023.

3. Matthew Balcer, Daniel Ramirez-Tamayo, Arturo Montoya, and **Harry Millwater**, "Uncertainty Quantification Modeling of Structures and Materials Using the Hypercomplex Differentiation Method." Proceedings, 15 Apr. 2021, pp. 29-35, <https://doi.org/10.1061/9780784483381.003>.
4. Matthew R. Balcer, Jeffrey A. Favorite, and **Harry Millwater**, "Multidual Sensitivity Method in Ray-Tracing Transport Simulations," Transactions of the American Nuclear Society, 123, 715–718 (2020); <https://doi.org/10.13182/T123-33400>.
5. J. Ocampo, **H. Millwater**, N. Crosby, B. Gamble, C. Hurst, M. Nuss, M. Reyer, and S. Mottaghi, "An Ultrafast Crack Growth Lifting Model to Support Digital Twin, Virtual Testing, and J. Probabilistic Damage Tolerance Applications," Int. Conf. Aeronautical Fatigue (ICAF), Poland, Krakow 2-7 June 2019
6. D. Ramirez Tamayo*, A. Montoya, and **H. Millwater**, "A New Complex-variable Thermal Fracture Finite Element Method for Evaluating the Structural Integrity of Aircraft Structures," AIAA SciTech Conference, Kissimmee, FL, Jan 8-12, 2018, AIAA-0649, <https://doi.org/10.2514/6.2018-0649>
7. J. Ocampo, **H. Millwater**, N. Crosby, B. Gamble, C. Hurst, M. Nuss, M. Reyer, S. Mottaghi, "Probabilistic Damage Tolerance for Aircraft Fleets Using the FAA-Sponsored SMART|DT Software," Int. Conf. on Aeronautical Fatigue, Nagoya Japan, June 7-9, 2017
8. N. Crosby*, **H. Millwater**, J. Ocampo, E. Anagnostou, S. Engel, J. Madsen, K. Engel, "Probabilistic Damage Tolerance for Aviation Fleets Using a Kriging Surrogate Model," AIAA SciTech Conference, Ft. Worth, TX, Jan 9-13, 2017
9. E. Anagnostou, S. Engel, J. Madsen, K. Engel, J. Nardiello, D. Hoitsma, **H. Millwater**, J. Ocampo, C. Quintana, and N. Crosby*, "Developing the Airframe Digital Twin Prognostic & Probabilistic Individual Aircraft Tracking Paradigm," Aircraft Airworthiness & Sustainment, Grapevine, TX, March 21-24, 2016
10. D.M. Sparkman, J.E. Garza*, **H.R. Millwater**, and B.P. Smarslok, "Sampling-based Post-Processing Method for Global Sensitivity Analysis," AIAA SciTech, 4-8 January 2016, San Diego, California, USA, 18th AIAA Non-Deterministic Approaches Conference
11. J. Ocampo and **H.R. Millwater**, "Probabilistic Damage Tolerance Analysis for Aircraft Fleets" Australian Aircraft Airworthiness & Sustainment Conference. Brisbane, Australia, July 2015.
12. **H.R. Millwater**, D. Wagner, "A New Progressive Curvilinear Strain Energy-based Crack Growth Modeling Algorithm using Multicomplex Variable Finite Elements," Advanced Materials Research Vols. 891-892 (2014) pp 1015-1020 Online available at www.scientific.net^[T_{SEP}]© (2014) Trans Tech Publications, Switzerland doi:10.4028/www.scientific.net/AMR.891-892.1015
13. **H.R. Millwater**, J.D. Ocampo, T. Castaldo, "Probabilistic Damage Tolerance Analysis for General Aviation," Advanced Materials Research Vols. 891-892 (2014) pp 1191-1196 Online available at www.scientific.net^[T_{SEP}]© (2014) Trans Tech Publications, Switzerland doi:10.4028/www.scientific.net/AMR.891-892.1191
14. C. Quintana, **H.R. Millwater**, and R.C. Penmetsa, "Integration of System Reliability Analysis and FMECA to Efficiently Identify Structural Hot Spots," AIAA SciTech Conference, National Harbor, MD, Jan. 2014

15. **H.R. Millwater**, D. Wagner, J.E Garza, A. Baines, K. Lovelady, "Application of the Complex Variable Finite Element Method, ZFEM, to Structural Mechanics Sensitivity Analysis, 15th Nondeterministic Approaches Conference, April 8-12, 2013, Boston, MA
16. J.E. Garza, **H.R. Millwater**, "Sensitivity Analysis in Structural Dynamics using the ZFEM Complex Variable Finite Element Method," 15th Nondeterministic Approaches Conference, April 8-12, 2013, Boston, MA
17. J.D. Ocampo, **H.R. Millwater**, "Probabilistic Damage Tolerance for Small Airplanes Using a Linear-Elastic Crack Growth Fracture Mechanics Surrogate Model," 15th Nondeterministic Approaches Conference, April 8-12, 2013, Boston, MA
18. C. Quintana, **H.R. Millwater**, "Investigating the Feasibility of Interpolating Scatter in Material Property Data," 15th Nondeterministic Approaches Conference, April 8-12, 2013, Boston, MA
19. C. Dubinsky, **H.R. Millwater**, G. Singh, and P. Golden, "Experimental Resource Allocation for Statistical Simulation of Fretting Fatigue," 14th AIAA Nondeterministic Approaches Conference, 23 - 26 April 2012, Honolulu, Hawaii
20. L.C. Domyancic and **H.R. Millwater**, "Sensitivity Analysis for Risk Assessment of an Aircraft," 14th AIAA Nondeterministic Approaches Conference, 23 - 26 April 2012, Honolulu, Hawaii
21. D.M. Sparkman, **H.R. Millwater**, P. Golden, R. John, "Probabilistic Framework for Prediction of Material Property Distributions from Small Microstructural Models," 14th AIAA Nondeterministic Approaches Conference, 23 - 26 April 2012, Honolulu, Hawaii
22. M. Cortina, J. Ocampo, and **H.R. Millwater**, "Sensitivity analysis for General Aviation Risk Assessment," 14th AIAA Nondeterministic Approaches Conference, 23 - 26 April 2012, Honolulu, Hawaii
23. G. Singh, J. Ocampo, and **H.R. Millwater**, "Extreme Value Modeling and Parametric Investigations of Gust and Maneuver Loads for General Aviation," 23 - 26 April 2012, Honolulu, Hawaii
24. D. Wagner, A. Baines, T. Ross, C. Dubinsky and **H.R. Millwater**, "User-defined Elements with Complex Nodal Coordinates, Aircraft Airworthiness & Sustainment Conference, Baltimore, MD, April 2-6, 2012
25. J. Ocampo, **H.R. Millwater**, "Probabilistic Damage Tolerance Analysis for Small Airplanes," Aircraft Airworthiness & Sustainment Conference, Baltimore, MD, April 2-6, 2012
26. J. Garza and **H.R. Millwater**, "Sensitivity of the Probability of Failure to POD Curve Regions", Aircraft Airworthiness & Sustainment Conf., San Diego, CA, April 2011
27. **H.R. Millwater**, D. Sparkman L. Smith, L. Domyancic, and D. Wieland, "System Reliability-based Filtering Methods for Determining Critical Locations of Aircraft structures," Aircraft Airworthiness & Sustainment Conf., San Diego, CA, April 2011
28. J.D. Ocampo and **H.R. Millwater**, "SMART|LD (Small Aircraft Risk Technology –Linear Damage) Technology and Case Studies Applications," Aircraft Airworthiness & Sustainment Conf., San Diego, CA, April 2011

29. D. Wagner and **H.R. Millwater**, "2D Weight Function Development using a Complex Taylor Series Expansion Method", Aircraft Airworthiness & Sustainment Conf., San Diego, CA, April 2011
30. Y.-T. Wu, **H. Millwater**, and F. Abali, "Significance of Including Missed-Detections in Structural Reliability Updating," 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference - 13th AIAA Nondeterministic Approaches Conference, April 4-7, 2011, Denver, CO
31. G. Singh, M. Cortina, and **H. Millwater**, "Sensitivity Analysis of Laser Peening, a Fatigue Life Enhancement Process," 13th AIAA Nondeterministic Approaches Conference, April 4-7, 2011, Denver, CO
32. G. Singh, **H. Millwater**, Extreme Value Modeling of Gust and Maneuver Loads for General Aviation, 13th AIAA Nondeterministic Approaches Conference, April 4-7, 2011, Denver, CO
33. L. Domyancic, **H.R. Millwater**, "Advances in Bounding Techniques for Aircraft Structures," 13th AIAA Nondeterministic Approaches Conference, April 4-7, 2011, Denver, CO, AIAA-2011-1760
34. D. Sparkman, and **H. Millwater**, "FORM-Based Filtering of Limit States," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010. **First Place Student Competition.**
35. J. Garza and **H. Millwater**, Sensitivity of Probability-of-Failure Estimates with respect to Probability of Detection Curve Parameters," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010
36. E. Vazquez, **H. Millwater**, Y.-T. Wu, and M. Shiao, Bayesian Updating with MCMC for Computational Efficiency," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010
37. J. Ocampo and **H. Millwater**, "Development of Probabilistic Stress Life Curves and Probabilistic Miner's Damage Distribution Using Fatigue Testing Results," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010.
38. D. Sparkman, L. Domyancic, and **H. Millwater**, "FORM-Based Filtering of Limit States for Gaussian Random Fields," 12th AIAA Nondeterministic Approaches Conference, April 12-15, 2010, Orlando, FL
39. L. Smith, **H. Millwater**, "Series System Error-Based Identification of Critical Locations Using Sampling," 12th AIAA Nondeterministic Approaches Conference, April 12-15, 2010, Orlando, FL
40. E. Vazquez and **H. Millwater**, "Sensitivity Analysis of Markov Chain Monte Carlo," 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida. AIAA 2010-2683
41. J. Ocampo, **H. Millwater**, H. Smith, E. Meyer, M. Nuss, M. Reyer, F. Abali and M. Shiao, "Probabilistic Risk Assessment for Small Airplanes," 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida. AIAA 2010-2680

42. C. Dubinsky, G. Singh and **H. Millwater**, "Optimal Allocation of Testing Resources for Statistical Simulations, 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida. AIAA 2010-2845
43. G. Singh, J. Ocampo, C. Acosta and **H. Millwater**, "Distributed Computing for Probabilistic Structural Integrity Analysis of Aircraft Structures," 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida. AIAA 2010-2848
44. Y.-T. Wu, J. Zhao, M. Shiao, **H.R. Millwater**, "Efficient Methods For Probabilistic Damage Tolerance Inspection Optimization," 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida
45. Y.-T. Wu, M. Shiao, **H.R. Millwater**, "A Bayesian-Updating Computational Method for Probabilistic Damage Tolerance Analysis," 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference. 12 - 15 April 2010, Orlando, Florida
46. C. Dubinsky and **H. Millwater**, Allocation of Testing Resources in Statistical Simulations Using Particle Swarm Optimization. 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **1st place Master's competition.**
47. L. Domyancic and **H. Millwater**, "Advances in Bounding Techniques for Aircraft Structures," 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **2nd place Master's competition.**
48. C. Acosta, J. Ocampo and **H. Millwater**, "High Performance Computing Implementation and Evaluation on a Structural Risk Assessment Code," 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **3rd place team competition.**
49. J. Garza and **H.R. Millwater**, A "Method for Estimating Sensitivities of the Probability-of-Failure with respect to Probability of Detection Curve Parameters," 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas
50. L. Domyancic, D. Sparkman, and **H.R. Millwater**, L. Smith and D. Wieland, "A Fast First-Order Method for Filtering Limit States," 50th AIAA Nondeterministic Approaches Conference, May 4-7, 2009, Palm Springs, CA, AIAA 2009-2260
51. P. Golden, **H.R. Millwater**, and X. Yang, "Probabilistic Sensitivity Analysis of Fretting Fatigue," 50th AIAA Nondeterministic Approaches Conference, May 4-7, 2009, Palm Springs, CA, AIAA 2009-2304
52. A. Voorhees, R. Bagley, **H.R. Millwater**, P. Golden, "Application of Complex Variable Methods for Fatigue Sensitivity Analysis," 50th AIAA Nondeterministic Approaches Conference, May 4-7, 2009, Palm Springs, CA, AIAA 2009-2711, <https://doi.org/10.2514/6.2009-2711>
53. C. Acosta and J. Ocampo, and **H.R. Millwater**, "High Performance Computing Implementation on a Risk Assessment Problem," 2009 AIAA Region IV Student Conference Program, April 17-18, 2009, First Place Team Competition
54. D. Sparkman and L. Domyancic, and **H.R. Millwater**, Critical Failure Location Identification in an Exhaust Manifold," 2009 AIAA Region IV Student Conference Program, April 17-18, 2009

55. A. Voorhees, R. Bagley, **H.R. Millwater**, P. Golden, "Application of Complex Variable Methods for Fatigue Sensitivity Analysis," 2009 AIAA Region IV Student Conference Program, April 17-18, 2009, Third Place Masters Competition
56. **H.R. Millwater**, R. John, J. Larsen, D. Buchanan, "Probabilistic Modeling of Residual Stress Data in IN100", AIAA Nondeterministic Approaches Conference, April 7-10, Schaumburg, IL, 2008
57. J.P. Moody, **H.R. Millwater** and M.P. Enright, "Adaptive Risk Refinement Methodology for Gas Turbine Engine Rotor Disks," AIAA Nondeterministic Approaches Conference, April 7-10, Schaumburg, IL, 2008, AIAA-2008-2224
58. L. Smith, **H.R. Millwater**, K. Griffin, and D. Wieland, "Conditional Filtering for Simplification of Aircraft Structural System Reliability Calculation," AIAA Nondeterministic Approaches Conference, April 7-10, Schaumburg, IL, 2008
59. J.P. Moody, **H.R. Millwater**, and M.P. Enright, "Automatic Risk Assessment Methodology for Gas Turbine Engines Employing Adaptive Recursive Triangulation," IGTI2006-90780, ASME IGTI conference, Montreal, Canada, May 2007, GT2007-27576
60. M.P. Enright, **H.R. Millwater**, J. Moody, "Efficient Integration of Sampling-Based Spatial Conditional Failure Joint Probability Densities," 10th AIAA Nondeterministic Approaches Conference, Honolulu, HI, April 2007
61. M.P. Enright, R.C. McClung, S.J. Hudak, **H.R. Millwater**, "Application of Nonparametric Methods to Rainflow Stress Density Estimation of Gas Turbine Engine Usage," IGTI2006-90780, IGTI conference, Barcelona, Spain, May 2006
62. H. Smith, **H.R. Millwater**, J.A. Wollschlager, R. Holzwarth, "An Approach to Validation Utilizing a Probabilistic Methodology as Applied to Composite Structural Design," 9th AIAA Nondeterministic Approaches Conference, Newport, RI, May 2006
63. Y.H. Han, **H.R. Millwater**, J. Portillo, E. John, "Towards Hardware Implementation of a Probabilistic Fatigue Algorithm for Engine Health Monitoring," 9th AIAA Nondeterministic Approaches Conference, Newport, RI, May 2006
64. B. Shook, **H.R. Millwater**, S. Hudak, M.P. Enright, and W.L. Francis, "Impact of Multiple On-Board Inspections on Cumulative Probability of Detection," IGTI conference, Reno, NV, June 2005, GT2005-68585
65. R.W. Osborn, and **H.R. Millwater**, "Application of Probabilistic Sensitivities to Probabilistic Fatigue Analysis of Gas Turbine Engine Disks," 46th AIAA Structures, Dynamics and Materials Conference, Austin, TX, April 18-21, 2005
66. F. Momin, **H.R. Millwater**, R.W. Osborn, and M.P. Enright, "Application of the Generalized Conditional Expectation Method for Enhancing a Probabilistic Design Fatigue Code," 46th AIAA Structures, Dynamics and Materials Conference, Austin, TX, April 18-21, 2005
67. B. Shook, **H.R. Millwater**, S. Hudak, M.P. Enright, and W.L. Francis, "Comparison of Continual On-Board Inspections to a Single Mid-Life Inspection for Gas Turbine Engine Disks," 46th AIAA Structures, Dynamics and Materials Conference, Austin, TX, April 18-21, 2005

68. F. Momin, **H.R. Millwater**, R.W. Osborn, and M.P. Enright, (2004) "Application of a Conditional Expectation Response Surface Approach to Probabilistic Fatigue," ASCE 9th Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability, Santa Fe, NM, June 2004
69. **H.R. Millwater**, B. Shook, S. Guduru, and G. Constantinides (2004). "Application of Parallel Processing Methods to Probabilistic Fracture Mechanics Analysis of Gas Turbine Disks," Proceedings, 45th Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, April 19-22, 2004, AIAA-2004-1745
70. M.P. Enright, **H.R. Millwater**, L. Huyse, (2004). "Adaptive Optimal Sampling Methodology for Reliability Prediction of Series Systems," Proceedings, 45th Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, April 19-22, 2004, AIAA-2004-1829
71. S. Hudak, M.P. Enright, R.C. McClung, **H.R. Millwater**, and W. Francis, "A Probabilistic Damage-based Approach to Structural Health Management," Proceedings, 45th Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, April 19-22, 2004, AIAA-2004-1953
72. M.P. Enright, L. Huyse, R.C. McClung, and **H.R. Millwater**, "Probabilistic Methodology For Life Prediction of Aircraft Turbine Rotors," 9th ASCE Aerospace Division International Conference on Engineering, Construction and Operations in Challenging Environments (Earth and Space 2004, League City/Houston, TX, U.S.A. during March 7-10, 2004
73. M.P. Enright, Y.-D. Lee, R.C. McClung, L. Huyse, G.R. Leverant, **H.R. Millwater**, S.H.K. Fitch, "Probabilistic Surface Damage Tolerance Assessment of Aircraft Turbine Rotors," ASME International Gas Turbine Conference (IGTI), June 16-19, 2003, Atlanta, GA, ASME Paper no. GT2003-38731
74. Wieland, **H.R. Millwater**, "Probabilistic Sensitivity Analysis of Aircraft Damage Tolerance Estimates," AIAA Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 2003-1836, Norfolk, VA, April 7-10, 2003
75. **H.R. Millwater**, S.H.K. Fitch, M.P. Enright, L. Huyse, "Application of an XML-based Database for Probabilistic Analysis," 44th AIAA Structures, Structural Dynamics, and Materials Conference, Non-Deterministic Approaches Forum, AIAA Paper No. 2003-1837, Norfolk, VA, April 7-10, 2003
76. M. P. Enright, S. J. Hudak, R. C. McClung, and **H.R. Millwater**, "Probabilistic-Based System for Prognosis of Fatigue in Aircraft Engine Components," 44th AIAA Structures, Structural Dynamics, and Materials Conference, Non-Deterministic Approaches Forum, AIAA Paper No. 2003-8014, Norfolk, VA, April 7-10, 2003
77. **H.R. Millwater**, M. Enright, "A Convergent Probabilistic Technique for Risk Assessment of Gas Turbine Disks Subject to Metallurgical Defects," AIAA Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 2002-1382, Denver, CO, April 22-25, 2002
78. M.P. Enright, **H.R. Millwater**, "Optimal Sampling Techniques for Zone-Based Probabilistic Fatigue Life Prediction," AIAA Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 2002-1383, Denver, CO, April 22-25, 2002
79. G.R. Leverant, R.C. McClung, **H.R. Millwater**, M.P. Enright, "A New Tool for Design and Certification of Aircraft Turbine Rotors," IGTI Conference, June 2002, Amsterdam, Netherlands, Paper no. 2002-GT-30303

80. **H.R. Millwater**, M.P. Enright, R.C. McClung, and G.R. Leverant, "A Probabilistically-based Damage Tolerance Analysis Computer Program for Engine Rotor Integrity," Proceedings of the 12th AeroMat Conference and Exhibition (AeroMat 2001), Paper TES-4.6, Long Beach, CA, June 2001
81. **H.R. Millwater**, M.P. Enright, R.C. McClung, and G.R. Leverant, "A Probabilistically-based Damage Tolerance Analysis Computer Program for Engine Rotor Integrity," Forum 57, American Helicopter Society, Special Session on Engine Life Management: Addressing Fleet Risk with Innovative Approaches, Washington, DC, May 2001
82. B.H. Thacker, D.S. Riha, **H.R. Millwater**, and M.P. Enright, "Errors and Uncertainties in Probabilistic Engineering Analysis," Proceedings of the 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Non-Deterministic Approaches Forum, Seattle, WA, April 16-19, AIAA Paper 2001-1239.
83. **H.R. Millwater**, S. Fitch, Y.-T. Wu, D. Riha, M. Enright, G. Leverant, C. McClung, C. Kuhlman, G. Chell, Y.-D. Lee, "A Probabilistically-based Damage Tolerance Analysis Computer Program for Hard Alpha Anomalies in Titanium Rotors," ASME International Gas Turbine Conference (IGTI), ASME Paper No. 2000-GT-0421, Munich, Germany, May 8-11, 2000
84. **H.R. Millwater**, K. Griffin, D. Wieland, A. West, H. Smith, M. Holly, R Holzwarth, "Probabilistic Analysis of an Advanced Fighter/Attack Composite Wing Structure," Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 2000-1567, Atlanta, GA, April 3-6, 2000
85. D.S. Riha, B.H. Thacker, **H.R. Millwater**, Y.-T. Wu, and M.P. Enright, "Probabilistic Engineering Analysis Using the NESSUS Software," 41st Structural Dynamics and Materials Conference, Paper 2000-1512, Atlanta, Georgia, April 2000.
86. R. C. McClung, **H.R. Millwater**, and G. G. Chell, "Probabilistic Analysis of Multiple-Cycle Proof Testing", 1998 ASME/JSME Pressure Vessels & Piping Conference, San Diego, CA., July 26-30, 1998
87. **H.R. Millwater**, J. Wu, H. Burnside, and M. Mear, "Investigation of Probabilistic Methods for Mult-Site Damage," The First Joint DoD/FAA/NASA Conference on Aging Aircraft, The David Eccles Conference Center, Ogden, Utah, July 8-10, 1997
88. **H.R. Millwater**, J. Wu, H. Burnside, and M. Mear, "A Risk Assessment Method for Multi-Site Damage," ICAF'97 (International Committee on Aeronautical Fatigue), Edinburgh, Scotland, June 16-20, 1997.
89. G.R. Leverant, D.L. Littlefield, R.C. McClung, **H.R. Millwater**, and Y.-T. Wu, "A Probabilistic Approach to Aircraft Turbine Rotor Material Design," *IGTI 97*, Orlando, FL, June 2-5, 1997.
90. **H.R. Millwater**, G. G. Chell, and D.S. Riha, "A Probabilistic Creep Fatigue Computer Program for Structural Integrity Analysis," 41st International Gas Turbine Conference (IGTI), ASME Paper No. 96-GT-265, Birmingham, UK, June 10-13, 1996.
91. R. C. McClung, **H.R. Millwater**, and G.G. Chell, "A Probabilistic Fracture Mechanics Analysis of Multiple-Cycle Proof Testing," FATIGUE '96: The Sixth International Fatigue Congress, Berlin, FRG, May 6-10, 1996.

92. G. G. Chell, **H.R. Millwater**, D.A. Mauney, and S.J. Hudak, Jr., "Combining Probabilistic Failure Assessment and Decision Analysis for the Safe and Economic Management of Flawed Petrochemical Components," 1995 ASME Pressure Vessel and Piping Conference, AMD-Vol. 207, July 1995.
93. G.G. Chell, C.J. Kuhlman, **H.R. Millwater**, and D.S. Riha, "Application of Reference Stress and Probabilistic Methodologies to Assessing Creep Crack Growth," 27th National Symposium on Fatigue and Fracture Mechanics, Williamsburg, VA, June 26-29, 1995.
94. **H.R. Millwater**, Y.-T. Wu, J. W. Cardinal, and G. G. Chell, "Application of Advanced Probabilistic Fracture Mechanics to Life Evaluation of Turbine Rotor Blade Attachments," 40th International Gas Turbine Conference (IGTI), ASME Paper No. 95-GT-214, Houston, TX, June 5-8, 1995.
95. **H.R. Millwater**, Y.-T. Wu, and J.W. Cardinal, "Probabilistic Structural Analysis of Fatigue and Fracture," AIAA/ASME/ASCE/AHS/ASC 35th Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 94-1507, Hilton Head, SC, April 18-20, 1994.
96. **H.R. Millwater** and Y.-T. Wu, "Computational Structural Reliability Analysis of a Turbine Blade," 38th International Gas Turbine Conference (IGTI), ASME Paper No. 93-GT-237, Cincinnati, OH, May 24-27, 1993.
97. **H.R. Millwater**, and Y.-T. Wu, "Global/Local Methods for Probabilistic Structural Analysis," AIAA/ASME/ASCE/AHS/ASC 34th SDM - Structures, Structural Dynamics, and Materials Conference, AIAA Paper No. 93-1378, La Jolla, CA, April 19-21, 1993.
98. A.J. Smalley, **H.R. Millwater**, Y.-T. Wu, and B. F. Evans, "Probabilistic Rotor Dynamic Analysis Using the Fast Probability Integral," Fifth International Conference on Vibrations in Rotating Machinery, Paper No. C/044, pp. 485-491, University of Bath, England, September 7-10, 1992.
99. **H.R. Millwater** and Y.-T. Wu, "Structural Reliability Assessment Capability in NESSUS," AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conference and Exhibit, AIAA Paper No. 92-3417, Nashville, TN, July 6-8, 1992.
100. **H.R. Millwater**, A. J. Smalley, Y.-T. Wu, T. Y. Torng, and B. F. Evans, "Computational Techniques for Probabilistic Analysis of Turbomachinery," International Gas Turbine and Aeroengine Congress and Exposition, ASME Paper No. 92-GT-167, Cologne, Germany, June 1-4, 1992.
101. **H.R. Millwater** and Y.-T. Wu, "Structural Reliability Assessment Capability in NESSUS," 1992 Conference on Advanced Earth-To-Orbit Propulsion Technology, NASA Marshall Space Flight Center, Huntsville, AL, May 19-21, 1992
102. T.Y. Torng, Y.-T. Wu, and **H.R. Millwater**, "Structural System Reliability Calculation Using a Probabilistic Fault Tree Analysis Method," 33rd SDM, Structures, Structural Dynamics, and Materials Conference, pp. 603-613, Dallas, Texas, April 13-15, 1992.
103. **H.R. Millwater**, T. Torng, B. Thacker, D. Riha, and C.-P. Leung, "Recent Developments of the NESSUS Probabilistic Structural Analysis Computer Program," 33rd SDM, Structures, Structural Dynamics, and Materials Conference, Paper No. AIAA-92-2411, Dallas, Texas, April 13-15, 1992.

104. **H.R. Millwater**, S.V. Harren, and B.H. Thacker, "A Probabilistic Methodology for Random Stress-Strain Curves," ASME 9th Biennial Conference on Reliability Stress Analysis and Failure Prevention, ASME Paper DE-Vol. 30, Book No. G00640 - 1991, pp. 37-41, Miami, FL, September 22-25, 1991.
105. Y.-T. Wu, T.Y. Torng, **H.R. Millwater**, A.F. Fossum, and M.H. Rheinfurth, "Probabilistic Methods for Rotordynamics Analyses," by, SAE Conference, SAE Paper No. 911110, Dayton, OH, April 22-26, 1991.
106. B.H. Thacker, **H.R. Millwater**, and S.V. Harren, "Computational Methods for Structural Load and Resistance Modeling," 32nd SDM Conference, Baltimore, MD, April 7-10, 1991.
107. **H.R. Millwater**, S.V. Harren, "Probabilistic Analysis of Structures Involving Random Stress-Strain Behavior," by, B.H. Thacker, presented at the 32nd SDM Conference, Baltimore, MD, April 7-10, 1991.
108. **H.R. Millwater**, "Probabilistic Fracture Mechanics Analysis Using the Boundary Element Method," First International Symposium on Uncertainty Modeling & Analysis (ISUMA), University of Maryland, MD, December 1990.
109. T.A. Cruse, A.F. Fossum, **H.R. Millwater**, "Probabilistic Design Methods for Advanced Flight Vehicles and Propulsion," Symposium on Computational Technology for Flight Vehicles and Propulsion, Washington, DC, November 5-7, 1990.
110. S.V. Harren, **H.R. Millwater**, and B.H. Thacker, "Structural Reliability and Resistance Modeling with the NESSUS Software System," AIAA/SAE/ASME/ASEE 26th Joint Propulsion Conference and Exhibit, Orlando, FL, July 17-18, 1990.
111. **H.R. Millwater**, Y.-T. Wu, and A.F. Fossum, "Probabilistic Analysis of a Materially Nonlinear Structure," AIAA/ASME/AHS/ASC 31st SDM Conference, Long Beach, CA, April 2-4, 1990.
112. B.H. Thacker, R.C. McClung, and **H.R. Millwater**, "Application of the Probabilistic Approximate Analysis Method to a Turbopump Blade Analysis," AIAA/ASME/AHS/ASC 31st SDM Conference, Long Beach, CA, April 2-4, 1990.
113. T.A. Cruse, **H.R. Millwater**, and S.V. Harren, "Application of Probabilistic Structural Modeling to Elastoplastic and Transient Analyses," 3rd IFIP Working Conference on Structural Reliability and Optimization of Structural Systems, Berkeley, CA, March 26-28, 1990.
114. C.T. Dyka, A.M. Remondi, and **H.R. Millwater**, "Integration of 3D Boundary Elements for Static Elasticity," International Symposium on Boundary Element Methods: Advances in Solid and Fluid Mechanics, United Technologies Research Center, East Hartford, CT, October 2-4, 1989.
115. T.A. Cruse, C.C. Chamis, and **H.R. Millwater**, "An Overview of the NASA (LeRC) - SwRI Probabilistic Structural Analysis (PSAM) Program," ICOSSAR '89/5th Int'l Conf., San Francisco, CA, August 7-11, 1989.
116. **H.R. Millwater**, Y. -T. Wu, J. B. Dias, R. C. McClung, S. T. Raveendra, and B. H. Thacker "The NESSUS Software System for Probabilistic Structural Analysis," ICOSSAR '89/5th Int'l Conf., San Francisco, CA, August 7-11, 1989.

117. R.C. McClung, **H.R. Millwater**, Y.-T. Wu, BH Thacker, "An Approximate Methods Approach to Probabilistic Structural Analysis," 30th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Mobile, Alabama, April 3-5, 1989
118. R.C. McClung, **H.R. Millwater**, et al., "An Approximate Methods Approach to Probabilistic Structural Analysis," Structural Integrity and Durability of Reusable Space Propulsion Systems Conference, NASA-Lewis Research Center, Cleveland, OH, April 18-19, 1989.
119. **H.R. Millwater** and Y.-T. Wu, "Structural Reliability Analysis Using a Probabilistic Finite Element Program," AIAA/ASME/ASCE/AHS/ASC 30th Structures, Structural Dynamics and Materials Conference, Mobile, AL, April 3-5, 1989.
120. Y.-T. Wu, **H.R. Millwater**, and T.A. Cruse, "An Advanced Probabilistic Structural Analysis Method for Implicit Performance Functions," AIAA/ASME/ASCE/AHS/ASC 30th Structures, Structural Dynamics and Materials Conference, Mobile, AL, April 3-5, 1989.
121. **H.R. Millwater**, K. Palmer, and P. Fink, "NESSUS/EXPERT--An Expert System for Probabilistic Structural Analysis Methods," AIAA/ASME/ASCE/AHS 29th Structures, Structural Dynamics and Materials Conference, Williamsburg, VA, April 18-20, 1988.

Presentations (not peer-reviewed)

1. N. Crosby, **H. Millwater**, J. Ocampo, S. Restrepo, M. Nuss, and B. Gamble, "Benchmarking problems for Verification of Probabilistic Risk Assessment Calculations," Aircraft Airworthiness & Safety Conference, August 2023.
2. Matthew Balcer, Mauricio Aristizabal, Juan Rincon-Tabares, Arturo Montoya, David Restrepo, **Harry Millwater**, "Uncertainty Quantification Using a Hypercomplex Finite Element Method," USNCCM Albuquerque NM, July 2023
3. Restrepo D., Velasquez-Gonzalez J.C., Navarro J.D., Montoya A., **Millwater H.R.**, "Parameter Optimization and Uncertainty Quantification of Phononic Metamaterials using Hypercomplex Automatic Differentiation (HYPAD)," USNCCM-17. Albuquerque, NM. July 2023.
4. **H. R. Millwater**, N Crosby, J. Ocampo, "Adaptive Multiple Importance Sampling for Structural Risk Assessment," International Conference on Fracture, June 12-14, 2023, Atlanta, GA.
5. Restrepo D., Velasquez-Gonzalez J.C., Navarro J.D., Montoya A., **Millwater H.R.**, "Sensitivity and Uncertainty Quantification Analysis in Metamaterials through Hypercomplex-Variable Finite Element Method," EMI/PMC 2023. Atlanta, GA. May 2023.
6. J. Ocampo, N. Crosby, H. Millwater, M. Nuss, and B. Gamble, "The Single Flight Probability of Failure: Past, Present, and Future: An Open Discussion" 22nd International Workshop on the Holistic Structural Integrity Process (HOLSIP), Jan 16-19, 2023, Salt Lake City, UT
7. J. Rincon-Tabares, M. Balcer, M. Aristizabal, A. Montoya, **H. Millwater**, D. Restrepo, "Fast and Effective First Order Local Sensitivity Analysis for Metal-Based Additive Manufacturing," SES Technical Meeting, Texas A&M University, October 2022
8. M. Balcer, M. Aristizabal, J. Rincon-Tabares, D. Restrepo, A. Montoya, **H. Millwater**, "Uncertainty Quantification Using a Hypercomplex Finite Element Method in Additive Manufacturing," SES Technical Meeting, Texas A&M University, October 2022

9. M. Aristizabal, J. Rincon-Tabares, M. Balcer, D. Restrepo, A. Montoya, **H. Millwater**, “An Efficient method to Compute Arbitrary-order Multivariable Derivatives in Non-linear Finite Element Problems using the Order Truncated Imaginary Numbers,” SES Technical Meeting, Texas A&M University, October 2022
10. Drishya Dahal*, Daniel Ramirez, Brendy Rincon, Arturo Montoya, **H. Millwater**, and D. Restrepo. “Determining Adhesion Constitutive Parameters Using Hypercomplex Finite Element Method,” 2022 SEM (The Society for Experimental Mechanics) Annual Conference, 12th International Symposium on the Mechanics of Biological Systems & Materials, Advancement of Optical Methods in Experimental Mechanics Track, June 13-16, 2022. Pittsburgh, PA.
11. J. Ocampo, N. Crosby, **H. Millwater**, Chris Hurst, Beth Gamble, and Marv Nuss, “Fleet Management Considering Inspection Schedule Optimization”, Aircraft Airworthiness & Safety Conference, August 2021.
12. J. S. Rincon-Tabares, M. Balcer, M. Aristizabal, A. Montoya, **H. Millwater**, and D. Restrepo, “Fast and Effective Sensitivity and Uncertainty Quantification for Metal-Based Additive Manufacturing” Additive Manufacturing Benchmarks (AM- Bench), Bethesda, MD, August 2022.
13. M. Aristizabal, M. Balcer, **H. Millwater**, “Uncertainty Quantification of Finite Element models Using High-Order Derivatives Computed via Hypercomplex Numbers” USACM Thematic Conference on Uncertainty Quantification for Machine Learning Integrated Physics Modeling (UQ-MLIP), Arlington, VA, August 2022.
14. J. Ocampo, D. Posso, and **H.R. Millwater**, “Risk Based Optimized Inspections for Aircraft Fleets” Aircraft Airworthiness & Safety Conference, August 2020.
15. N. Crosby, **H. Millwater**, “Adaptive Importance Sampling for Probabilistic Damage Tolerance Analysis,” Aircraft Airworthiness & Safety Conference, August 2020
16. J. Ocampo, D. Posso, and **H.R. Millwater**, “Risk Based Optimized Inspections for Aircraft Fleets” 19th International Workshop on the Holistic Structural Integrity Process (HOLSIP), Salt Lake City, UT, February 2020.
17. **H.R. Millwater**, M. Balcer*, D. Ramirez*, and A. Montoya, “UQ Modeling of Structures and Materials Using the Hypercomplex Differentiation Method,” MS&T Conference, Sept. 29-Oct. 3, 2019, Portland OR
18. N. Crosby*, **H.R. Millwater**, J.D. Ocampo, B. Gamble, C. Hurst, M. Nuss, “Large Scale Cluster Computing for Comprehensive Risk Assessment,” Aircraft Airworthiness & Sustainment, April 22-26, 2019, Washington, DC
19. J.D. Ocampo, **H.R. Millwater**, N. Crosby, B. Gamble, C. Hurst, M. Reyer, S. Mottaghi, M. Nuss, “An Ultrafast Crack Growth Lifting Model for Efficient Prognosis, International Conference on Fatigue Damage of Structural Materials XII. Hyannis, MA, 16-21, Sept. 2018
20. **H. Millwater**, David Wagner, Daniel Ramirez-Tamayo, Andres Aguirre, Arturo Montoya, Manuel Garcia, Brendy Rincon-Troconis, “Two and Three Dimensional Progressive Fracture under Thermal Loading: Computational Modelling and Experimental Validation, International Conference on Fatigue Damage of Structural Materials XII. Hyannis, MA, 16-21, Sept. 2018
21. D. Ramirez Tamayo, A. Montoya, **H.R. Millwater**, D. Wagner, ”A Multicomplex Finite Element Approach for Thermoelastic Curvilinear Progressive Fracture”, 2018 conference of Engineering

Mechanics Institute, Boston, MA, May 29-June 1, 2018

22. M. Aristizabal, M. Garcia, and **H. Millwater**, “General Purpose Finite Element Library for Computation of High-Order Multivariable Sensitivities,” 13th World Congress of Computational Mechanics, New York, NY July 2018
23. A. Aguirre, D. Ramirez-Tamayo, M. Garcia, and **H. Millwater**, “Computation of the Energy Release Rate using a Complex Stiffness Derivative Approach,” 13th World Congress of Computational Mechanics, New York, NY July 2018
24. D. Ramirez-Tamayo, A. Montoya, **H. Millwater**, and D. Wagner, “A Multicomplex Finite Element Approach for Thermoelastic Curvilinear Progressive Fracture,” 13th World Congress of Computational Mechanics, New York, NY July 2018
25. A. Montoya, **H. Millwater**, R. Fielder, & P. Golden, “A Complex Variable Finite Element Based Approach for Rapid Estimates of Residual Stress Variance,” 13th World Congress of Computational Mechanics, New York, NY July 2018
26. M. Garcia, M. Aristizabal, A. Aguirre, **H. Millwater**, and A. Montoya, “An Overview of Hypercomplex Algebras for Sensitivity Analysis in the Finite Element Method,” 13th World Congress of Computational Mechanics, New York, NY July 2018
27. **H. Millwater**, J. Ocampo, and N. Crosby, “An Ultrafast Crack Growth Lifting Algorithm for Probabilistic Damage Tolerance Analysis, Aircraft Airworthiness & Sustainment Conference, Jacksonville, FL, April 2018
28. J. Ocampo, **H. Millwater**, and N. Crosby “An Ultrafast Crack Growth Lifting Algorithm for Probabilistic Damage Tolerance Analysis”, 17th International Workshop on the Holistic Structural Integrity Process (HOLSIP), Salt Lake City, UT, February 2018.
29. J. Ocampo, A Horwath, S. Carlson, L. Smith, **H. Millwater**, N. Crosby “Incorporating Residual Stresses into Probabilistic Damage Tolerance Analysis – Case Study”, Engineered Residual Stress Implementation Workshop 2017, Salt Lake City, UT, September 2017.
30. J. Ocampo and **H. Millwater**, “Incorporating Residual Stresses into Probabilistic Damage Tolerance Analysis”, Aircraft Airworthiness & Sustainment Conf., Phoenix, AZ, May 2017.
31. J. Ocampo and **H. Millwater** “Incorporating Residual Stresses into Probabilistic Damage Tolerance Analysis – First Approach and Open Discussion”, 16th International Workshop on the Holistic Structural Integrity Process (HOLSIP), Salt Lake City, UT, February 2017.
32. J. Ocampo and **H. Millwater** “HOLSIP-Based Extensions to the SMART-DT Software”, 15th International Workshop on the Holistic Structural Integrity Process (HOLSIP), Salt Lake City, UT, February 2016.
33. **H. Millwater**, R. Fielder, F. Garcia, and C. Labowsky, Probabilistic and Sensitivity Method Development and Application in Life Prediction of metallic Materials and Structures,” AFRL Minority Leaders Research Collaboration Program Review, Dayton, OH, Sept 20-22, 2016
34. A. Aguirre, M. Garcia, M. Aristizabal, and **H. Millwater**, “MCX: A Multicomplex Finite Element Library for High Order Derivatives,” World Congress on Computational Mechanics, July 2016, Seoul, Korea

35. **H.R. Millwater**, "Overview of the ZFEM Multicomplex Finite Element Method", Parameterized Reduced Order Modeling Workshop Organized by Sandia National Laboratories in Albuquerque, New Mexico, June 1-2, 2016
36. M. Garcia, D. Wagner, **H.R. Millwater**, "Two Dimensional Curvilinear Progressive Fracture using a Multicomplex Finite Element Method," Parameterized Reduced Order Modeling Workshop Organized by Sandia National Laboratories in Albuquerque, New Mexico, June 1-2, 2016
37. A. Aguirre, M. Garcia, **H.R. Millwater**, "Multi-Complex and Multi-Dual Numbers," Parameterized Reduced Order Modeling Workshop Organized by Sandia National Laboratories in Albuquerque, New Mexico, June 1-2, 2016
38. **H.R. Millwater**, J. Ocampo, N. Crosby, B. Gamble, C. Hurst, M. Nuss, "Probabilistic Damage Tolerance using the FAA-Sponsored SMART|DT Software," Air Force Structural Integrity Program, Dec. 1-3, 2015, San Antonio, TX
39. J. Ocampo and **H.R. Millwater**, "Risk Calculations Using the FAA SMART Probabilistic Damage Tolerance Software and AFGROW" AFGROW Users Workshop. Layton, UT, September 2015.
40. J. Ocampo and **H.R. Millwater**, "Latest Developments in Probabilistic Fatigue and Damage Tolerance Analysis", 14th International Workshop on the Holistic Structural Integrity Process, (HOLSIP), Salt Lake City, UT, February 2015.
41. **H.R. Millwater**, and J. D. Ocampo, "An Overview of the SMART Damage Tolerance Software for Aircraft Risk Assessment," Aircraft Airworthiness & Sustainment Conference, Baltimore, MD, March 30-Apr 2, 2015
42. J. Ocampo and **H.R. Millwater** "Multiple Repair Scenarios in Aircraft Fleets Using the Weighted Branch Integration (WBI) Method," Aircraft Airworthiness & Sustainment Conference, Baltimore, MD, March 30-Apr 2, 2015
43. J. Ocampo and **H.R. Millwater** "Probabilistic Fatigue and Damage Tolerance Analysis for General Aviation", 13th International Workshop on the Holistic Structural Integrity Process (HOLSIP), Salt Lake City, UT, February 2014.
44. A. Baines and **H.R. Millwater**, "Two-Dimensional Weight Function Development Using ZFEM, AIAA Region IV Student Conference, April, 2013 Baines and H. Millwater, "Two-Dimensional Weight Function Development Using ZFEM, AIAA Regional Student Conference, April 2013
45. E.E. Iglesias and **H.R. Millwater**, "Sensitivity Analysis of Turbine Engine Sustainment," AIAA Regional Student Conference, April 2013
46. **H.R. Millwater**, D. Wagner, J. Garza, A. Baines, K. Lovelady, C. Quintana, T. Ross, "Complex Variable Finite Element Methods for Fracture Mechanics Analysis," NavAir/DSTO Fatigue Technology Symposium, Melbourne, Australia, March 2013
47. **H.R. Millwater**, D. Wagner, J. Garza, A. Baines, K. Lovelady, "A New Finite Element Method based on Complex Variable Mathematics," San Antonio Scientific Visualization Symposium, San Antonio, TX, Nov. 12-13, 2012
48. **H.R. Millwater**, "Probabilistic Sensitivity Analysis for General Aviation Risk Assessment", Aircraft Airworthiness & Sustainment Conference, Baltimore, MD, Apr. 2-6, 2012

49. **H.R. Millwater**, NAVAIR Fatigue/Fracture Mechanics Workshop, UC-Irvine, November 17, 2011
50. J.D. Ocampo and **H.R. Millwater**, Probabilistic Stress Life Curves and Probabilistic Miner's Damage Distribution Development Using Testing Data and Simulation Analysis, ASTM student competition, San Antonio, Texas November 17, 2010
51. **H.R. Millwater**, G. Singh, M. Cortina, Localized Probabilistic Sensitivity Method to Determine Random Variable Regional Importance, Sensitivity of Model Output conference, July 19-22, 2010, Milam, IT, and Engineering Mechanics Institute, Los Angeles, CA, August 8-11, 2010
52. **H.R. Millwater**, J. Ocampo, G. Singh, H. Smith, E. Meyer, F. Abali, M. Shiao, M. Nuss, M. Reyer, Probabilistic Structural Risk Assessment and Risk Management for Small Airplanes," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010.
53. **H.R. Millwater**, R. Bagley, A. Bates, A. Voorhees, J. Garza, and P. Golden "New Sensitivity Methods for Life Prediction Estimates," Propulsion, Safety, Affordability, and Readiness, Myrtle Beach, SC, March 2009
54. **H.R. Millwater**, R. Bagley, A. Bates, A. Voorhees, J. Garza, and P. Golden "New Sensitivity Methods for Life Prediction Estimates," Propulsion, Safety, Affordability, and Readiness, Myrtle Beach, SC, March 2008
55. **H.R. Millwater**, A. Bates, E. Vazquez, J. Larsen, S. Jha "Enhanced Probabilistic Sensitivity Methods For Life Prediction Estimates," Propulsion, Safety, Affordability, and Readiness, San Diego, CA, March 2007
56. **H.R. Millwater**, "Probabilistic Sensitivities for Fatigue Analysis of Gas Turbine Engine Disks," Propulsion, Safety, Affordability, and Readiness, Jacksonville, FL, March 2006
57. M.P. Enright, L. Huyse, Y.-D. Lee, G. Chell, C. McClung, G. Leverant, **H.R. Millwater**, S.H.K. Fitch, "Summary of DARWIN™ Capabilities for Surface Damage Tolerance Assessment and Related Enhancements," 6th Annual FAA/Air Force/NASA/Navy Workshop on the Application of Probabilistic Methods to Gas Turbine Engines, March 18-20, Solomon's Island, Maryland, 2003
58. L. Huyse, M.P. Enright, **H.R. Millwater**, and S.H.K. Fitch, "Recent Probabilistic Computational Efficiency Enhancements in DARWIN™," 6th Annual FAA/Air Force/NASA/Navy Workshop on the Application of Probabilistic Methods to Gas Turbine Engines, March 18-20, Solomon's Island, Maryland, 2003
59. D. Wieland, **H.R. Millwater**, A. Nagar, "Impact of Parameter Variation on Damage Tolerance Analysis Estimates," USAF ASIP Conference, Williamsburg, VA, December 2002
60. **H.R. Millwater**, "An Extreme Value Approach to Probabilistic Evaluation of Multi-Site Damage," ASTM Symposium on Probabilistic Aspects of Life Prediction, Miami FL, November 6-7, 2002
61. S. J. Hudak, Jr, M. P. Enright, **H.R. Millwater**, and R. C. McClung, "Enhanced Prognosis through Probabilistic Damage Assessment," DARPA Prognostics Workshop, December 12-13, 2001, Arlington, Virginia

62. R.C. McClung, M.P. Enright, **H.R. Millwater**, G.R. Leverant, and S.J. Hudak, Jr., "A Software Framework for Probabilistic Fatigue Life Assessment," ASTM Symposium on Probabilistic Aspects of Life Prediction, Miami FL, November 6-7, 2002
63. **H.R. Millwater** and T.A. Cruse, "Probabilistic Structural Analysis Methods for Select Space Propulsion System Components," Structural Integrity and Durability of Reusable Space Propulsion Systems Conference, NASA-Lewis Research Center, Cleveland, OH, April 18-19, 1989.
64. **H.R. Millwater**, B. Thacker, and Y.-T. Wu, "Structural Reliability Methods Code - Development Status," Structural Durability Conference, NASA-Lewis Research Center, May 14-15, 1991.

Reports

1. E.H. Glaessgen, L.E. Levine, P.W. Witherell, M.A. Donmez, M. Gorelik, N.A. Ashmore, R.R. Barto, C.C. Battaile, **H.R. Millwater**, G.J. Nanni, A.D. Rollett, E.J. Schwalbach, V. Venkatesh, "NASA / NIST / FAA Technical Interchange Meeting on Computational Materials Approaches for Qualification by Analysis for Aerospace Applications," NASA/TM-20210015175 DOT/FAA/TC-20/38
2. R.C. McClung, M.P. Enright, Y.-D. Lee, W. Liang, J.P. Moody, S.H.K. Fitch, **H.R. Millwater**, J.P. Dubke, R.J. Maffeo, M.E. McClure, A.D. Peralta, "Probabilistic Design for Rotor Integrity," Federal Aviation Administration DOT/FAA/TC-18/6, Oct. 2018
3. J. Ocampo, **H.R. Millwater**, G. Singh, H. Smith, E. Meyer, "Probabilistic Structural Risk Assessment and Risk Management for Small Airplanes," Federal Aviation Administration DOT/FAA/AR-11/14, Nov. 2017
4. **H.R. Millwater** and J. Ocampo, "Probabilistic Damage Tolerance-Based Maintenance Planning for Small Airplanes," Federal Aviation Administration DOT/FAA/TC-16/33, Oct. 2017
5. Y.-T.. Wu and **H.R. Millwater**, "Analysis Methods for the Management of Structural Damage with Structural Health Monitoring", Federal Aviation Administration DOT/FAA/TC-15/60, Oct. 2017
6. **H.R. Millwater**, D. Wagner, M. Garcia, A New Progressive Crack Growth Modeling Algorithm using Complex Variable Finite Elements, ONR final report. September 2016
7. M.R.W. Brake, B.I. Epureanu, and **H.R. Millwater**, Proceedings of the 2016 Parameterized Reduced Order Modeling Workshop, Sandia Report, SAND2016-9621, September 2016
8. S.J. Hudak, Jr., M.P. Enright, R.C. McClung, L.J. Huyse, **H.R. Millwater**, T. Conquest, A. Del Amo, and S. Fitch, "Enhanced Life Prediction Technology for Engine Rotor Life Extension (ERLE)," AFRL-RX-WP-TR-2008-4287, Sept. 2008
9. D. Wieland, **H.R. Millwater**, "Impact of Parameter Variation on Damage Tolerance Analysis Estimates," Final Report, AFRL-VA-TR-2002-3089, November 2002
10. S.J. Hudak, Jr., M.P. Enright, R.C. McClung, **H.R. Millwater**, and A. Sarlashkar, "Enhanced Prognosis through probabilistic Damage Assessment," Final Report for ARFL DARPA, Air Force Materiel Command, Wright-Patterson AFB, OH, June 2002

Short courses and Training courses

- Introduction to Probabilistic Methods with Applications to Probabilistic Damage Tolerance Analysis, Aircraft Airworthiness & Safety conference, Jacksonville, FL, August 2022
- Introduction to Probabilistic Methods with Applications to Probabilistic Damage Tolerance Analysis, Aircraft Airworthiness & Safety conference, August 2020
- Introduction to Probabilistic Methods with Applications to Probabilistic Damage Tolerance Analysis, Aircraft Airworthiness & Safety conference, Washington, DC, April 2019
- Introduction the FAA-Sponsored SMART|DT Software, Aircraft Airworthiness & Safety conference, Jacksonville, FL, April 2018
- Introduction the FAA-Sponsored SMART|LD Software, Aircraft Airworthiness & Safety conference, Phoenix, AZ, May 2017
- Introduction to Probabilistic Damage Tolerance Analysis Using the FAA-Sponsored SMART|DT Software, Air Force Structural Integrity Conference, San Antonio, TX, November 28, 2016
- Introduction the FAA-Sponsored SMART|LD Software, Aircraft Airworthiness & Safety conference, Ft. Worth, TX April 2016
- Introduction to Probability and Statistics, Aug. 19-21, 2015. Army Proving Grounds, Aberdeen MD
- Probabilistic Engineering Design, July 28 – Aug. 8, 2014. Eafit University, Medellin Colombia

Scientific and Professional Societies

Tau Beta Pi

American Society of Mechanical Engineers (ASME)

American Institute of Aeronautics and Astronautics (AIAA)

Honors and Awards

Mauricio Aristizabal - UTSA Postdoctoral Research Fellow of the Year Award, 2023

2019 Most Prolific Researcher of the Year - UTSA Mechanical Engineering

Strongest Graduate Student Supporter of the Year - UTSA Mechanical Engineering 2018 and 2019

Daniel Ocampo, UTSA COE Competitive Engineering MS Student Scholarships, Spring & Summer 2019

Daniel Ramirez-Tamayo, UTSA Mechanical Engineering Competitive Engineering PhD Student Scholarship, 2016 & 2017

Nathan Crosby (MS student) and Harry Millwater, “Developing a High Performance Surrogate Model Implementation for Risk Assessment of Aircraft Fleets,” AIAA Region IV Student Conference, April 2015, **2nd place Master’s competition**

E.E. Iglesias (MS student), “Sensitivity Analysis of Turbine Engine Sustainment,” AIAA Abe Zarem Award, 2013

Juan Ocampo (PhD student), August 2013. Valero International Research Scholar, Pilatus Aircraft Ltd, Switzerland. Title: Probabilistic Risk Assessment of Aerospace Structures

A. Baines and H.R. Millwater, “Two-Dimensional Weight Function Development Using ZFEM,” AIAA Region IV Student Conference, April 2013, **1st place Master’s competition**

E.E. Iglesias and H.R. Millwater, “Sensitivity Analysis of Turbine Engine Sustainment,” AIAA Regional Student Conference, April 2013, **3rd place Master’s competition**

UTSA Leadership program, 2012

Juan Ocampo (PhD student), June 2012. Valero International Research Scholar, Institute for Aerospace Research, National Research Council, Canada. Title: Probabilistic Risk Assessment Methodology and Application to Aerospace Structures.

Carolina Dubinsky (PhD student), "Optimal Allocation of Testing Resources for Statistical Simulations," **1st Place NSF Sivirt Center Student Poster Competition, 2012**

Jose Garza (PhD student), "Probability of Detection, Applications in Structural Reliability," **3rd Place NSF Sivirt Center Student Poster Competition, 2012**

Juan Ocampo (PhD student), June 2011. Valero International Research Scholar, Institute for Aerospace Research, National Research Council, Canada. Title: Implementation and validation of a method for computing stress intensity factors and beta factor of collinear interacting cracks.

D. Sparkman, and H.R. Millwater, "FORM-Based Filtering of Limit States," Aircraft Airworthiness & Sustainment Conference, Austin, TX, May 10-13, 2010. **First Place Student Competition.**

C. Dubinsky and H.R. Millwater, Allocation of Testing Resources in Statistical Simulations Using Particle Swarm Optimization. 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **1st place Master's competition.**

L. Domyancic and H.R. Millwater, "Advances in Bounding Techniques for Aircraft Structures," 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **2nd place Master's competition.**

C. Acosta, J. Ocampo and H.R. Millwater, "High Performance Computing Implementation and Evaluation on a Structural Risk Assessment Code," 2010 AIAA Region IV Student Conference 2-3 April 2010, Houston, Texas, **3rd place team competition.**

C. Acosta and J. Ocampo, and H.R. Millwater, "High Performance Computing Implementation on a Risk Assessment Problem," 2009 AIAA Region IV Student Conference Program, April 17-18, 2009, **First Place Team Competition**

A. Voorhees, R. Bagley, H.R. Millwater, P. Golden, "Application of Complex Variable Methods for Fatigue Sensitivity Analysis," 2009 AIAA Region IV Student Conference Program, April 17-18, 2009, **Third Place Masters Competition**

Air Force Summer Faculty Fellowship Program, 2005, 2006, 2007, Wright-Patterson AFB, Sponsor: Dr. James Larsen, AFRL Fellow, Materials Directorate

Research and Development magazine R&D 100 award for "DARWIN – Design Assessment of Reliability With INspection", September 2000

NASA Award, Turning Goals into Reality, 2000 Objective Award for Exceptional Progress toward Next-Generation Design Tools and Experimental Aircraft, May 2000

"Airliner Reliability by Design" – Southwest Research Institute's Annual Meeting, presentation to the Board of Trustees, February 2000

"Boundary Element Technology in Engineering," General Dynamics, Electric Boat Division Honors Program, 1987

Funded Grants (32 grants as PI, 20 grants as Co-PI and Sr. Personnel)

STRI: An Integrated Computational Modeling and Simulation Platform for Qualification and Certification of Metals Additive Manufacturing, \$15M (\$825,000 to UTSA), UTSA lead (A. Rollet Carnegie Mellon Univ. PI), 2023-2028

Novel Architected Materials for Drag Reduction and Flow Control in Hypersonic Vehicles, \$799,993, Co-PI (D. Restrepo PI), May 2023 – May 2027, Army Research Office, Award W911NF2310192

Design, manufacture, and validate architected materials that can delay laminar to turbulent flow in hypersonic flows.

In-Situ Spatially Resolved Characterization of Stress-Affected Corrosion Kinetics, \$352,134, Co-PI (B. Rincon PI), May 2023 – April 2024, Office of Naval Research, Award N00014-23-1-2516

Equipment grant to purchase an Electron backscatter diffraction detector, Nanomechanical testing system, and Sample transfer suitcase.

Fast and effective Sensitivity and Uncertainty Quantification in Morphable Architected Materials, \$249,913, Co-PI (D. Restrepo PI), June 2023 – May 2025, Minority Leaders Research Collaboration Program (ML-RCP), AFRL through Ohio State University, Award FA8650-20-2-5853

To introduce, verify and validate a computational and experimental modeling framework to enable a new understanding of how the onset of elastic micro-buckling in periodic AMs can be modified, controlled, and designed to achieve desired post micro-buckling patterning all while accounting for variability and imperfections

Determining equivalent initial defect size for additively manufactured Ti specimens using powder bed fusion. \$194,000, PI, Sept. 2022-Aug. 2024, Minority Leaders Research Collaboration Program (ML-RCP), AFRL through Ohio State University, Award FA8650-20-2-5853

Understand and quantify the defect distribution of additively manufactured (AM) titanium components as a function of various machine & geometry parameters for powder bed fusion printing and to determine the effect the AM distributions have on safety and inspection intervals.

CONNECT- the CONSortium on Nuclear sECurity Technologies-Renewal, National Nuclear Security Administration, Sr. Personnel (E. Sooby PI), October 1, 2022 – September 30, 2027, \$4,999,995, National Nuclear Security Agency (NNSA), DE-NA0004107

Educate and train the best next-generation professionals with strong backgrounds in nuclear science, fissionable fuels fabrication and processing, nuclear materials characterization, nuclear forensic signatures, nuclear technology, and data and visual analytics.

HSI Institutional Transformation Project: STEM Undergraduate Education through a Latinx Student Success Framework, \$3,000,000, Sr. Personnel (H. Shipley PI), Oct. 2022-Nov. 2026, National Science Foundation, award 2225199

Develop a Latinx Student Success Servingness Framework that focuses on pedagogy development, combined with enhanced student peer mentoring and professional development of graduate students and faculty for improving student learning and overall success.

Scalable Synthesis of Transition Metal Dichalcogenides Engineered by the Pulsed Laser Ablation in Liquids Technique for 3D Printed Architectures, \$199,821, Co-PI, Apr. 2022-March 2024, Clarkson Aerospace

3D print thin films of transition metal dichalcogenides (TMDCs) using pulsed laser ablation and measure their mechanical strength.

Advances in probabilistic damage tolerance analysis using the Smart/DT software, \$910,000, PI, Oct. 2021 – August 2024, Federal Aviation Administration, Cooperative Agreement 692M152140011

Develop a fleet management, risk-based optimized inspection schedule, and machine learning stress intensity factor capabilities for the Smart|DT probabilistic damage tolerance software.

Sensitivity-enhanced NDE computations for SHM applications, \$599,803, PI, July 2021 - July 2024, Office of Naval Research (ONR) grant N00014-21-1-2428

Develop, verify, and validate a unique modeling capability to assess, to optimize, and to deploy effective on-board damage detection sensor systems.

A Fast and Effective Sensitivity and Uncertainty Quantification Method for Additively Manufactured Metals, \$659,970, PI, Aug. 2020 – July 2024, Army Research Office (ARO) grant W911NF2010315
Develop a sensitivity and uncertainty quantification method for metal powder bed fusion technology.

3D Fracture Simulations using the Hypercomplex Finite Element Software, \$200,000, PI, July 2020 – Feb. 2024, Metis Design Corporation - NavAir SBIR Program (SBIR Phase II.5 N12-T007), Contract No. N68335-20-C-0858
Apply the hypercomplex finite element software ZFEM to 3D fracture problems.

A complex finite element method based inverse methodology to extract constitutive parameters, \$74,833, PI, Sept. 2019 – Dec. 2020, Contract No. 484440 from the Pacific National Northwest Laboratory (PNNL)
Develop an integrated computational framework to obtain the cohesive parameters governing the response of the interface of joints.

CONNECT- the CONSortium on Nuclear sECurity Technologies, \$2,985,438, Co-PI, Oct. 2019 – Sept. 2022, National Nuclear Security Agency (NNSA), DE-NA0003948
Educate and train the best next-generation professionals with strong backgrounds in nuclear science, fissionable fuels fabrication and processing, nuclear materials characterization, nuclear forensic signatures, nuclear technology, and data and visual analytics.

Enhancing Understanding of Mathematics through Augmented and Virtual Reality, \$30,000, PI, Jan. 2019 – June 2020, UTSA Innovative Course Redesign Grant
Develop augmented and virtual reality learning tools for differential equations and linear algebra

Cyber: Development and Security Analysis of Cyber Physical Systems, \$220,000, Oct. 1, 2018-June 9, 2019. Co-PI (J. Prevost PI), Georgia Tech Research Institute
Hands-on teaching and research for ROTC cadets to develop secure cyber-physical systems

Building Capacity: Transforming STEM Undergraduate Education through Academic Literacy, Mentoring, and Professional Development. \$1,500,000, Oct. 1, 2018-Sept. 30, 2022, Sr. Personnel (H. Shipley PI), National Science Foundation, award 1832388
Develop new methods of instruction, curricular improvements, student mentoring, research opportunities and professional development for undergraduate students to improve retention rates, critical thinking skills, professional knowledge, graduation rates and professional and workforce preparedness.

CC* Networking Infrastructure: The Roadrunner High-Performance Science, Engineering, and Business DMZ, \$500,000, July 1, 2018 – Dec. 31, 2021, Co-PI, (B. League PI), National Science Foundation, award no. OAC-1827139
Establish a campus-wide high-speed research network at UTSA

Secure Cyber-Physical Systems Research and Education, \$50,000, Nov. 2017 – June 2018, Co-PI, (J. Prevost PI), Clarkson Aerospace
Mentor ROTC cadets to develop secure cyber-physical systems

Digital Twin Big Data and High-Performance Computing in the Cloud, \$30,000, Oct. 2017-Sept. 2018, PI, UTSA Open Cloud Institute
Develop cloud-based risk assessment methods and software

Faculty Development Program at the University of Texas at San Antonio: Probabilistic Risk Assessment of Stress Corrosion Cracking in Nuclear Facilities, \$450,000, June 2017-June 2021, PI, Nuclear Regulatory Commission, NRC-HQ-60-17-G-0024

Develop a finite element-based probabilistic fracture mechanics tool to evaluate the probability of rupture in nuclear components and conduct experimental validation.

Probabilistic Modeling of Random Variables and K-Solution Developments for General Aviation – Extensions to the SMART|DT Software, \$1,080,000, Sep. 1, 2016 – Aug. 31, 2021, PI, Federal Aviation Administration, FAA Grant 16-G-005.

Develop a probabilistic database and enhance K solutions for the Smart|DT probabilistic damage tolerance software.

Three Dimensional Fracture Mechanics Capability for Structures operating in High Temperature Thermal Environments, \$397,843, Aug. 2015-July 2018. PI, Department of Defense, W911NF-15-1-0456

Development accurate method for energy release rate calculations of high temperature materials

Probabilistic Risk Assessment of Aircraft Structures, \$42,750, June 14 – Mar. 15, PI, Texas Research Institute (USAF SBIR Phase I)

Development of structural reliability risk assessment software

Gas Turbine Engine Probabilistic Fracture Mechanics Research, \$66,981, Jan. 14 – Aug. 15, PI, Southwest Research Institute

Probabilistic software verification

Advanced Digital Twin, \$200,000, Jan. 14 – Dec. 16, PI, Northrop-Grumman Corp. (from Air Force Research Lab), Contract number FA8650-14-D-2413.

Develop probabilistic methods for real-time simulation of aircraft structure reliability

A New Progressive Crack Growth Modeling Algorithm using Complex Variable Finite Elements, \$293,666, PI, Oct. 13 – Sep. 16, Office of Naval Research, N00014-14-1-0004

Develop a new high-order progressive 2D and 3D crack growth algorithm

Probabilistic and Sensitivity Method Development and Application in Life Prediction of Metallic Materials and Structures, \$237,318, PI, Sep. 1, 2013 – Mar. 2019, Clarkson Aerospace (from Air Force Research Lab) UTSA M13-S7700-01-C1 & M16-S7700-03-C2, AFRL grant to UTC FA8650-13-C-5800. Develop probabilistic lifing analysis methods for materials with residual stresses

Probabilistic Sensitivity Modeling of Residual Stress in Life Prediction of Metallic Materials and Structures, \$50,000, PI, Oct. 1, 2012 – Dec. 31, 2013, Clarkson Aerospace (from Air Force Research Lab.) UTSA M12-8567-018-02-C1, AFRL grant to Clarkson FA8650-05-D-1912

Develop and apply probabilistic finite element methods to materials under residual stresses

Probabilistic Modeling of Turbine Engine Sustainment, \$152,443, PI, Oct. 1, 2012 – Nov. 30, 2014, Air Force Research Lab through GDIT Prime Contract No. FA8650-11-D-5702 / 0004

Develop probabilistic methods for improved engine sustainment

Probabilistic Fatigue Management Program for General Aviation, \$1.187M, PI, Sep. 2012-Aug. 2016, Federal Aviation Administration, Grant 12-G-012

Develop a probabilistic fatigue management program applicable to general aviation

Implementation of complex variable finite element methods in Abaqus, \$75,433, PI, Nov. 1, 2011 – Aug. 31, 2012, DoD Contract No. GS04T09DBC0017

Implement new complex variable sensitivity method into Abaqus, verify, and document.

Enhanced fracture mechanics crack growth analysis using complex variable sensitivity methods, \$285,000, PI, May 2011 – May 2013, AFOSR W911NF-11-1-0208

Exploit new methods for fracture mechanics analysis of both metals and composites to support the Prognosis of Aircraft, and Space Devices, Components, and Systems

Efficient Finite Element-based 3D Fracture Mechanics Crack Growth Analysis using Complex Variable Sensitivity Methods, \$53,945, PI, Sep. 2010 – Aug. 2011, Department of Defense PETTT Program GS04T09DBC0017

Develop new fracture mechanics capabilities using the complex variable sensitivity methods

Probabilistic Damage Tolerance-Based Maintenance Planning for Small Airplanes, \$983,232, PI, Sep. 2009-Aug. 2012, Federal Aviation Administration, Grant 09-G-016

Develop methodology and software for a probabilistic damage tolerance computer code for use by FAA engineers for structural safety issues

NSF/MRI: Acquisition of an Integrated System for Advanced Visualization with Haptic Feedback Control, Co-PI, \$482,667, NSF Award Abstract #0923468, Oct 2009 – Sep 2012

Equipment grant to develop a large-scale visualization wall with haptic device for data exploration

Integrating High Performance Computing in Research and Education for Simulation, Visualization and Real-Time Prediction, \$5M, NSF Award Abstract #0932339, Aug. 2009 – July – 2014, Co-PI (Task Lead: Uncertainty Quantification), NSF

Lead task (one of 3) on uncertainty quantification with applications to fracture mechanics, biomechanics, fluid mechanics and environmental issues

A Novel Probabilistic Multi-Scale Modeling and Sensing Framework for Fatigue Life Prediction of Aerospace Structures And Materials, \$750,000 (\$175,100 to UTSA), Co-PI – joint with S. Ghosh, Ohio State Univ., AFOSR, June – 2009 – May 2012

Develop a probabilistically-based homogenization model for aerospace materials

SHM (Structural Health Monitoring) Analysis Methods for the Management of Rotorcraft Structural Damage, \$435,000, Sep 2007 – Aug 2011, PI, Federal Aviation Administration, Grant 07-G-018

Develop methodology and software for Bayesian updating of initial crack size parameters

Probabilistic Structural Risk Assessment and Risk Management for Small Airplanes, \$465,000, Sep 2007-Dec 2010, PI, Federal Aviation Administration, Grant 07-G-011

Develop methodology and software for a probabilistic safe-life computer code to be used by FAA engineers for structural safety issues

Efficient Sensitivity Methods for Probabilistic Lifting and Engine Prognostics, \$199,584, Aug 2007 - Sep 2010, PI, Air Force Research Lab FA8650-07-C5060

Explore sensitivity methods relevant to USAF lifting issues

Advanced Structural System Reliability Methods for Aircraft Structures, \$286,000 Feb 2007 - Jan 2010, PI, Air Force Research Lab

Develop enhanced system reliability methods to be used for hypersonic aircraft design

Advanced Stochastic Modeling Methods for Evaluation of Residual Stresses Effects in Lifting of Turbine Engine Materials and Components, \$59,300, Oct 2006-Mar 2009, PI, Air Force Research Lab

Develop modeling and sensitivity methods for analysis of residual stresses in turbine materials

Materials and Manufacturing Research, Summer Internship Program, \$14,000, PI, May 2009 – Aug 2009, Air Force Research Lab

Funding for a summer internship at AFRL for a UTSA MSME student

Prediction of Post-Yield Behavior of Bone, \$184,720, Sep. 06-Aug 08, Co-PI NIH R21 AG027780

Develop probabilistic models of bone behavior

Development of Reliability Methods for Fatigue Life Prognosis Technology, \$125,000, Jun 2006 – May 2010, Vertical Lift Rotorcraft Center of Excellence, Co-PI, US Army
Investigate advanced reliability methods for helicopter structural integrity

Reliability-based Optimization of Dental Implants, \$82,920, Aug. 2005-Mar. 2007, Co-PI
San Antonio Life Sciences Institute
Develop a probabilistic sensitivity model to a dental implant

Enhanced Probabilistic Methods for Risk Assessment of Gas Turbine Rotors, \$256,906. Apr. 2005 - Mar. 2010, Co-PI, Federal Aviation Administration through Southwest Research Institute
Develop and implement probabilistic methods into the DARWIN rotor integrity software

Advances in Adaptive Mesh Technology for DOD CSM Applications, \$43,500, June 2005 – May 2006, PI, USAF PET Program
Verify new methods implemented in the CTH hydrodynamics computer code

Innovative Methods for Engine Health Monitoring, \$973,000 (\$80,000 under my direction), June 2005 - Dec. 2006, Co-PI, AFOSR
Investigate potential to include probabilistic lifing algorithms into dedicated hardware

Development of Enhanced Probabilistic Life Prediction Methodologies for Engine Rotor Life Extension, \$128,000 over 3 years (50% cost share: \$256,000 total), Sept. 2003 - Aug 2006, C0-PI, USAF Air Force Research Lab, Materials Directorate
Develop and implement probabilistic sensitivity methods for engine rotor integrity

Probabilistic Methods for Risk Assessment of Gas Turbine Rotors, \$166,460. Jan. 2002 – June 2005, PI
Federal Aviation Administration
Develop and implement probabilistic methods into the DARWIN rotor integrity software

Computational Simulation of Bone Remodeling for Fracture Prevention and Recovery, UTSA Faculty Research Award, \$5,000, Jan 2003 - Dec. 2004, PI

I2 Connectivity for UTHSCA and UTSA, NSF, \$150,000 (Participant – money used for internet 2 equipment), Internet 2 activated at UTSA in Fall 2003

Synergistic Activities

Dr. Millwater received an ASEE summer faculty fellowship for during the summers 2005, 2006, and 2007. Dr Millwater was sponsored by Dr. James Larsen, AFRL Fellow, in the Materials Directorate, Life Prediction branch and investigated the effects of residual stress on probabilistic life prediction for gas turbine disks.

Dr. Millwater spent the summer of 2008 and 2009 as a visiting professor at the Air Force Research Lab, Air Vehicles Directorate, as a guest of Dr. Ravi Chona, AFRL Fellow.

Dr. Millwater has participated as an instructor in the short course Probabilistic Analysis and Design presented at Southwest Research Institute over the past 15 years. This course has provided theoretical and hands on training to several hundred students from many countries and industries.

Dr. Millwater, along with Dr. Paul Wirsching, developed a chapter entitled “Analysis Methods for Probabilistic Life Assessment” for the American Society of Materials Handbook, Vol. 11, Failure Analysis and Prevention, 2002

Invited Talks

University of Utah, Fracture Mechanics Class – “Overview of probabilistic damage tolerance analysis and the Smart|DT software,” March 29, 2023

CONNECT- the CONSortium on Nuclear sECurity Technologies – “Introduction to Uncertainty Quantification,” July 20, 2020

Nasa Langley Research Center, “A New Finite Element Method based on Hypercomplex Algebra for the Computation of High-order Derivatives - Applications to Materials and Uncertainty Quantification”, Feb. 8, 2018

Brigham Young University Distinguished Guest Speaker, “A New Finite Element Method based on Hypercomplex Algebra for the Computation of High-order Derivatives”, September 18, 2017

Nasa Langley Research Center, Jan. 2014 (High order sensitivity analysis using the multicomplex step)

Sandia National Lab, Nov. 2013 (High order sensitivity analysis using the multicomplex step)

NavAir/DSTO Fatigue Technology Symposium, Melbourne, Australia, March 2013 (Complex Variable Finite Element Methods for Fracture Mechanics Analysis)

NavAir Fatigue/Fracture Mechanics Workshop, November 17, 2011

Collaborators and other Affiliations

Dr. J. Larsen, AFRL Materials Directorate, Wright-Patterson AFB, Dayton, OH
Dr. R. John, AFRL Materials Directorate, Wright-Patterson AFB, Dayton, OH
Dr. P. Golden, AFRL Materials Directorate, Wright-Patterson AFB, Dayton, OH
Prof. S. Ghosh, Johns Hopkins University, Baltimore, MD
Dr. M.P. Enright, Southwest Research Institute, San Antonio, TX
Dr. L. Fitzwater, Boeing Aircraft, St. Louis, MO

Graduate and Postdoctoral Advisors

Graduate Advisor: Mark Mear, University of Texas at Austin

Thesis Advisor and Postgraduate-Scholar Sponsor

Total of 5 Post Docs, 8 PhD graduates, 25 MS graduates, 2 BS Honors graduates, 5 current PhD students, and 2 current MS students as follows:

BS Honors Students

Kayla Lovelady, BSME Honors College, May 2013, Finite Element Methods for Anisotropic Materials
Raquel de la Garza, BSME Honors College, May 2015, System for Automated Software Verification

BS URE students

Briley Perkins, BSME, St. Mary’s University, San Antonio, TX, Summer 2022 - Understanding of Additive Manufacturing with the Combination of the Flexible Manufacturing Process
Emmanuel Ewuzie, BSME, St. Mary’s University, San Antonio, TX, Summer 2022 - Additive Manufacturing & G Code

MS Students

F. Momin, MSME May 2004 – Application of Generalized Conditional Expectation Method to Enhance a Probabilistic Design Code without Modifying the Source Code
R. W. Osborn, MSME Aug 2005- Expanded Application of Probabilistic Sensitivities in Engineering Design
B. Shook, MSME Dec 2005 – The Simulation of Automated Inspection on Probability of Fracture Estimates
J. Moody, MSME Dec 2006 – Automated Risk Assessment Methodology for Gas Turbine Engines Employing Advanced Metamodeling Techniques
T. Ross, MSME Dec 2007 - Probabilistic Analysis of Preload Developed in a Dental Implant System

- A. Bates, MSME May 2008 - Development and Application of Probabilistic Sensitivity Methods for Improving Material Lifting Assessments
- L. Smith, MSME Aug 2008 - Conditional Filtering for Simplification of Aircraft Structural System Reliability Calculation
- H. Singh, MSME Aug 2008 – Error Estimator for Finite Element Based Stress Intensity Factor using the J Integral
- M. Barsotti, MSME Dec 2008 - Optimization of a Passive Aircraft Arrestor with Depth-Varying Crushable Material Using a Smoothed Particle Hydrodynamics (SPH) Model
- J. Ocampo, MSME May 2009 - Probabilistic Risk Assessment in Small Airplanes
- L. Domyancic, MSME Dec 2009 – A Structural Reliability-based Method for Identifying Critical Locations
- J. Garza, MSME May 2010 - Efficient Method for Estimating Sensitivities of the Reliability of Fatigued Structures with Respect to Pod Curve Parameters
- D. Sparkman, MSME May 2010 - Critical Failure Location Identification with Form-Based Filtering for Gaussian Random Fields
- E. Vazquez, MSME August 2010 - MCMC and its Applications to Bayesian Updating and Sensitivity Analysis
- C. Dubinsky, MSME Aug 2011 - Optimal Allocation of Testing Resources for Statistical Simulations
- D. Wagner, MSME Aug. 2012 - A Complex Finite Element Method to Compute Accurate Weight Functions
- M. Cortina, MSME Aug. 2012 - Global Sensitivity Methods in Engineering Analysis
- M. Meddouri, MSME May 2014 - Monte Carlo Variance Reduction Using Sensitivity Derivative Enhanced Sampling Method (non-thesis)
- E. Iglesias, MSME – Dec 2014 - Sensitivity Analysis of Turbine Engine Sustainment
- A. Baines, MSME – Dec 2014 - Calculation of Strain Energy Release Rates using a Complex Variable Finite Element Method
- S. Zaman, MSME – May 2016 - Probabilistic Damage Tolerance Analyses with Inspections using the First- and Second-Order Reliability Analysis Methods
- N. Crosby, MSME – Aug 2016 - High Performance Implementation of Probabilistic Damage Tolerance Analysis
- R. Fielder, MSME – Dec 2016 - Residual Stress Analysis of Thick-Walled Spherical Pressure Vessels Using a Complex Variable Finite Element Method
- A. Rios, MSME – May 2022 – Transient Thermomechanical Sensitivity Analysis Using a Complex-Variable Finite Element Method and Development of a High-Throughput Tensile Test Protocol for Ti-6Al-4V Additively Manufactured (AM) Components
- M. Hoffmeyer, MSME – May 2022 – Application of Bidual Numbers to Compute Objective Function Gradients for Solving an Inverse Thermal Finite Element Problem

Ph.D. Students

- J. Ocampo, PhD – ME Dec 2013 – Probabilistic Damage Tolerance for Small Airplanes Using a Linear-Elastic Crack Growth Fracture Mechanics Surrogate Model
- D. Sparkman, PhD – ME May 2014 - Spatial Statistical Characterization and Simulation of Microtexture
- J. Garza, PhD – ME Dec 2014 - Multicomplex Variable Differentiation in Probabilistic Analysis and Finite Element Models of Structural Dynamic Systems
- C. Quintana, PhD – Aug 2016 - A Variance Reduction Sampling Method to Efficiently Estimate the Probability-of-Failure for Damage-Tolerant Structures
- D. Wagner, PhD – ME Aug. 2018 - A Finite Element-Based Adaptive Energy Response Function Method for Curvilinear Progressive Fracture
- D. Ramirez-Tamayo, PhD – ME May 2021 - A Hypercomplex Multi-Physics Approach for Fracture Mechanics and Inverse Material Parameter Determination
- N. Crosby, PhD – ME Aug 2021 - Efficient Adaptive Importance Sampling Estimation of Time Dependent Probability of Failure with Inspections for Damage Tolerant Aircraft Structures

A. Aguirre, PhD – ME May 2021 - Efficient and Accurate Mixed-Mode Fracture and Shape Sensitivity Analysis using the Hypercomplex Finite Element Method
M. Balcer, PhD – ME Sept. 2023 - Efficient Development and Application of Taylor Series Expansions as Surrogate Models for Uncertainty Quantification
S. Restrepo, PhD – current
J. Smith, PhD – current
B. Banerjee, PhD – current
D. Possos, PhD – current
S. Roberts, PhD - current

Post Docs

Dr. Y.-H. Han, Mech. Eng, Univ. of Texas at Austin, Aug. 2004-Jan. 2006
Dr. G. Singh, Wright State Univ., Sep 2009 – Aug 2011
Dr. S. Shirinkam, Oct. 2012-Sep 2013
Dr. Roshan Joseph, S. Carolina Univ. Oct. 2020-Sept. 2021
Dr. M. Aristizabal, Eafit University, Medellin, Colombia, Dec. 2021-present
Dr. A. Aguirre, Univ. of Texas at San Antonio, June-Aug. 2022

Visiting Professors

Dr. Manuel Garcia, Eafit Univ., Medellin, Colombia, July 2015 – Aug 2016

Thesis Committees Served

Jason Fleming, MS ME, UTSA, May 2005
Patchigolla Ravichandra, MS ME, UTSA, Dec. 2005
Andrew Voorhees, MS ME, UTSA, May 2009
Ayhan Oruc, MS ME, UTSA, June 2009
Kyle Robinson, MS ME, UTSA, May 2009
Christian Moza, MS ME, UTSA, May 2010
Andrew Wharmby, MS BME, UTSA, May 2010
Young Joo Lee, PhD CE, University of Illinois, Dec 2011
Carlos Acosta, MS ME, UTSA, August 2012
K. Halbert, PhD Statistics, Temple Univ., May 2014 - Estimation of Probability of Failure for Damage-Tolerant Aerospace Structures
C. Hegde, MS PE, Univ. of Texas at Austin, Dec. 2016
C. Soares, PhD PE, Univ. of Texas at Austin, Aug. 2018 - Continuous Learning of Analytical and Machine Learning Rate of Penetration (ROP) Models for Real-Time Drilling Optimization
C. Hegde, MS PE, Univ. of Texas at Austin, Aug. 2018 - End-to-end Drilling Optimization using Machine Learning
A. Gandomkar, PhD PE, Univ. of Texas at Austin, Dec. 2018 - Thermoporoelastic Wellbore Stability Model with Local Thermal Non-Equilibrium
M. Chapa, MS ME, UTSA, Dec. 2018
MD Abrar, MS ME, UTSA, Dec. 2018
M. O. Oyedere, PhD PE, Univ. of Texas at Austin, August 2018 - Improved Torque and Drag Modeling using Traditional and Machine Learning Methods
C. Gao, PhD PE, Univ. of Texas at Austin, May 2019 - A Coupled Geomechanics and Reservoir Simulator and its application to Reservoir Development Strategies
M. Aristizabal Cano, PhD ME, Universidad EAFIT, Medellin, Colombia, November 2020 - Order Truncated Imaginary Algebra for Computation of Multivariable High-Order Derivatives in Finite Element Analysis
E. Ytuarte, MS, May 2022 - Sensitivity Analysis of Hyperelastic Problems Using the Local And Global Complex-Variable Finite Element Methods

Service

UTSA Blueprint Information Technology Task Force, 2016-Present
UTSA Blueprint Strategic Budget and Fiscal Sustainability Task Force, 2016-Present
UTSA Research IT Enhancement Advisory Group (RIEAG) (Chair), 2016
UTSA Research IT Task Force (Chair), 2015
UTSA Defense Advisory Group (DAG), 2015 - 2016
UT System FreshAir conference on Big Data (Co-Chair Research Analytics), 2015
Texas Sustainable Research Institute Council Member, 2011-2014
Interim Department Chair 2011-2012
ME department Search Committee 2010-2011
ME department ABET committee 2008-2010
University Review Committee 2008-2009
College Faculty Advisory Committee (Chair) 2007-2009
Interim Assistant Department Chair 2006-2007
Periodic Performance Evaluation Committee 2007
Intellectual Property Committee (Chair) 2005
Graduate Studies Program (Chair) 2005-2006
ME newsletter 2005, Co-editor
ME committee on undergraduate curriculum, 2004
Center for Excellence in Engineering Education, 2008

JOURNAL REVIEWS

AIAA Journal
AIAA J. Aircraft
AIAA J. Propulsion and Power
ASME J. of Mechanical Design
ASME J. of Electronic Packaging
Composite Structures
Engineering Fracture Mechanics
International Journal of Pressure Vessels and Piping
International Journal of Reliability and Risk
International Journal of Fatigue
J. Computational and Applied Mathematics
Mathematic and Mechanics of Solids
Probabilistic Engineering Mechanics
Structural Health Monitoring