

## Ratneshwar (Ratan) Jha

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Associate Professor, Mechanical and Aeronautical Engineering  
Clarkson University, Potsdam, NY 13699-5725  
(Citizenship: USA)

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### EDUCATION

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Ph. D. Mechanical Engineering, Arizona State University, Tempe, Arizona, May 1999  
M. S. Aerospace Engineering, Georgia Institute of Technology, Atlanta, Dec 1982  
B. Tech. Aeronautical Engineering (Honors), IIT Kharagpur, India, May 1981

### APPOINTMENTS

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2007 **Summer Faculty Fellow**, AFRL/ML, NDE Branch, Dayton, OH  
2006 **Summer Faculty Fellow**, AFRL/VS, Albuquerque, NM  
2005-Present **Associate Professor**, Mech. and Aeronautical Engineering, Clarkson University  
1999-2004 **Assistant Professor**, Mech. and Aeronautical Engineering, Clarkson University  
1983-1995 **Aeronautical Engineer / Deputy Manager / Manager**, Aerodynamics Group, Aircraft Design Bureau, Hindustan Aeronautics Limited (HAL), Bangalore, India

### ACADEMIC ACHIEVEMENTS

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**Research:** Structural health management, modeling of composite and smart structures, intelligent control of smart structures and aerospace vehicles, UAV, and optimization  
Research grants awarded \$4 Million (with Co-Investigators)  
Published over 90 papers in archival journals and conference proceedings  
John Graham Faculty Research Award (2005), Million Dollar Club (2010)  
Research cited in "Year in Review 2011," Aerospace America (AIAA Publication)

**Teaching:** Aircraft Structures, Engineering Design Methodology, Aircraft Stability and Control, Aircraft Performance and Flight Mechanics, Intro to Aeronautical Design  
Graduated 4 PhD, 16 MS, 2 ME, and 3 undergraduate honors students  
Currently advising 2 PhD, 1 MS, and 2 undergraduate students  
School of Engineering Teaching Excellence Recognition (2006, 2010)

**Service:** Faculty Senate, Provost Search Committee, Curriculum and Academic Policies Committee, Research and Innovation Committee, Aeronautical Engineering Committee  
Technical Chair, 21<sup>st</sup> AIAA/ASME/AHS Adaptive Structures Conf., 8-11 April 2013, Boston, MA  
Associate Fellow - American Institute of Aeronautics and Astronautics (AIAA)  
Member – ASME, ASEE, AIAA Adaptive Structures Technical Committee (ASTC)  
Editorial Board Member, *International Journal of Aerospace Engineering*  
Served as reviewer for 22 archival journals, several books, and research proposals

### AIRCRAFT DESIGN EXPERIENCE

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**Led a team of five engineers** and performed aircraft conceptual design studies, including drag estimation, stability & control derivative prediction and performance calculation

**Developed aerodynamic model** of supersonic fighter aircraft in the entire flight envelope for simulation and control law design

**Authored 104 technical reports** relating to wind tunnel data analysis, configuration definition, and flight aerodynamic database

**Completed advanced management development program** (12 weeks – HAL Bangalore)

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### EDUCATION

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- Ph. D.** Mechanical Engineering, Arizona State University, Tempe, Arizona, May 1999  
“Development of Multidisciplinary Design Optimization Procedures for Smart Composite Wings and Turbomachinery Blades” (Advisor: Dr. Aditi Chattopadhyay)
- M. S.** Aerospace Engineering, Georgia Institute of Technology, Atlanta, Georgia, Dec. 1982
- B. Tech.** Aeronautical Engineering (Honors), Indian Institute of Technology, Kgp, May 1981

### APPOINTMENTS

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- 2007 **Summer Faculty Fellow**, AFRL/ML, NDE Branch, Dayton, OH
- 2006 **Summer Faculty Fellow**, AFRL/VS, Albuquerque, NM
- 2005-Present **Associate Professor**, Mech. and Aeronautical Engineering, Clarkson University
- 1999-2004 **Assistant Professor**, Mech. and Aeronautical Engineering, Clarkson University
- 1999 **Senior Engineer**, ZONA Technology, Inc., Scottsdale, Arizona
- 1995-1999 **Graduate Research Associate**, MAE, Arizona State University, Tempe, AZ
- 1990-1995 **Manager (Design)**, Aerodynamics Group, Aircraft Design Bureau, Hindustan Aeronautics Limited (HAL), Bangalore, India
- 1987-1990 **Deputy Manager (Design)**, Aerodynamics Group, HAL, Bangalore, India
- 1983-1987 **Aeronautical Engineer**, Aerodynamics Group, HAL, Bangalore, India

### THESES AND DISSERTATIONS (Clarkson University)

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#### PhD Dissertations Supervised

1. **Chengli He**, “Identification and Control for Vibration Suppression of a Nonlinear and Time Varying Smart Structure,” PhD, Mechanical Engineering, January 2004.
2. **Ali Alavinasab**, “Nonlocal Theory and Finite Element Modeling of Nano-Composites,” PhD, Mechanical Engineering, August 2009 (Co-Advisor: Prof. Ahmadi, MAE).
3. **Brian D. LeFevre**, “Hybrid Adaptive Ascent Flight Control for a Flexible Launch Vehicle,” PhD, Mechanical Engineering, August 2010.
4. **Xuefei Guan**, “A General Probabilistic Inference Framework for Prognostics and Health Management under Uncertainty,” PhD, Mechanical Engineering, November 2011 (Co-Advisor: Prof. Liu, CEE).

5. **Sohaib Obeid**, "Design and Experimental Implementation of Adaptive Controller for Active Flow Control," PhD Candidate, Mechanical Engineering, expected graduation Fall 2012 (Co-Advisor: Prof. Ahmadi, MAE).
6. **Dulip Samaratunga**, "Development of Composite SHM Techniques using Wavelet Spectral Finite Element and Damage Force Indicator Methods," PhD, Mechanical Engineering, expected graduation Spring 2013.

#### **MS Theses Supervised**

7. **Jacob H. Rower**, "Active Vibration Control Using Neural Networks and Piezoelectric Actuators," MS, Mechanical Engineering, May 2001.
8. **Matthew E. Pausley**, "Active Vibration Control of Space Structures During Space Shuttle Lift-Off," MS, Mechanical Engineering, December 2001 (Co-Advisor: Prof. Ahmadi).
9. **Allison F. Bailey**, "Combined Active and Passive Vibration Control During Space Shuttle Liftoff," MS, Mechanical Engineering, January 2003 (Co-Advisor: Professor Ahmadi).
10. **Feng Yan**, "Structural Health Monitoring Based on the Hilbert-Huang Transform," MS, Mechanical Engineering, January 2005 (Co-Advisor: Professor Ahmadi).
11. **Brian D. LeFevre**, "Attitude Dynamics and Stability of Solar Sails During Spin Deployment," MS, Mechanical Engineering, October 2006.
12. **Kevin R. Cross**, "Numerical and Experimental Investigations of Bridge Health Monitoring Using Modal Curvature and Instantaneous Phase Methods," MS, Mech. Eng., Nov. 2007.
13. **Conner B. Shane**, "Development of a Proper Orthogonal Decomposition Based Algorithm for Structural Health Monitoring of Composite Plates," MS, Mech. Eng., May 2008.
14. **Yousof Azizi**, "Damage Detection Based on Adaptive Estimation of Amplitude and Phase," MS, **Electrical Engineering**, December 2008 (Advisor: Prof. Ziarani, ECE).
15. **Hardikkumar Shah**, "An Approach to Coat Multiple Layers of Catalyst Ink on Proton Exchange Membrane Fuel Cells (PEMFC) Membrane Using Spin Coating Techniques," MS, Mechanical Engineering, December 2008 (Advisor: Prof. Rengasamy, CBE).
16. **Myles Farrel**, "Nanosensor Fabrication through Layer-by-Layer Deposition," MS, Mechanical Engineering, September 2010 (Co-Advisor: Prof. Ding, MAE).
17. **Anshuman Kunwar**, "Structural Health Monitoring of an Experimental Bridge Model Using Hilbert Huang Transform of Transient Vibrations," MS, Mechanical Engineering, Jan 2011.
18. **Peter Coffin**, "An Experimental and Computational Investigation of a Tube Launched MAV," MS, Mechanical Engineering, April 2011 (Co-Advised with Profs. Ahmadi and Marzocca).
19. **Shaoqing Xu**, "Damage Detection in a Multi-Level Structure Using Hilbert-Huang Transform," MS, Mechanical Engineering, May 2011 (Co-Advisor: Prof. Ahmadi, MAE).
20. **Omkar Dole**, "Finite Element Modeling of Composites using Random Sequential Adsorption Algorithm," MS, Mechanical Engineering, June 2011.

21. **Inho Kim**, "Investigation of Lamb Wave Excitation Frequency on Detection of Delamination in a Composite Plate," MS, Mechanical Engineering, June 2011.
22. **Dulip Samaratunga**, "Wavelet Spectral Finite Element Modeling and Damage Detection in Composite Plates," MS, Mechanical Engineering, November 2011.
23. **Michael Vuto**, "Modeling and Simulation of Advanced Composite Energy Storage System for Smart Grid Applications," MS, Mechanical Engineering, expected graduation Spring 2012.

#### **Master of Engineering Projects Supervised**

24. **Steven M. DeLessio**, "Design of a Compliant Mechanism to Amplify Displacements," ME, Mechanical Engineering, May 2000.
25. **Josef Ulrich**, "Design and Construction of a Bridge Model for Structural Health Monitoring Experiments," ME, Mechanical Engineering, May 2007.

#### **Undergraduate Honors Theses Supervised**

26. **Joel Thomson**, "The Evolutionary Neuro Controller," Clarkson University, April 2005.
27. **Conner Shane**, "Structural Health Monitoring of a Wing using Linear Time Series Analysis Methods," Clarkson University, April 2006.
28. **Ryan Watkins**, "Lamb Wave Based Diagnostics of Composite Plates Using a Modified Time Reversal Method," Clarkson University, April 2009.
29. **Nateenond Supatpitak**, "Modified Time Reversal of Lamb Waves for Composite SHM Using a Scanning Laser Vibrometer," Clarkson University, expected graduation May 2013.

#### **SPONSORED RESEARCH**

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##### **External Grants and Contracts (Total - \$4.0 Million; Jha- \$1.2 Million)**

1. Air Force Office of Scientific Research – **\$225,876**  
"Wavelet Spectral Finite Elements for Wave Propagation in Composite Plates," April 2009 – May 2012, **Jha (PI)**.
2. Army Research Office – **\$261,735**  
"Smart Responsive Nanocomposites for Soldier Protection," June 2009- Sep 2012, Cetinkaya (PI), Ahmadi, Aidun, Cheng, Ding, **Jha**, Marzocca, Moosbrugger.
3. NASA (Ames/Langley Research Center) – **\$598,391**  
"Validation and Uncertainty Management of Prognostic Algorithms," Sep 2008-August 2012, Liu (PI) and **Jha**.
4. Air Force Office of Scientific Research – **\$1,741,500**  
"Advancement of Intelligent Aerospace Systems," Feb 2009 – Jan 2012, Ahmadi (PI), **Jha**, Marzocca, McLaughlin, Helenbrook, Bollt, Visser and Bohl.
5. Nanomaterials Innovation Center - **\$2,000**  
"Characterization of AL-CNT Composite Materials," Sep 2011-Aug 2012, **Jha (PI)**.

6. Dynamic Design Solutions – **\$2,500**  
“Implementation of Hilbert Transform in FEMtools,” July-August 2010, **Jha (PI)**.
7. Imperial Machine & Tool / ARDEC - **\$60,000**  
“Hybrid Projectile,” June 2010 – June 2011, Ahmadi (PI), **Jha**, Marzocca.
8. Magna Powertrain – **\$40,000**  
“Study of the Engineering Properties of Composite Polymer/Metallic Housings,” Oct 2008 – Oct 2009, **Jha (PI)**.
9. MAS Composites / New York State Energy Research and Development Authority – **\$30,000**  
“High Speed Automated Composite Fiber Placement,” Nov 2008 – July 2009, **Jha (PI)**.
10. Army Research Office – **\$102,396**  
“Smart Responsive Nanocomposite for Soldier Protection,” Sep 2006- Sep 2009, **Jha (PI)**, Cetinkaya and Ahmadi.
11. NASA (Marshall Space Flight Center) – **\$133,400**  
“Microgravity Vibration Suppression Using Adaptive Predictive Controllers,” July 2004- June 2010, **Jha (PI)** (GSRP Student: Brian LeFevre).
12. Vento Tek – **\$50,000**  
“Fabrication and Marketing of Smart Wind Turbine Blade,” Jan 2008- Dec 2008, Marzocca (PI), **Jha**, Ahamdi, and Bollt.
13. Pratt & Whitney – **\$120,000**  
“Development of a Blade Outer Air Seal Parametric Geometry Tool,” Aug 2006-Dec 2008, Willmert (PI), **Jha**, Helenbrook, Marzocca, Visser, and Moosbrugger.
14. New York State Energy Research and Development Authority – **\$453,273**  
“Wireless Intelligent Sensor Network for Transportation Infrastructure,” Dec 2003 - Oct 2008, **Jha (PI: Phase3)**, Janoyan, Sazonov (PI: Phases 1-2).
15. National Science Foundation – **\$4,730**  
“US-India Planning Visit: International Collaboration for Research in Smart Structures,” June 2007 – May 2008, **Jha (PI)**.
16. National Science Foundation – **\$199,000**  
“MRI: Acquisition of a Scanning Laser Vibrometer for Smart Structures Research,” Sep 2005- Aug 2006, **Jha (PI)**, Ahmadi, Kim, Marzocca and Sazonov.
17. Spectra Quest, Inc – **\$7,000**  
“Machinery Health Monitoring,” May 2003-Aug 2004, **Jha (PI)**.

#### **Clarkson University Grants**

1. Center for Advanced Materials Processing - **\$5,000**  
“CAMP Support – Al-CNT Nanocomposites,” Sep 2011 – June 2012, **Jha (PI)**.
2. School of Engineering Seed Grant - **\$5,000**  
“Strategic Partnership with IITs for Research in Smart Structures,” Sep – Dec 2009, **Jha (PI)**.

3. Center for Advanced Materials Processing - **\$8,000**  
"CAMP Support - Magna," July 2008 – June 2009, **Jha** (PI).
4. Center for Advanced Materials Processing - **\$6,000**  
"CAMP Support – MAS Composites," July 2008 – June 2009, **Jha** (PI).
5. Center for Advanced Materials Processing - **\$10,000**  
"CAMP Support - Ventotek," July 2008 – June 2009, Marzocca (PI) and **Jha**.
6. School of Engineering Seed Grant - **\$7,000**  
"Experimental Validation of Closed-loop Flow Control for Wind Turbine Blades," April 2006 – March 2007, **Jha (PI)** and Marzocca.

## **ARCHIVAL PUBLICATIONS**

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### **Book Chapters** (\* or \*\* indicates graduate or undergraduate student at Clarkson University)

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1. Guan, X. \*, He, J. \*, Jha, R., and Liu, Y., "Structure reliability and response prognostics under uncertainty using Bayesian analysis and analytical approximations," in "Diagnostics and Prognostics of Engineering Systems: Methods and Techniques," S. Kadry (ed.), IGI Global, 2012, in press.
2. Jha, R. and Barai, S.K., "Neural Network and Genetic Algorithm in Structural Health Monitoring," in "Intelligent Materials and Structural Health Monitoring: Materials, Devices, and Analysis," S. Nayak and J. Agrawal (ed.), John Wiley and Sons, 2012 (under review).

### **Journal Papers in Print**

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1. Coffin, P. \*, Ahmadi, G., Jha, R., and Marzocca, P., "Experimental In-Flight Rolling MAV Wing Deployment and Aerodynamic Characterization," *SAE International Journal of Aerospace*, vol. 4, no. 2, pp. 1106-1114, November 2011.
2. Guan, X. \*, He, J. \*, Jha, R., and Liu, Y., "An efficient analytical Bayesian method for reliability and system response updating based on Laplace and inverse first-order reliability computations," *Reliability Engineering & System Safety*, Volume 97, Issue 1, January 2012, Pages 1-13.
3. Kunwar, A. \*, Jha, R., Whelan, M., and Janoyan, K., "Damage Detection in an Experimental Bridge Model Using Hilbert-Huang Transform of Transient Vibrations," *Structural Control and Health Monitoring*, DOI:10.1002/stc.466, published online: 8 JUN 2011.
4. Guan, X. \*, Jha, R., and Liu, Y., "Model Selection, Updating and Averaging for Probabilistic Fatigue Damage Prognosis," *Structural Safety*, Volume 33, Issue 3, 2011, pp. 242-249.
5. LeFevre, B. \* and Jha, R., "Hybrid Adaptive Ascent Flight Control for a Flexible Launch Vehicle," *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering*, August 2011, vol. 225, no. 8, 851-862.

6. Shane, C.\* and Jha, R., "Proper Orthogonal Decomposition Based Algorithm for Detecting Damage Location and Severity in Composite Beams," *Mechanical Systems and Signal Processing* 25 (2011), pp. 1062–1072.
7. LeFevre, B.\* and Jha, R., "Attitude Dynamics of Square Solar Sails During Spin-Deployment," *Proceedings of the Institution of Mechanical Engineers, Part G, Journal of Aerospace Engineering*, Vol. 225 (2011), pp. 433-440.
8. Guan, X.\*, Jha, R., Liu, Y., Saxena, A., Celaya, J. and Goebel, K., "Comparison of Two Probabilistic Fatigue Damage Assessment Approaches Using Prognostic Performance Metrics," *International Journal of Prognostics and Health Management*, ISSN2153-2648, 2011 005.
9. Whelan, M.J.\* , Gangone, M.V.\* , Janoyan, K.D., and Jha, R., "Operational Modal Analysis of a Multi-Span Skew Bridge Using Real-Time Wireless Sensor Networks," *Journal of Vibration and Control*, 17(13) 1952-1963, 2011.
10. Guan, X.\* , Jha, R. and Liu, Y., "Probabilistic fatigue damage prognosis using maximum entropy approach," *Journal of Intelligent Manufacturing* (doi: 10.1007/s10845-009-0341-3; Published online: 28 October 2009).
11. Whelan, M.J.\* , Gangone, M.V.\* , Janoyan, K.D., and Jha, R., "Real-Time Wireless Vibration Monitoring for Operational Modal Analysis of an Integral Abutment Highway Bridge," *Engineering Structures*, Volume 31, Issue 10, October 2009, pp. 2224-2235.
12. Alavinasab, A.\* , Jha, R., Ahmadi, G., Cetinkaya, C., and Sokolov, I., "Computational Modeling of Nano-Structured Glass Fibers," *Computational Materials Science*, Vol. 44, 2008, pp. 622-627.
13. Jha, R., and He, C.\* , "Adaptive Neurocontrollers for Vibration Suppression of Nonlinear and Time Varying Structures," *Journal of Intelligent Material Systems and Structures*, Vol. 15, No. 9-10, Sept.- Oct. 2004, pp. 771-781.
14. Jha, R., and He, C.\* , "A Comparative Study of Neural and Conventional Adaptive Predictive Controllers for Vibration Suppression," *Smart Materials and Structures*, Vol. 13, No. 4, 2004, pp. 811-818.
15. He, C.\* , and Jha, R., "Experimental Evaluation of Augmented UD Identification Based Vibration Control of Smart Structures," *Journal of Sound and Vibration*, Vol. 274, No. 3-5, July 2004, pp. 1065-1078.
16. Marzbanrad, J., Ahmadi, G., and Jha, R., "Optimal Preview Active Control of Structures During Earthquakes," *Engineering Structures*, Vol. 26, August 2004, pp. 1463-1471.
17. Jha, R., Pausley, M.\* , and Ahmadi, G., "Optimal Active Control of Launch Vibrations of Space Structures," *Journal of Spacecraft and Rockets*, Vol. 40, No. 6, November 2003, pp. 868-874.
18. Jha, R., and He, C.\* , "Design and Experimental Validation of an Adaptive Neurocontroller for Vibration Suppression," *Journal of Intelligent Material Systems and Structures*, Vol. 14, No. 8, August 2003, pp. 497-506.

19. Jha, R., and He, C.\*, "Neural-Network-Based Adaptive Predictive Control for Vibration Suppression of Smart Structures," *Smart Materials and Structures*, Vol. 11, No. 6, December 2002, pp. 909-916.
20. Jha, R., and Rower, J.\*, "Experimental Investigation of Active Vibration Control Using Neural Networks and Piezoelectric Actuators," *Smart Materials and Structures*, Vol. 11, No. 1, February 2002, pp. 115-121.
21. Chen, P. C., Sarhaddi, D., Jha, R., Liu, D. D., Griffin, K. and Yurkovich R., "Variable Stiffness Spar Approach for Aircraft Maneuver Enhancement Using ASTROS," *Journal of Aircraft*, Vol. 37, No. 5, September 2000, pp. 865-871.
22. Jha, R. and Chattopadhyay, A., "Multidisciplinary Optimization of Composite Wings Using Refined Structural and Aeroelastic Analysis Methodologies," *Engineering Optimization*, Vol. 32, No. 1, 1999, pp. 59-78.
23. Chattopadhyay, A., Seeley, C. E. and Jha, R., "Aeroelastic Tailoring Using Piezoelectric Actuation and Hybrid Optimization," *Smart Materials and Structures*, Vol. 8, No. 1, February 1999, pp. 83-91.

#### **Journal Papers in Press**

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24. Guan, X. \*, Griffin, A., Jha, R., and Liu, Y., "Maximum Relative Entropy Based Probabilistic Inference in Fatigue Crack Damage Prognostics," *Probabilistic Engineering Mechanics* (doi:10.1016/j.probengmech.2011.11.006).

#### **Journal Papers in Review**

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25. Watkins, R. \*\* and Jha, R., "A Modified Time Reversal Method for Lamb Wave Based Diagnostics of Damage Location and Severity," *Mechanical Systems and Signal Processing* (revision submitted).
26. Guan, X. \*, Jha, R., and Liu, Y., "Entropy-based Prior and Posterior Probability Distributions Construction with Partial Information for Fatigue Damage Prognostics," *Structural Health Monitoring* (revision submitted).
27. Alavinasab, A. \*, Jha, R. and Ahmadi, G., "Modeling of Carbon Nanotube Composites Based on Nonlocal Elasticity Approach," *International Journal for Computational Methods in Engineering Science & Mechanics*.
28. Coffin, P. \*, Ahmadi, G., Jha, R., and Marzocca, P., "Deployment Dynamics of a Small Carbon Fiber Tape-Spring UAV Wing," *Journal of Aircraft*.

#### **Journal Papers in Preparation**

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29. Dole, O.\* and Jha, R., "Random Sequential Adsorption Based Modeling of Short Fiber Composites and Experimental Verification," *Composites Science and Technology*.
30. Samaratunga, D. \*, Kim, I. \*, Jha R., and Gopalakrishnan, S., "Delamination Detection in Composites Using Wavelet Spectral Finite Element and Damage Force Indicator Method," *Structural Health Monitoring*.

31. Guan, X.\* , He, J.\* , Jha, R., and Liu, Y., "Bayesian Fatigue Damage and Reliability Analysis Using Laplace Approximation and Inverse Reliability Method," *International Journal of Prognostics and Health Management*.
32. Samaratunga, D.\* , Jha R., and Gopalakrishnan, S., "Wavelet Spectral Finite Element Modeling of Transverse Crack in Composite Plates," *Smart Materials and Structures*.
33. Kim, I.\* and Jha R., "Effect of Lamb Wave Excitation Frequency on Instantaneous Phase for Composite Delamination Detection," *Structural Control and Health Monitoring*.

#### **CONFERENCE PROCEEDINGS PAPERS (Draft paper and/or abstract reviewed)**

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1. Obeid, S.\* , Jha, R., and Ahmadi, G., "Closed-loop feedback control of flow over a flapped airfoil at high angles of attack using identified NARMAX model," ASME Fluids Engineering Division Summer Meeting, 8-12 July 2012, Puerto Rico, USA.
2. Samaratunga, D.\* and Jha R., "Lamb wave propagation simulation in smart composite structures," SIMULIA Customer Conference, 15-17 May 2012, Providence, RI.
3. Samaratunga, D.\* , Jha R., and Gopalakrishnan, S., "Wavelet spectral finite element modeling of transverse crack for structural health monitoring of composite plates," 20th AIAA/ASME/AHS Adaptive Structures Conference, 23 - 26 April 2012, Honolulu, HI.
4. Guan, X.\* , He, J.\* , Jha, R., and Liu, Y., "Time-dependent reliability analysis using efficient Bayesian method," 53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 23 - 26 April 2012, Honolulu, HI.
5. Coffin, P.\* , Ahmadi, G., Jha, R., and Marzocca, P., "Deployment Dynamics of a Small Carbon Fiber Tape-spring UAV Wing," IMECE2011-65669, ASME 2011 International Mechanical Engineering Congress & Exposition, Nov 11-17, 2011, Denver, CO.
6. Obeid, S.\* , Jha, R., and Ahmadi, G., "Closed-Loop Feedback Control Algorithms for Flow Control over NACA 0015 Airfoil," IMECE2011-65050, ASME 2011 International Mechanical Engineering Congress & Exposition, Nov 11-17, 2011, Denver, CO.
7. Coffin, P.\* , Ahmadi, G., Jha, R., and Marzocca, P., "Experimental In-Flight Rolling MAV Wing Deployment and Aerodynamic Characterization," Paper No. 2011-01-2648, SAE 2011 AeroTech Congress & Exhibition, October 2011, Toulouse, France.
8. **(Finalist for Best Paper Award)** Guan, X.\* , Jha, R. and Liu, Y., "Bayesian Fatigue Damage and Reliability Analysis Using Laplace Approximation and Inverse Reliability Method," Annual Conf. Prognostics and Health Management Society, 25-29 Sep. 2011, Montreal, Canada.
9. Kim, I.\* and Jha R., "Effect of Lamb Wave Excitation Frequency on Detection of Delamination in Composite Plates," ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2011-5225, 18-21 Sep. 2011, Scottsdale, AZ.
10. Samaratunga, D.\* , Kim, I.\* , Jha R., and Gopalakrishnan, S., "Composite Delamination Detection Using Wavelet Spectral Finite Element and Damage Force Indicator Method," AIAA2011-1953, 19th AIAA Adaptive Structures Conference, 4-11 April 2011, Denver, CO.

11. Guan, X\*, Jha, R. and Liu, Y., "A Probabilistic Multi-model Bayesian Network for Fatigue Damage Prognosis," 13th AIAA Non-Deterministic Approaches Conference, 4-11 April 2011, Denver, CO.
12. **(Invited Paper)** Alavinasab, A\*, Jha, R., and Ahmadi, G., "Modeling of Carbon Nanotube Composite Based on Nonlocal Elasticity Approach," International Conf. on Composites for 21st Century: Current & Future Trends, 4-7 Jan. 2011, Indian Institute of Science, Bangalore.
13. Guan, X\*, Jha, R. and Liu, Y., "Trans-dimensional MCMC for Fatigue Prognosis Model Determination, Updating, and Averaging," 2010 Annual Conference of the Prognostics and Health Management Society, Portland, OR, Oct. 10 – 16, 2010.
14. Jha, R., Kim, I\* and Samaratinga, D\*, "Investigation of Incident Lamb Wave Parameters on Detection of Composite Delamination," SMASIS2010-3780, ASME Conf. on Smart Materials, Adaptive Structures and Intelligent Systems, Sept 28-Oct 1, 2010, Philadelphia, PA.
15. Alavinasab, A., Padewski, E., Holley, M., Jha, R. and Ahmadi, G., "Damage Identification Based on Vibration Response of Prestressed Concrete Pipes," Proceedings of the Pipelines 2010 Conference, August 28 – September 1, 2010, Keystone, CO.
16. Gopalakrishnan, S. and Jha, R., "A Wavelet Spectral Element for Composite Plate with Delamination and Transverse Damage," AIAA 2010-2901, 18th AIAA/ASME/AHS Adaptive Structures Conference, 12 - 15 Apr 2010, Orlando, Florida.
17. Guan, X\*, Jha, R. and Liu, Y., "Maximum Entropy Method for Model and Reliability Updating Using Inspection Data," AIAA 2010-2591, 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 12 - 15 Apr 2010, Orlando, FL.
18. Coffin, P\*, Ahmadi, G., Jha, R., Marzocca, P., Su, W.-J. and Manole, L., " Design and Experimental Investigation of a Small UAV," 09ATC-0322, SAE AeroTech Congress and Exhibition, 10-12 November 2009, Seattle, Washington.
19. LeFevre, B\* and Jha, R., "Hybrid Adaptive Launch Vehicle Ascent Flight Control," AIAA-2009-5958, AIAA Guidance, Navigation and Control Conference and Exhibit, Chicago, Illinois, 10-13 Aug 2009.
20. Jha, R. and Watkins, R\*\* , "Lamb Wave Based Diagnostics of Composite Plates Using a Modified Time Reversal Method," AIAA-2009-2108, 17th AIAA/ASME/AHS Adaptive Structures Conference, Palm Springs, CA, 4-7 May 2009.
21. Shane, C\* and Jha, R., "Singular Value Decomposition Based Algorithm for Damage Detection in Composite Structures," SMASIS 2008-597, ASME Conf. on Smart Materials, Adaptive Structures and Intelligent Systems, 28-30 October 2008, Ellicott City, Maryland.
22. Alavinasab, A\*, Ahmadi, G., and Jha, R., "Nonlocal Continuum Theory Based Modeling of Carbon Nanotube Composites," SMASIS2008-595, ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, October 28-30, 2008, Ellicott City, Maryland.
23. Azizi, Y\*, McNamara, D\*, Ziarani, A., and Jha, R., "Damage Detection Based on Adaptive Estimation of Amplitude and Phase," ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, October 28-30, 2008, Ellicott City, Maryland, USA.

24. LeFevre, B\* and Jha, R., "Launch Vehicle Ascent Flight Control Augmentation via a Hybrid Adaptive Controller," AIAA Guidance, Navigation and Control Conference and Exhibit, 18 - 21 Aug 2008, Honolulu, Hawaii.
25. Shane, C\* and Jha, R., "Integrated Structural Health Monitoring for Composites using Proper Orthogonal Decomposition-based Model Filter," SPIE Paper 6935-61, Smart Structures and Materials & NDE and Health Monitoring, 9-13 March 2008, San Diego, CA.
26. Whelan, M\*, Gangone, M\*, Janoyan, K., and Jha, R., "Wireless Vibration Monitoring for Damage Detection of Highway Bridges," Invited Paper, SPIE Paper 6933-19, Smart Structures and Materials & NDE and Health Monitoring, 9-13 March 2008, San Diego, CA.
27. Gangone, M\*, Whelan, M\*, Janoyan, K., and Jha, R., "Field Deployment of a Dense Wireless Sensor Network for Condition Assessment of a Multispan Bridge," SPIE Paper 6933-21, Smart Struct. and Materials & NDE and Health Monitoring, 9-13 March 2008, San Diego, CA.
28. Shane, C\* and Jha, R., "Proper Orthogonal Decomposition Based Model Filter for Health Monitoring of Composite Structures," The 18th International Conference of Adaptive Structures and Technologies, 3-5 October 2007, Ottawa, Canada.
29. Cross, K\*, Jha, R., Whelan, M\*, Janoyan, K., and Gangone, M\*, "Bridge Health Monitoring Using Linear and Nonlinear Approaches: Experimental Validation," The Sixth International Workshop on Structural Health Monitoring, 11-13 Sep 2007, Stanford University, CA.
30. Cross, K\*, Jha, R., Whelan, M\*, and Janoyan, K., "Bridge Health Monitoring Using Linear and Nonlinear Approaches: Numerical Simulations," The Sixth International Workshop on Structural Health Monitoring, 11-13 Sep 2007, Stanford University, CA.
31. Gangone, M\*, Whelan, M\*, Janoyan, K., Cross, K\*, and Jha, R., "Performance Monitoring of a Bridge Superstructure using a Dense Wireless Sensor Network," The Sixth International Workshop on Structural Health Monitoring, 11-13 Sep 2007, Stanford University, CA.
32. Whelan, M\*, Gangone, M\*, Janoyan, K., Cross, K\*, and Jha, R., "Reliable High Rate Bridge Monitoring Using Dense Wireless Sensor Arrays," The Sixth International Workshop on Structural Health Monitoring, 11-13 Sep 2007, Stanford University, CA.
33. Cross, K\*, Jha, R., Whelan, M\*, and Janoyan, K., "Numerical Evaluation of Hilbert-Huang Transform and Fourier Spectrum for Benchmark Bridge Health Monitoring," 18<sup>th</sup> Engineering Mechanics Division Conference, ASCE, 3-6 June 2007, Blacksburg, VA.
34. Shane, C.B\* and Jha, R., "Structural Health Monitoring of a Composite Wing Model using Proper Orthogonal Decomposition," AIAA-2007-1726, 15th AIAA/ASME/ AHS Adaptive Structures Conference, Honolulu, Hawaii, 23-26 April 2007.
35. O'Donnell, K.\*, McNall, C\*\*, Marzocca, P., Jha, R., and Bollt, E., "Development of a Wind Tunnel Apparatus to Assist Flow and Aeroelastic Control via Zero Net Mass Flow Actuators," AIAA2007-1771, 48th AIAA SDM Conference, Honolulu, HI, 23-26 April 2007.
36. LeFevre\*, B. and Jha, R., "Attitude Dynamics and Stability of Solar Sails during Deployment," AIAA-2006-1704, 7th AIAA Gossamer Spacecraft Forum, 1-4 May 2006, Newport, RI.

37. Rendall, T., Cormier, C\*\*, Marzocca, P., and Jha, R., "Static, Buckling and Dynamic Behavior of Inflatable Beams," AIAA-2006-1701, 7th AIAA Gossamer Spacecraft Forum, 1-4 May 2006, Newport, RI.
38. Shane, C\*, and Jha, R., "Structural Health Monitoring of a Wing Using Linear Time Series Analysis Methods," AIAA Region I-NE Student Conference, March 30 – April 1, 2006, Syracuse University, Syracuse, NY (won third place in individual paper competition).
39. Jha, R., Cross, K\*, Janoyan, K., Sazonov, E., Fuch\*, M., Krishnamurthy\*, V., "Experimental Evaluation of Instantaneous Phase Based Index for Structural Health Monitoring," SPIE Paper 6173-51, Smart Struct. and Materials and NDE, 26 Feb.-2 March 2006, San Diego, CA.
40. Janoyan, K., Sazonov, E., Jha, R., Fuch\*, M., Cross, K. \*, Krishnamurthy\*, V., "Environmental Testing of Wireless Sensor System for Structural Health Monitoring of Civil Infrastructure," Smart Struct. and Materials and NDE, 26 Feb.-2 March 2006, San Diego, CA.
41. Sazonov, E., Jha, R., Janoyan, K., Krishnamurthy\*, V., Fuch\*, M., and Cross, K. \*, "Wireless Intelligent Sensor and Actuator Network (WISAN): A scalable ultra-low-power platform for structural health monitoring," Smart Struct. and Mat., 26 Feb-2 Mar 2006, San Diego, CA.
42. Jha, R., Xu, S\*, and Ahmadi, G, "Health Monitoring of a Multi-Level Structure Based on Empirical Mode Decomposition and Hilbert Spectral Analysis," Fifth International Workshop on Structural Health Monitoring, 12-14 September 2005, Stanford University, CA.
43. Sazonov, E., Janoyan, K., Jha, R., Nelson, R., Krishnamurthy, V., Gao, Z., and Fuch, M., "Signal processing and power issues in acquisition of vibration data by MEMS accelerometers," Fifth International Workshop on SHM, September 12–14, 2005, Stanford University, CA.
44. Thomson, J\*\* and Jha, R., "Development of an Evolutionary Neuro Controller for Autonomous Control Under Various Flight Conditions," AIAA Region I-North East Student Paper Conference, April 2005, Princeton University, NJ.
45. Jha, R., Xu, S\*, and Ahmadi, G, "Damage Detection in a Multi-Level Structure Using Hilbert-Huang Transforms," 13<sup>th</sup> AIAA/ASME/AHS Adaptive Structures Conference, 18-21 April 2005, Austin, TX.
46. Thomson, J\*\*, Jha, R., and Doorly, D., "Evolutionary Neuro-Controller Design for Autonomous Unmanned Aerial Vehicles," AIAA-2005-0913, 43rd AIAA Aerospace Sciences Meeting, 10-13 January 2005, Reno, NV. (\*\*indicates undergrad student at Clarkson)
47. Sazonov, E., Janoyan, K, and Jha, R., "Sensor Network Application Framework for Autonomous Structural Health Monitoring of Bridges," Structural Materials Technology (SMT): NDE/NDT for Highways and Bridges 2004, 14-17 September 2004, Buffalo, NY.
48. Jha, R., Yan, F\*, and Ahmadi, G, "Energy-Frequency-Time Analysis of Structural Vibrations Using Hilbert-Huang Transform," AIAA 2004-1975, 12<sup>th</sup> AIAA/ASME/AHS Adaptive Structures Conference, 19-22 April 2004, Palm Springs, CA.
49. Sazonov, E., Janoyan, K, and Jha, R., "Wireless Intelligent Sensor Network for Autonomous Structural Health Monitoring," Proceedings of SPIE's Annual International Symposium on Smart Structures and Materials, March 2004, San Diego, CA.

50. Thomson, J\*\*, Jha, R., and Pradeep, S., "Neurocontroller Design for Nonlinear Control of Takeoff of Unmanned Aerospace Vehicles," AIAA 2004-777, 42<sup>nd</sup> AIAA Aerospace Sciences Meeting, 5-8 January 2004, Reno, NV.
51. Marzbanrad, J., Ahmadi, G., and Jha, R., "Vibration Control of Structures During Earthquakes with an Optimal Preview Active Control Strategy," Sixth International Conference on Civil Engineering, 5-6 May 2003, Isfahan, Iran.
52. Jha, R., and He, C\*, "Neural and Conventional Adaptive Predictive Controllers for Smart Structures," AIAA-2003-1808, 11<sup>th</sup> AIAA/ASME/AHS Adaptive Structures Conference, 7-10 April 2003, Norfolk, VA.
53. Jha, R., Bailey, A\*, and Ahmadi, G., "Combined Active and Passive Control of Space Structure Vibrations During Launch," AIAA-2003-1724, 11<sup>th</sup> AIAA/ASME/AHS Adaptive Structures Conference, 7-10 April 2003, Norfolk, VA.
54. Jha, R., and He, C\*, "Adaptive Neurocontrollers for Vibration Suppression of Nonlinear and Time Varying Structures," 13<sup>th</sup> International Conference on Adaptive Structures and Technologies (ICAST '02), October 7-9, 2002, Potsdam/Berlin, Germany.
55. Jha, R., and He, C\*, "Neural Network Based Adaptive Predictive Control for Vibration Suppression," AIAA 2002-1540, 43rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 22-25, 2002, Denver, CO.
56. Pausley, M\*, Jha, R., and Ahmadi, G., "Optimal Vibration Control of Onboard Equipment During Space Vehicle Lift-Off," AIAA 2002-1628, 43rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 22-25, 2002, Denver, CO.
57. Jha, R., and He, C\*, "Design and Experimental Validation of Adaptive Neurocontroller for Beam Vibration Suppression Using Piezoelectric Actuators," IMECE2001/AD-23731, ASME International Mechanical Engineering Congress, November 11-16, 2001, New York, NY.
58. Jha, R., and Rower, J\*, "Experimental Investigation of Active Vibration Control Using Neural Networks," AIAA 2001-1436, 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 16-19, 2001, Seattle, WA.
59. Jha, R. and Chattopadhyay, A., "Smart Composite Wing Design for Optimal Aeroelastic Control," AIAA 99-1514, 40th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, St. Louis, Missouri, April 12-15, 1999 (CD-ROM: A99-24934).
60. Chen, P. C., Jha, R., Sarhaddi, D., Liu, D. D., Griffin, K. and Yurkovich, R., "A Variable Stiffness Spar (VSS) Approach for Aircraft Maneuver Enhancement Using ASTROS," AIAA 99-1471, 40th AIAA Structures, Structural Dyn. and Materials Conf., St. Louis, MO, 12-15 April 1999.
61. Talya, S. S., Jha, R., Chattopadhyay, A. and Rajadas, J. N., "Development of Multidisciplinary Optimization Procedure for Gas Turbine Blade Design," AIAA 99-0364, 37th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 11-14, 1999.
62. Jha, R., Chattopadhyay, A. and Rajadas, J. N., "Optimization of Turbomachinery Airfoil Shape for Improved Performance," AIAA 98-1917, 39th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conf., Long Beach, CA, April 20-23, 1998.

63. Chattopadhyay, A., Seeley, C. E. and Jha, R., "Aeroelastic Tailoring Using Piezoelectric Actuation and Hybrid Optimization," SPIE 3329-04, SPIE's 5th Annual International Symposium on Smart Structures and Materials, San Diego, CA, March 1-5, 1998.
64. Chattopadhyay, A. and Jha, R., "Multidisciplinary Optimization of Composite Wings Using Refined Structural and Aeroelastic Analysis Methodologies," AD-Volume 53-3, ASME International Mechanical Engineering Congress, Dallas, TX, Nov. 16-21, 1997.
65. Jha, R., and Chattopadhyay, A., "Development of a Comprehensive Aeroelastic Analysis Procedure for Composite Wings Using Laplace Domain Methodology," AIAA 97-1026, 38th AIAA Structures, Structural Dynamics and Materials Conf., Kissimmee, FL, April 7-10, 1997.
66. Chattopadhyay, A., Jha, R., and Seeley, C. E. "Application of Hybrid Optimization Technique for Improved Aeroelastic Performance of Composite Wings," AIAA 96-4015, Sixth AIAA Symposium on Multidisciplinary Analysis and Optimization, Bellevue, WA, Sep. 4-6, 1996.
67. Chattopadhyay, A., Zhang, S., and Jha, R., "Structural and Aeroelastic Analysis of Composite Wing Box Sections Using Higher-Order Laminate Theory," AIAA 96-1567, 37<sup>th</sup> AIAA Structures, Structural Dynamics and Materials Conf., Salt Lake City, UT, April 15-19, 1996.
68. Sreenivasan, M. N., and Jha, R., "Evolution of Aerodynamic Configuration for a Modern Combat Aircraft," 42nd Annual General Body Meeting, Aeronautical Society of India, Calcutta, India, December 1990.

#### **AWARDS AND HONORS**

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1. Technical Chair, 21<sup>st</sup> AIAA/ASME/AHS Adaptive Structures Conference, 8-11 April 2013, Boston, Massachusetts
2. Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA)
3. Member - Editorial Board, *International Journal of Aerospace Engineering*
4. Research cited in "Year in Review 2011," Aerospace America (AIAA Publication)
5. Member - Million Dollar Club, Clarkson University
6. School of Engineering Teaching Excellence Recognition (Spring 2010; Spring 2006)
7. John Graham Faculty Research Award 2005, Clarkson University
8. Who's Who in Science and Engineering
9. Who's Who in Engineering Academia
10. Regents Graduate Academic Scholarship, ASU, Fall 1995-Fall 1998
11. Indian Institute of Technology Merit Scholarship, 1976-1981
12. National Merit Scholarship (India), 1974-1976

#### **INVITED SEMINARS**

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1. "Smart Structures: Adaptive Vibration Control and Structural Health Monitoring," Global Webinar, International Federation of Engineering Education Societies, 9 November 2011.

2. "CBM+ : Evolving Paradigm for Inspection and Maintenance," Center for Advanced Materials Processing (CAMP) Fall Meeting, Clarkson University, 11 October 2011.
3. "Wavelet Spectral Finite Element and Modified Time Reversal Methods for SHM of Composites," Arizona State University, 21 September 2011.
4. "SHM of Composite Structures: Lamb Wave and Spectral Finite Element Method," NASA Langley Research Center, 27 July 2011.
5. "Structural Health Monitoring of Composite plates with Spectral Finite Elements," Virginia Commonwealth University, 26 July 2011.
6. "Damage Force Indicator Method for Composite Delamination Detection, CAMP Annual Technical Meeting, 18 May 2011, Albany, NY.
7. "Guided Wave Health Monitoring of Composite Structures," Center for Automation Technologies and Systems, Rensselaer Polytechnic Institute, 27 April 2011.
8. "Predictive Modeling of Random Fiber Composite Structures." CAMP Annual Spring Symposium, 7 March 2011, Rochester, NY.
9. "Active Flow Control of Hinged Airfoil – Current Activities and Future Directions," National Aerospace Laboratories Bangalore, 24 November 2009.
10. "Nonlocal Continuum Theory Based Modeling of Carbon Nanotube Composites," Indian Institute of Technology Madras, 28 October 2009.
11. "Lamb Wave Based Diagnostics of Composite Plates Using a Modified Time Reversal Method," Indian Institute of Technology Kanpur, 9 October 2009.
12. "Neural and Conventional Adaptive Predictive Controllers for Vibration Suppression of Smart Structures," Indian Institute of Technology Delhi, 29 September 2009.
13. "Indo-US Collaboration for Engineering Education," Washington, DC, 14 November 2008.
14. "Diagnostics of Latent Damage in Composite Structures," GE Global Research Center, Niskayuna, NY, 11 June 2008.
15. "Diagnostics of Composite Structures," CAMP Symposium, Albany, NY, April 2008.
16. "Advanced Composites Research at Clarkson University," LIFT Composite Summit, Hofstra University, Long Island, NY, 6 February 2008.
17. "Vibration Suppression of Nonlinear and Time Varying Structures Using Adaptive Predictive Control," NASA Marshall Space Flight Center, Huntsville, AL, Dec. 9, 2004.
18. "Design of a Neural Adaptive Predictive Controller for Nonlinear Control of UAV Takeoff," West Virginia University Institute of Technology, Montgomery, WV, April 26, 2004.
19. "Vibration-based Health Monitoring of Composite Structures: Issues and Approaches," GE Global Research Center, Niskayuna, NY, February 16, 2004.

## TEACHING AND MENTORING

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### Curriculum and Laboratory Development

1. Initiated major enhancements to the Aeronautical Engineering (AE) curriculum, introduced and coordinated new AE Seminar course, and developed new course material.
2. Developed **Composite and Smart Structures Laboratory** for graduate/undergraduate research and education. Research focuses on Lamb wave based structural health monitoring, vibration characterization of synthetic jet actuators, modal analysis of MAV wing, and control of smart structures. The laboratory equipments include a Scanning Laser Vibrometer (acquired through NSF grant of \$199,000), electro-dynamic shakers, data acquisition system, PZT actuator/sensor, signal generator, and power amplifier.

### Research Experience for Undergraduate Students

Ruisheng Wang, Class of 2015

Gerald Frasco, Class of 2014

Nateenond Supatpitak, Class of 2013

Chris Mason, Class of 2012

Zachary Dean, Class of 2010

Ryan Watkins, Class of 2009

Conner Shane, Class of 2006

Chris Cormier, Class of 2006

Joel Thomson, Class of 2005

### Undergraduate Instruction

1. **AE212 Introduction to Aeronautical Design:** This course introduces students to concepts of aircraft design, aerodynamics, performance, stability & control, structures, and propulsion. It encourages students to apply their technical knowledge towards engineering design and problem solving. Additional objectives include raising awareness of ethical issues and to encourage self-study for continuing professional education. A 'glider competition' at the semester's end serves as a motivator and 'reality check' for students.
2. **AE350 Aircraft Structural Analysis:** This course provides fundamental knowledge in topics of aircraft structural analysis and design concepts. I employ a consistent elasticity approach, instead of the traditional problem-solving drill, to better prepare the students for current structural design practices based on the finite element methods. The course coverage is tailored for a seamless integration with the next course in aircraft structures (AE 458).
3. **AE429 Aircraft Performance and Flight Mechanics:** This course introduces the students to the fundamental concepts of airplane aerodynamics, propulsion, and the equations of motion. It enables the students to analytically estimate airplane performance for all phases of flight. I have introduced a semester long project in this course wherein student teams select an airplane and carry out a complete performance analysis. The teams make oral

4. **AE430 Stability and Control of Aerospace Vehicles:** This course provides fundamental concepts of atmospheric flight dynamics and enables students to analytically estimate static and dynamic stability derivatives. It includes the stability of longitudinal and lateral motions using the linearized equations and responses to actuation of open-loop and closed-loop controls. I have introduced project work in this course similar to that discussed above (AE 429). Since AE 429 and AE 430 were given as a single course earlier, I have developed the course material for the two separate courses based on my aircraft design experience.
5. **AE458 Design of Aircraft Structures:** This course provides knowledge in advanced topics of aircraft structural analysis and design. It introduces the students to finite element analysis and mechanics of composite structures, which are very important for current design of aircraft structures. I relate the material presented in the classroom to real world applications using my industry experience, such as the F-18 structural analysis and optimization. A semester long project using finite element analysis of wing-like structures gives the students an idea about real aircraft structural design.

#### Graduate Instruction

1. **ME504 Design Methodology:** This graduate level course covers fundamentals of engineering design process including design requirements, concept generation and evaluation, product development, modeling and simulation, and robust & quality design. The course is aimed at helping students learn how to be more creative in solving design problems and how to design as part of a group activity.
2. **ME657 Selected Topics in Solid Mechanics:** This is an advanced independent study course in 'Smart Structures' for graduate and undergraduate students. The course material is based mostly on journal papers and my research. This course included introduction to smart materials (piezoelectric and SMA), modeling of smart composite structures (beams and plates), control systems for vibration suppression, and structural health monitoring.

#### Teaching Evaluations

Course No.	Course Title	Year	Average* (max 5.0)
AE 200	Aeronautical Engineering Seminar	Fall 2000-07	4.4
AE/ME 350	Aircraft Structural Analysis	Fall 2003-11	4.3
AE 429	Aircraft Performance and Flight Mechanics	Spring 2000-01	4.2
AE 430	Stability and Control of Aerospace Vehicles	Fall 1999-2002	4.4
AE 458	Design of Aircraft Structures	Spring 2002-11	4.5
ME 504	Design Methodology	Summer 06, 09	4.8

\* Question- "Overall, how would you rate this instructor?" (University average: 4.15/5.0)

## Teaching Conference Participation

1. "Creating Productive Student Learning Environments," 12<sup>th</sup> Annual Teaching Effectiveness Conference, Associated Colleges of the St. Lawrence Valley, SUNY Potsdam, Nov. 1, 2003.
2. "Improving Student Learning: Classroom Assessment as if Learning Matters Most," 11<sup>th</sup> Annual Teaching Effectiveness Conference, , St. Lawrence University, November 2, 2002.
3. "Good Teaching Matters – A Lot," 10<sup>th</sup> Annual Teaching Effectiveness Conference, Associated Colleges of the St. Lawrence Valley, Clarkson University, November 3, 2001.
4. "A Life in School: What The Teacher Learned," 9<sup>th</sup> Annual Teaching Effectiveness Conference, Associated Colleges of the St. Lawrence Valley, SUNY Canton, Nov. 4, 2000.
5. "Effective Teaching for Multiple Learning Styles," 8<sup>th</sup> Annual Teaching Effectiveness Conference, St. Lawrence University, November 6, 1999.

## UNIVERSITY AND PROFESSIONAL SERVICES

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### Clarkson Committees and Duties

Faculty Senate (University level; 2010-Present)  
Senior Vice President/Provost Search Committee (University level; 2011-2012)  
Library Committee – Chair (University level; 2010-Present)  
Research and Innovation Committee (School of Engineering, 2011)  
Faculty Search Committee (MAE, 2011-2012)  
Curriculum and Academic Policies Committee (University level; 2005-2008)  
Research Advisory Committee (University level; 2009- 2010)  
Honors Council (University level; 2008- 2010)  
Coulter School of Engineering Dean Search Committee (2006-2007)  
Aeronautical Engineering Committee (Chair/member; 1999-Present)  
Recruitment and Teaching Committee  
MAE Strategic Planning Committee  
MAE Curriculum Committee  
MAE Accreditation Committee  
Advisor - Sigma Gamma Tau; Co-Advisor - AIAA Student Chapter

### Professional Services/Memberships

Technical Chair, 21<sup>st</sup> AIAA/ASME/AHS Adaptive Structures Conference, 8-11 April 2013, Boston, Massachusetts  
Editorial Board, *International Journal of Aerospace Engineering*  
Member - AIAA Adaptive Structures Technical Committee (ASTC)  
Vice Chair – Education Subcommittee of ASTC (2004-2005)  
Associate Fellow – American Institute of Aeronautics and Astronautics (AIAA)

Member – American Society of Mechanical Engineers  
Member – American Society for Engineering Education

**Session Chair/Co-Chair**

Adaptive Structures Modeling, AIAA Adaptive Structures Conference, April 2002  
Adaptive Structures Modeling, AIAA Adaptive Structures Conference, April 2003  
Morphing Aircraft Structures, AIAA Adaptive Structures Conference, April 2005  
Active Noise and Vibration Control, AIAA Adaptive Structures Conference, May 2006  
Design and Analysis of Smart Structures, AIAA Adaptive Structures Conference, May 2008  
Vibration-Based Techniques, Structural Health Monitoring/NDE, SMASIS, October 2008  
Applications of Adaptive Structures, 17<sup>th</sup> AIAA Adaptive Structures Conference, May 2009  
Optimization and Analysis, 18<sup>th</sup> AIAA Adaptive Structures Conference, April 2010  
Composite Structures Applications, 20<sup>th</sup> AIAA Adaptive Structures Conference, April 2012

**Reviewer**

AIAA Journal (3)  
Control and Cybernetics  
International Journal of Engineering Science  
Journal of Aerospace Engineering (ASCE)  
Journal of Aerospace Engineering (2) - Proceedings of the Institution of Mechanical Engineers, Part G  
Journal of Aircraft (3)  
Journal of Guidance, Control, and Dynamics (3)  
Journal of Intelligent Material Systems and Structures (3)  
Journal of Mechanical Design  
Journal of Offshore Mechanics and Arctic Engineering  
Journal of Sound and Vibration  
Journal of Systems and Control Engineering (3) - Proceedings of the Institution of Mechanical Engineers, Part I  
Journal of Vibration and Control  
Kuwait Journal of Science and Engineering  
Mechanical Systems and Signal Processing (2)  
Mechatronics  
Shock and Vibration  
Smart Materials and Structures (3)  
Soft Computing  
Structural and Multidisciplinary Optimization

Structural Control and Health Monitoring  
Structural Health Monitoring: An International Journal  
AIAA Adaptive Structures Conferences  
ASME/AIAA SMASIS Conference  
SAE Technical Paper  
Introduction to Flight, 5<sup>th</sup> edition (Book)  
Finite Element Method (Book)  
Wavelet Methods for Dynamical Problems (Book)  
Proposal - Air Force Office of Scientific Research (2)  
Proposal - National Science Foundation - CMMI (2)  
Proposal - NSF - Centers of Research Excellence in Science and Technology (2)  
Proposal - NASA Post-Doctoral Program  
Proposal - NASA Experimental Program to Stimulate Competitive Research

#### **Thesis/Dissertation Committees (Clarkson University)**

1. **Robert Alstrom**, "Synchronization for Control of Aero-Mechanical Systems," **PhD**, Mechanical Engineering, Proposal Defense October 2011.
2. **Jingjing He**, "Concurrent Structural Damage Diagnostics and Prognostics," **PhD**, Civil Engineering, Proposal Defense April 2011.
3. **Michael Gangone**, "Framework for In-Service Bridge Health Assessment using Quantitative Measures," **PhD**, Civil Engineering, Proposal Defense December 2009.
4. **Attilio Milanese**, "Volterra Series Revisited, with Applications in Nonlinear Structural Dynamics and Aeroelasticity," **PhD**, Mechanical Engineering, March 2009.
5. **Yibing Xiang**, "Crack growth-based fatigue life prediction," MS, Civil Engineering, March 2009.
6. **Matthew Whelan**, "In-Service Highway Bridge Condition Assessment using High-Rate Real-Time Wireless Sensor Networks," **PhD**, Civil Engineering, February 2009.
7. **Keegan O'Donnell**, "Lifting Surfaces Aeroelastic Experimental Investigation and Implementation of Active Flow Control Using Synthetic Jet Actuators," MS, Mechanical Engineering, 2008.
8. **Andrea Howard**, "Fabrication and Evaluation of Nanotube Reinforced Polyelectrolyte Thin Film Strain Sensors," MS, Mechanical Engineering, May 2008.
9. **Michael Gangone**, "Design and Monitoring of a Full-Scale FRP reinforced Concrete Bridge Superstructure," MS, Civil Engineering, December 2006.
10. **Ryan Schmit**, "Low Dimensional Tools for Flow-Structure Interaction: Application to Micro Air Vehicle," **PhD**, Mechanical Engineering, 2003.

11. **Robyn Jackey**, "Virtual Robot Prototyping and Control," MS, Electrical Engineering, December 2002.
12. **Jamison Coon**, "The Effects of Non-Ventilated Plate-Cavity Devices on Drag Reduction of Tractor-Trailers," MS, Mechanical Engineering August 2002.
13. **Matthew Lotito**, "Analysis of Rotating Flows in Cylindrical Containers," MS, Mechanical Engineering, April 2000.
14. **Jeffery Shimmel**, "Passive Vibration Control of Space Structures for Space Shuttle Lift-Off, Descent, and Microgravity Environments," MS, Mechanical Engineering, December 1999.

**Hindustan Aeronautics Limited, Bangalore, India (1983-1995)**

Aeronautical Engineer/Deputy Manager/Manager, Aerodynamics Group, Aircraft Design Bureau

- Worked as 'core team member' for design of 'Light Combat Aircraft,' a supersonic fighter aircraft, currently under production by HAL.
- Led a team of 5-7 aeronautical engineers during 1985-95.
- Performed aircraft conceptual design studies, including drag estimation, stability & control derivative prediction, and performance calculation. Defined optimum aerodynamic configuration, including wing and tail shape, size and location.
- Analyzed results of over 7000 aerodynamic data polars obtained through low speed and high speed tests of 14 models in 9 wind tunnels (including AEDC, Tullahoma and Calspan, Buffalo). Test results included six-component Force & Moment, control surface hinge moments, wing/fin loads, and surface pressures.
- Developed aerodynamic database for LCA in the entire flight envelope for performance prediction and control law design. Database currently used for correlation with flight tests.
- **Authored 104 technical reports** relating to wind tunnel data analysis, configuration definition, and flight aerodynamic database.
- Completed advanced management development program (12 weeks full time).

**Arizona State University, Graduate Research Associate (1995-1999)***Composite and Smart Structures*

- Performed composite structural analysis using higher order laminate theory. Extended composite structural model to include smart actuators based on PZT material. Studied effects of composite ply orientations on wing aeroelasticity.

*Multidisciplinary Design Optimization*

- Developed procedure for multidisciplinary, multiobjective optimization of smart composite wings with aerodynamic, aeroelastic and strength requirements.
- Developed procedure for aerodynamic-heat transfer optimization of turbomachinery blades using CFD code for viscous fluid flow and finite element method for thermal analysis.

*Aeroelasticity*

- Performed aircraft aeroelastic computations using finite element structural analysis, panel method for unsteady aerodynamic loads and V-g/Laplace-domain method for dynamic aeroelasticity.

**ZONA Technology, Senior Engineer (1999)**

- Performed aeroelastic analysis and multidisciplinary optimization of F-18/VSS (Variable Stiffness Spar) aircraft using NASTRAN and ASTROS (MDO software)