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Research Interests

Computational methods for fluids and structures, High-order finite element analysis, Fluid-structure interaction, Aeroelasticity, Thermoelasticity, Multidisciplinary Design Optimization

Education

Ph.D.	Aeronautics and Astronautics	University of Washington, Seattle WA	2007
M.Tech.	Aerospace Engineering	Indian Institute of Technology Bombay, India	2002
B.E.	Mechanical Engineering	Amravati University, India	2000

Work Experience

- **Graduate Coordinator** — Apr 2017 - Present
  Computational Engineering, Center for Advanced Vehicular Systems
  Mississippi State University, Starkville, MS
- **AFOSR Summer Faculty Fellow** — May 2017 - Aug 2017
  AFRL, Wright Patterson AFB, Dayton, OH
- **AFOSR Summer Faculty Fellow** — May 2015 - Jul 2015
  AFRL, Eglin AFB, FL
- **Assistant Professor** — Aug 2014 - Present
  Department of Aerospace Engineering, Mississippi State University, Starkville, MS
- **Research Engineer** — Feb 2012 - Aug 2014
  Multidisciplinary Science & Technology Center
  Air Force Research Laboratory, Wright Patterson Air Force Base, Dayton, OH
  Contractor via: Universal Technology Corporation, Dayton, OH
- **Post-Doctoral Research Associate** — Dec 2007 - Jan 2012
  Department of Aerospace & Ocean Engineering, Virginia Tech, Blacksburg, VA
- **Loads & Dynamics Engineer** — May 2007 - Nov 2007
  Aviation Partners Boeing, Seattle, WA
- **Research Assistant** — Jan 2003 - Jun 2007
  Department of Aeronautics & Astronautics, Univ. of Washington, Seattle, WA
- **Research Assistant** — Feb 2002 - Apr 2002
  CASDE, Department of Aerospace Engg., IIT Bombay, Mumbai, India
- **Teaching Assistant** — Jul 2000 - Dec 2001
  Department of Aerospace Engg., IIT Bombay, Mumbai, India

Publications: Journal

1. **Bhatia, M.** and Livne, E., *Design-Oriented Thermostructural Analysis with External & Internal Radiation, Part I: Steady State*, AIAA Journal, Vol. 46, No. 3, March 2008, pp. 578-590

2. **Bhatia, M.** and Livne, E., *Design-Oriented Thermostructural Analysis with External & Internal Radiation, Part II: Transient Analysis*, AIAA Journal, Vol. 47, No. 5, May 2009, pp. 1228-1240

3. Dang, T. D., Kapania, R. K., Slemp, W. C., **Bhatia, M.**, Gurav, S., *Optimization and Post-Buckling Analysis of Curvilinear Stiffened Panel Under Multiple Load Cases*, Journal of Aircraft, Vol. 47, No. 5, 2010, pp. 1656-1671

4. Gur, O., **Bhatia, M.**, Schetz, J. A., Mason, W. H. and Kapania, R. K., *Design Optimization of a Truss-Braced Wing Aircraft*, Journal of Aircraft, Vol. 47, No. 6, 2010, pp. 1907-1917

5. **Bhatia, M.**, Kapania, R. K. and Evans, D., *A Comparative Study of Optimal Stiffener Placement for Curvilinearly Stiffened Panels*, Journal of Aircraft, Vol. 48, No. 1, 2011, pp. 77-91

6. Gur, O., **Bhatia, M.**, Mason, W. H., Schetz, J. A., Kapania, R. K. and Nam, T., *Development of Framework for Truss-Braced Wing Conceptual MDO*, Structural and Multidisciplinary Optimization, Vol. 44, No. 2, 2011, pp. 277-298

7. **Bhatia, M.**, Kapania, R. K. and Haftka, R. T., *Structural and Aeroelastic Characteristics of a Truss Braced Wing: A Parametric Study*, Journal of Aircraft, 2012, Vol. 49, No. 1, pp. 302-310

8. Meadows, N., Schetz, J. A., Kapania, R. K. and **Bhatia, M.**, *Multidisciplinary Design Optimization of Medium Range Transonic Truss-Braced Wing Transport Aircraft*, Journal of Aircraft, 2012, Vol. 49, No. 6, pp. 1844-1856

9. **Bhatia, M.**, Patil, M., Woolsey, C., Stanford, B. K., and Beran, P. S., *Stabilization of Flapping-Wing Micro-Air Vehicles in Gust Environments*, Journal of Guidance, Control, and Dynamics, 2014, Vol. 37, No. 2, pp. 592-607

10. Stanford, B. K., Beran, P. S., and **Bhatia, M.**, *Aeroelastic Topology Optimization of Blade-Stiffened Panels*, 2014, Journal of Aircraft, Vol. 51, No. 3, pp. 938-944

11. **Bhatia, M.**, and Beran, P. S., *h-Adaptive Stabilized Finite Element Solver for Calculation of Generalized Aerodynamic Forces*, 2015, AIAA Journal, Vol. 53, No. 3, pp. 554-572

12. Shahrokhabadi, S., Vahedifard, F. and **Bhatia, M.**, *Head-Based Isogeometric Analysis of Transient Flow in Heterogeneous Unsaturated Soils*, 2017, Computer and Geotechnics, Vol. 84, pp. 183-197

13. **Bhatia, M.** and Beran, P. S., *Design of Thermally-Stressed Panels Subject to Transonic Flutter Constraints*, 2017, Journal of Aircraft, Vol. 54, No. 6, pp. 2340-2349

14. **Bhatia, M.** and Beran, P. S., *Transonic Panel Flutter Predictions Using a Linearized Stability Formulation*, 2017, AIAA Journal, Vol. 55, No. 10, pp. 3499-3516

15. **Bhatia, M.** and Beran, P. S., *High-Order Transonic Panel Flutter Predictions*, 2017, AIAA Journal, Vol. 55, No. 11, pp. 3881-3890

16. **Bhatia, M.** and Beran, P. S., *Influence of Aerodynamic Nonlinearity on Flutter of Curved Panels at Transonic and Low Supersonic Mach Numbers*, Journal of Fluid and Structures, under review

17. **Bhatia, M.** and Beran, P. S., *MAST: An Open-Source Computational Framework for Design of Multiphysics Systems*, AIAA Journal, under review

Publications: Conference

1. **Bhatia, M.** and Livne, E., *Shape Sensitivities and Taylor Series Approximations of Thermoelastic Structures with External and Internal Radiation*, AIAA-2006-2054, 47th AIAA/ ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics, and Materials Conference, Newport, RI, May 2006

2. **Bhatia, M.** and Livne, E., *Buckling and Vibration Thermoelastic Shape Sensitivities and Approximations with Multimode Heat Transfer*, AIAA-2007-2125, 48th AIAA/ ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics, and Materials Conference, Honolulu, HI, May 2007

3. Kapania, R. K., Joshi, P., **Bhatia, M.**, Dang, T. *Optimal design of unitized structures with curvilinear stiffeners*, 6th International Conference on Computation of Shell and Spatial Structures, Cornell University, Ithaca, NY, May 2008

4. **Bhatia, M.** and Kapania, R. K., *Stiffener Effectiveness Approach for Optimal Stiffener Placement on Curvilinear Stiffened Panel*, AIAA-2009-2640, 50th AIAA/ ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, May 2009

5. **Bhatia, M.**, Kapania, R. K., van Hoek, M. and Haftka, R. T., *Structural Design of a Truss Braced Wing: Potential and Challenges*, AIAA-2009-2147, 10th AIAA Gossamer Spacecraft Forum, Palm Springs, CA, May 2009

6. **Bhatia, M.** and Livne, E., *Design Oriented Aeroelastic Analysis of Hypersonic Vehicles Including Internal and External Radiation Effects*, AIAA-2009-2362, 50th AIAA/ ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics, and Materials Conference, Palm Springs, CA, May 2009

7. Gur, O., **Bhatia, M.**, Schetz, J. A., Mason, W. H. and Kapania, R. K., *Design Optimization of a Truss-Braced Wing Aircraft*, AIAA-2009-7114, 9th AIAA ATIO Conference, Hilton Head, SC, Sept 2009

8. Dang, T. D., Kapania, R. K., Slemp, W. C., **Bhatia, M.**, *Optimization of Unitized Structures with Multi-Constraints under Multi-Load Cases*, International Conference on Computational and Experimental Engineering and Sciences, March 28 - April 1, 2010, Las Vegas, NV

9. Gur, O., **Bhatia, M.**, Mason, W. H., Schetz, J. A., Kapania, R. K. and Nam, T., *Development of Framework for Truss-Braced Wing Conceptual MDO*, AIAA-2010-2754, 51th AIAA/ ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, April 2010

10. **Bhatia, M.**, Kapania, R. K., Gur, O., Schetz, J. A., Mason, W. H., and Haftka, R. T., *Progress Towards Multidisciplinary Design Optimization of Truss Braced Wings with Flutter Constraints*, AIAA 2010-9077, 10th AIAA Aviation Technology, Integration, and Operations (ATIO) Conference, 13 - 15 September 2010, Fort Worth, Texas

11. **Bhatia, M.**, Kapania, R. K., and Haftka, R. T., *Structural and Aeroelastic Characteristics of Truss Braced Wings: A Parametric Study*, AIAA-2011-1710, 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference 19th AIAA/ASME/AHS Adaptive Structures Conference, Denver, Colorado, Apr. 4-7, 2011

12. **Bhatia, M.**, Patil, M., Woolsey, C., Stanford, B. K., and Beran, P. S., *LQR Controller for Stabilization of Flapping Wing MAVs in Gust Environments*, AIAA-2012-4867, AIAA Atmospheric Flight Mechanics Conference, Minneapolis, MN, Aug. 13-16, 2012

13. Stanford, B. K., Beran, P. S., and **Bhatia, M.**, *Aeroelastic Topology Optimization of Blade-Stiffened Panels*, AIAA-2013-1871, 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Boston, MA, Apr. 8-11, 2013

14. **Bhatia, M.**, and Beran, P. S., *h-Adaptive Stabilized Finite Element Solver for Calculation of Generalized Aerodynamic Forces*, AIAA-2013-1456, 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Boston, MA, Apr. 8-11, 2013

15. **Bhatia, M.**, and Beran, P. S., *Higher-Order Transonic Flutter Solutions*, AIAA-2014-0336, 55th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, National Harbor, MD, Jan. 13-17, 2014

16. **Bhatia, M.**, and Beran, P. S., *Adjoint-Based h-adaptive Calculation of Generalized Aerodynamic Forces*, AIAA-2015-0172, 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Kissimmee, FL, Jan 5-9, 2015

17. **Bhatia, M.**, and Beran, P. S., *Design of Thermally-Stressed Panels Subject to Transonic Flutter Constraints*, AIAA-2016-4119, 17th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Washington DC, June 13-17, 2016

18. Neiferd, D. J., Grandhi, R. V., Deaton, J. D., Beran, P. S., and **Bhatia, M.**, *A Nonlinear Finite Element Analysis Capability for the Optimization of Thermoelastic Structures*, AIAA-2017-1302, 58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Grapevine TX, Jan 9-13, 2017

19. Shahrokhabadi, S., Vahedifard, F. and **Bhatia, M.**, *A Fast-Convergence Solution for Modeling Transient Flow in Variably Saturated Soils Using the Isogeometric Analysis*, 2017, Geotechnical Frontiers 2017: Geotechnical Materials, Modeling, and Testing, Geotechnical Special Publication No. 280, Orlando, FL

20. **Bhatia, M.**, and Beran, P. S., *Influence of Aerodynamic Nonlinearity on Flutter of Curved Panels at Transonic and Low Supersonic Mach Numbers*, IFASD-2017-18, International Forum on Aeroelasticity and Structural Dynamics, 25-28 June 2017, Como, Italy

21. **Bhatia, M.**, and Beran, P. S., *MAST: An Open-Source Computational Framework for Design of Multiphysics Systems*, 58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Kissimmee, FL, Jan 8-12, 2017

Teaching

- **Introduction to FEM (EM 4123/6123)** Spring 2017, 2018
  Aerospace Engineering Department, Mississippi State University, Mississippi State, MS

- **Finite Elements for Fluid-Structure Interactions (ASE 8990)** Fall 2015

- **Aerospace Control (ASE 4123)** Fall 2016, 2017
  Aerospace Engineering Department, Mississippi State University, Mississippi State, MS

- **Finite Elements for Fluid-Structure Interactions (ASE 8990)** Fall 2015
  Aerospace Engineering Department, Mississippi State University, Mississippi State, MS

- **Structural Dynamics & Aeroelasticity (ASE 4990/6990)** Spring 2015, 2016
  Aerospace Engineering Department, Mississippi State University, Mississippi State, MS

- **Stabilized Finite Element Analysis of Convection Dominated Problems** 2013
  Short Course, Multidisciplinary Science & Technology Center
  Air Force Research Laboratory, WPAFB, Dayton, OH

- **Airplane Design (AOE 4065/4066)** 2010-2011
  Department of Aerospace & Ocean Engineering, Virginia Tech, Blacksburg VA

- **Structures Laboratory** Spring & Fall 2001
  Department of Aerospace Engineering, IIT Bombay, India

Research Funding

Total External Funding: $2,845,994, Dr. Bhatia's Allocations: $1,099,344

1. Sensitivity Analysis of Multidisciplinary Systems, AFRL/Universal Technology Corporation, $38,000, 08/16/2014 - 03/21/2015, PI: Manav Bhatia
2. Efficient Computation of Aerothermoelastic Phenomena Using Goal-Oriented Adjoint-Based Adaptation, AFOSR SFFP, $26,001.59, 05/07/2015 – 07/02/2015, PI: Manav Bhatia
3. Aerothermoelastic Design of a Stiffened-Panel, AFRL/Universal Technology Corporation, $67,140, 08/24/2015 - 03/10/2016, PI: Manav Bhatia
4. Design and Analysis Technologies, Aerospace Structures, AFRL/OAI, $37,794, 07/01/2016 - 7/31/2017, PI: Manav Bhatia
5. Adaptive Design-Oriented Solution of Viscous Fluid-Structure Interaction Phenomena for Thermally Stressed Structures, AFOSR SFFP, $26,000, 05/12/2017 – 08/05/2017, PI: Manav Bhatia
6. Methodology for Optimization of Bodies Subjected to Loads Produced by Chaotic Flows, AF STTR Phase-I w/ Lateral Unbounded, LLC, $60,000, 8/1/2017 –4/30/2018, PI: Manav Bhatia
7. An Immersed Boundary Framework for Topology Optimization of Nonlinear Thermoelastic Structures with Internal Radiation, AF STTR Phase-I w/ Spectral Energies, LLC, $70,000, 8/1/2017 –5/30/2018, PI: Manav Bhatia
8. Error-Estimation and Local Enrichment of High-Order FE Discretizations for Large-Scale Nonlinear Dynamic Simulations, Army ERDC, $377,782, 6/1/2017 –5/30/2020, Science PI: Manav Bhatia
9. Development of a High-Fidelity Unsteady Flow Simulation Strategy for Ground Vehicle Fording, Army ERDC, $1,260,833, 6/1/2017 –5/30/2020, Science PI: Shanti Bhushan, co-PI: Manav Bhatia
10. High-Fidelity Loci-CHEM Simulations for Acoustic Wave Propagation and Vibration, NASA EPSCoR, $782,448, 7/1/2017 –6/30/2020, PI: Shanti Bhushan, co-PI: Manav Bhatia
11. Robust Multiphysics Solution Procedures for Efficient Prediction of Coupled Fluid-Thermal-Structural Dynamic Responses, NASA, $99,996, 10/1/2017 –9/30/2018, PI: Manav Bhatia

Awards & Honors

- Excellent Reviewer for the AIAA Journal of Guidance, Control, and Dynamics (2015–2016)
- Inducted into Sigma Gamma Tau (2017)

Professional Society

- AIAA : Senior Member
- Member of AIAA MDO Technical Committee

Reviewer

- AIAA Journal

- Journal of Aircraft
- Journal of Thermophysics and Heat Transfer
- ASME Journal of Mechanical Design
- Structural and Multidisciplinary Optimization
- Optimization and Engineering
- Multiple AIAA conferences