KANNAN DASHARATHI

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Highlights

Ph.D. Research

- Established a pilot plant for processing and casting Shape Memory Polymer (SMP) resins
- Streamlined the manufacturing process to produce high quality SMP plaques
- Performance characterization of SMPs via Dynamic Mechanical and Thermo-Mechanical testing
- Accelerated Chemical Aging studies on SMPs to establish a Design and Operation space
- Mathematical modeling of SMP behavior for life cycle prediction and analysis
- Worked extensively with Epoxy based and Polyurethane based SMPs

Side Projects

- Developed a simple mathematical model of human heart and studied effects of myocardial changes leading to heart failure
- Experimental characterization of fracture toughness of wet paper
- Mathematical modeling of cardiac myocyte contraction in a viscoelastic media (in progress)
- Developing techniques for real-time measurement of suture tension (in progress)

Education

(2015)	**Ph.D.**, Aerospace Engineering, University of Michigan, Ann Arbor, MI, USA
(2014)	**M.S.E**, Mechanical Engineering, University of Michigan, Ann Arbor, MI, USA
2014	**M.S.E**, Aerospace Engineering, University of Michigan, Ann Arbor, MI, USA
2007	**B.E.**, Mechanical Engineering, Visveswaraiah Technological University, Belgaum, Karnataka, India

Work Experience

2014- **Graduate Student Instructor**, Aerospace Engineering, University of Michigan, Ann Arbor, MI, USA

- Fall 2014: Course on Mechanics of Aircraft and Spacecraft Structures
- Holding weekly recitation sessions geared towards problem solving
- Holding weekly office hours

2009- **Graduate Student Research Assistant**, Aerospace Engineering, University of Michigan, Ann Arbor, MI, USA

- Authoring a dissertation on Thermo-Mechanical Aging of Shape Memory Polymers

Research funded by General Motors through GM/UM Collaborative Research Lab

2007-2009 **Research Assistant**, Aerospace Engineering, Indian Institute of Science, Bangalore, Karnataka, India

- Developed a Shape Memory Alloy (SMA) wire integrated morphing wing.
- 1D FE model of SMA wire incorporating microstructural inhomogeneity.

Research funded by General Motors India Science Lab through GM-IISc partnership

Research Projects

Dissertation **Thermomechanical Aging of Shape Memory Polymers** (on going)

Committee: Prof. John Shaw (Chair), Prof. Anthony Waas, Prof. Alan Wineman, Prof. Diann Brei, Dr. Nilesh Mankame

Undergraduate Project Report **Virtual Four Post Test for Automotive Ride Analysis**

Team: Dasharathi, K., Kallali, B., Shenoy G. P., Kudva, V. K.

- Developed a virtual Four-Post-Test-Rig in MSC ADAMS for Noise, Vibration and Harshness (NVH) testing

- Analyzed Ride Comfort characteristics using a 78 degree-of-freedom (DOF) car model and the virtual Four-Post-Test-Rig
- Finite Element Analysis of a wheel knuckle in ANSYS from virtually measured suspension load distribution
- Demonstrated the importance of virtual prototype testing in the product development process

Journal Publications

1. Dasharathi, K., Shaw, J. A. Chemorheological Degradation in Shape Memory Polymers: I. Thermo-Mechanical Experiments (Manuscript under preparation for Polymer)
2. Dasharathi, K., Shaw, J. A., Wineman, A. S. Chemorheological Degradation in Shape Memory Polymers: II. Mathematical Modeling (Manuscript under preparation for Polymer)
3. Shaw, J. A., Dasharathi, K., Wineman, A. S., Si, M.-S., 2014. A Simple Model for Myocardial Changes in a Failing Heart. Int. J. Non-linear Mechanics. (Available online 08/01/2014) http://dx.doi.org/10.1016/j.ijnonlinmec.2014.06.015.
4. Dasharathi, K., Wadkar, A. A., Kancharla, A. K., Mahapatra, D. R., 2010, Shape Memory Alloy Actuator Integrated Morphing Aerofoil Structure. International Journal of Aerospace Innovations, 2(3), pp. 207-220.

Conference Proceedings and Talks

1. Dasharathi, K., Shaw, J.A., Wineman, A. S., Mar 2015. Chemorheological behavior of thermoset shape memory polymers: Experiments and modeling. Behavior and Mechanics of Multifunctional Materials and Composites at SPIE Smart Structures/NDE Conference. (Abstract Submitted)
2. Dasharathi, K., Shaw, J. A., Sept. 2014, The Influence of Thermo-Oxidative Degradation on the Behavior of Epoxy Shape Memory Polymers. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS14), Newport, RI.
3. Dasharathi, K., Shaw, J. A., Wineman, A. S., Jun. 2014, The influence of chemo-rheological degradation on the viscoelastic behavior of SMPs. 17th US National Congress on Theoretical and Applied Mechanics (USNCTAM14), Lansing, MI.
4. Shaw, J. A., Wineman, A. S., Dasharathi, K., Si, M.-S., Jun. 2014, A Simple Model for Myocardial Changes in a Failing Heart. 17th US National Congress on Theoretical and Applied Mechanics (USNCTAM14), Lansing, MI.
5. Dasharathi, K., May 2014, Thermo-Mechanical Degradation in Epoxy SMPs. 2014 Midwest Graduate Student Symposium on Experimental Mechanics, Univ. of Michigan, Ann Arbor, MI. (presentation only)
6. Dasharathi, K., Shaw, J. A., May 2013, Visco-Chemo-Rheological behavior in high Tg Shape Memory Polymers. Proceedings of International Conference on Shape Memory and Superelastic Technologies (SMST13), Prague, CZ.
7. Dasharathi, K., Shaw, J. A., Mar. 2013, Aging Effects in Epoxy Shape Memory Polymers. Behavior and Mechanics of Multifunctional Materials and Composites, San Diego, CA. Proceedings of SPIE Vol. 8689.
8. Dasharathi, K., Shaw, J. A., Sept. 2011, High Temperature behavior of an Epoxy-Based Shape Memory Polymer. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS11), Scottsdale, AZ. (presentation only)
9. Dasharathi, K., Wadkar, A. A., Mahapatra, D. R., May 2009. Thermo-Electrical Control and Fatigue Degradation of SMA Wire Actuator in Morphing Aerofoil. I.I.Sc Centenary International Conference and Exhibition on Aerospace Engineering, Bangalore, India.
10. Dasharathi, K., Mahapatra, D. R., Mar. 2009. Effect of Phase Inhomogeneity and Boundary Conditions on the Dynamic Response of SMA Wire Actuators. Behavior and Mechanics of Multifunctional Materials and Composites, San Diego, CA. Proceedings of SPIE Vol. 7289.
11. Kancharla, A. K., Dasharathi, K., Jha, V. K., Wadkar, A. A., Mahapatra, D. R., 2008. Structural Morphing Using Shape Memory Alloy Wire Integrated Systems. In proceedings of International Conference on Smart Materials Structures and Systems, Bangalore, India.

12. Jha, V. K., Dasharathi, K., Mahapatra, D. R., Mar. 2008. Dynamics and Control of Buckling Type Devices Using SMA Wire Integrated Beam. Active and Passive Smart Structures and Integrated Systems, San Diego, CA. Proceedings of SPIE, Vol. 6928.

Awards & Honors

2009-2010	Aerospace Engineering Department Fellowship, University of Michigan, Ann Arbor.
2003-2004	Sri Ramanuja Iyengar Scholarship by National Institute of Engineering for Highest Total Marks in the department during the 1st year B.E. Mechanical Engineering exams.
2007	Best paper award and First prize in the undergraduate National level paper presentation contest at the National Institute of Engineering for the "Design of Optimal Quadratic Regulator System for a Double Inverted Pendulum".

Outreach Activities

Summer 2014	Mentored an Undergraduate Summer Intern • Characterizing the mechanical behavior of Neoprene under uniaxial tension • Strain field measurements in Neoprene with needle punctures and sutures
Summer-Fall 2013	Mentored an Undergraduate Student • Design and fabrication of fixture for processing and casting SMP resins • Streamlining the fabrication process to get good quality SMP plaques
2010-2014	Lab Safety Coordinator • Served as a liaison between Active Structures Experimental Lab and Aerospace Eng. Dept. Safety Committee • Responsibilities included - Attending safety committee meetings, Disseminating OSEH's safety requirements to lab members, Assisting in scheduling OSEH services for the lab, Coordinating with OSEH for setting up new lab equipment and procedures

Technical Skills

Experimental	Dynamic Mechanical Analysis (DMA), Thermo-Mechanical Analysis (TMA), Digital Image Correlation (DIC), Differential Scanning Calorimetry (DSC), Rotational Rheometry
Programming	MATLAB, Mathematica
CAD	SolidWorks, CATIA, AutoCAD, MSC Adams
Fabrication	Resin Casting

Professional Societies

2011-	Member, American Society of Mechanical Engineers (ASME)
2013-	Member, International Society for Optics and Photonics (SPIE)
2013-2014	Member, American Society of Metals (ASM)

Extracurricular Activities

Traveling, Hiking, Kayaking, Nature Photography, Amateur Blogger