

Darren J. Hartl

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Education

Ph.D. Aerospace Engineering, Texas A&M University, August 2009 (Expected)
GPR: 4.00

B.S. Aerospace Engineering, Texas A&M University, May 2004
GPR: 3.94, *Summa Cum Laude*

Research

Graduate Research Assistant 2004–2009
Texas A&M University

Early research involved design and modeling of SMA actuators, including aviation-based actuation applications. Modeling included effects of multi-body coupling. Current work includes the development of new constitutive models for conventional and high temperature SMA alloys exhibiting plastic and viscoplastic behavior in conjunction with transformation. Models are motivated and calibrated by self-performed experimental studies and are implemented for use with three-dimensional structural analysis tools such as FEA.

Undergraduate Research Assistant 2002–2004
Texas A&M University

Designed/configured hardware and authored testing and control software for material testing machines. Designed experimental setups for a number of additional research projects. Investigated the use of SMAs as micro space actuators in collaboration with Johns Hopkins Applied Physics Laboratory, including experimental investigations and design studies.

Employment

American Airlines Fort Worth, TX
Power Plant Engineer - Co-op May–Dec, 2002

Developed and implemented the initial method for managing the retirement of the Rolls Royce Tay 650 engine fleet from American Airlines. Supervisor: Ken Hill.

American Airlines Tulsa, OK
Structures Engineer - Co-op June–Dec, 2001

Designed and implemented structural repairs for the 727 and 737 fleets. Helped direct the American Airlines Structural Maintenance Program while working closely with the FAA and several OEMs. Supervisor: Allen White.

Published Works

D. Lagoudas, D. Hartl, *Aerospace Applications of Shape Memory Alloys*, Proceedings of the Institution of Mechanical Engineers, Part G, Journal of Aerospace Engineering, Vol. 221 (Special Issue, Winner of the William Sweet Smith Prize), 2007, pp. 535–552.

D. Hartl, D. Lagoudas, *Thermomechanical Characterization of Shape Memory Alloys*, In D. Lagoudas (Ed.), *Shape Memory Alloys: Modeling and Engineering Applications*, Springer-Verlag, 2008, pp. 55–124.

M. Qidwai, D. Lagoudas, D. Hartl, *Numerical Implementation of an SMA Thermomechanical Constitutive Model Using Return Mapping Algorithms*, In D. Lagoudas (Ed.), *Shape Memory Alloys: Modeling and Engineering Applications*, Springer-Verlag, 2008, pp. 193–236.

D. Hartl, D. Lagoudas, *Constitutive Modeling and Structural Analysis Considering Simultaneous Phase Transformation and Plastic Yield in Shape Memory Alloys*, *Smart Materials and Structures*, submitted for publication, 2009.

Papers in Conference Proceedings

D. Hartl, B. Volk, D. Lagoudas, F. Calkins, J. Mabe, *Thermomechanical Characterization and Modeling of Ni60Ti40 SMA for Actuated Chevrons*, In *Proceedings of IMECE 2006 Conference*, Nov. 2006, Chicago, pp.1-10.

D. Hartl, D. Lagoudas, *Characterization and 3-D Modeling of Ni60Ti SMA for Actuation of a Variable Geometry Jet Engine Chevron*, In *Proceedings of SPIE Smart Structures and Materials/NDE Conference*, San Diego, March 2007, pp.1-12.

D. Hartl, D. Lagoudas, *Simultaneous Transformation and Plastic Deformation in Shape Memory Alloys*, In *Proceedings of SPIE Smart Structures and Materials/NDE Conference*, San Diego, March 2008, pp.1-12.

D. Hartl, D. Lagoudas, *Experimentally Validated Numerical Analysis of Aerostructures Incorporating Shape Memory Alloys*, In *Proceedings of SPIE Smart Structures and Materials/NDE Conference*, San Diego, March 2008, pp.1-12.

D. Hartl, D. Lagoudas, *Analysis of Simultaneous Transformation and Plastic Deformation in Shape Memory Alloys*, In *Proceedings of the 19th International Conference on Adaptive Structures and Technologies*, Ascona, Switzerland, October, 2008, pp.1-12.

D. Hartl, J. Mooney, D. Lagoudas, *Numerically Implemented Constitutive Model for SMA Applications Experiencing General Loads Resulting in Plastic Deformation and Large Rotations*, In *Proceedings of ASME 2008 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, Ellicott City, MD. October 2008.

D. Hartl, D. Lagoudas, *Experimental Investigation and 3-D Modeling of Rate-Dependent Irrecoverable Deformation in Shape Memory Alloys*, In *Proceedings of SPIE Smart Structures and Materials/NDE Conference*, San Diego, March 2009, pp.1-12.

Presentations

Preliminary Design of SMA Rotary Actuators and an Alternative Method of Thermomechanical Characterization. Undergraduate Summer Research Grant (USRG) Presentations, Texas A&M University, College Station, TX. August 6, 2003.

Thermomechanical Characterization and Modeling of Ni60Ti40 SMA for Actuated Chevrons. IMECE 2006 Conference, Chicago, Nov. 2006

Characterization and 3-D Modeling of Ni60Ti SMA for Actuation of a Variable Geometry Jet Engine Chevron. SPIE Smart Structures and Materials/NDE Conference, San Diego, March 2007

Review of Characterization and 3-D Modeling of Ni60Ti SMA for Actuation of a Variable Geometry Jet Engine Chevron. Student Research Week, Texas A&M University, College Station, TX. March 2007.

3-D FEA Modeling of Ni60Ti40 SMA Beams as Incorporated in Active Chevrons . ASME Applied Mechanics and Materials Conference, Austin, TX. June 2007.

Experimental Investigation and Modeling of Plastic Deformation in Shape Memory Alloys. Society of Engineering Science National Conference, College Station, TX. October 2007.

Experimentally Validated Numerical Analysis of Aerostructures Incorporating Shape Memory Alloys. Society of Engineering Science National Conference, College Station, TX. October 2007.

Simultaneous Transformation and Plastic Deformation in Shape Memory Alloys. SPIE Smart Structures and Materials/NDE Conference, San Diego, March 2008.

Experimentally Validated Numerical Analysis of Aerostructures Incorporating Shape Memory Alloys. SPIE Smart Structures and Materials/NDE Conference, San Diego, March 2008.

Analysis of Plastically Deformed Shape Memory Alloys Exhibiting Tension-Compression Asymmetry. Society of Engineering Science National Conference, University of Illinois at Urbana-Champaign, October 2008.

Numerically Implemented Constitutive Model for SMA: Plastic Deformation and Large Rotations. ASME 2008 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, Ellicott City, MD. October 2008.

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Service

Aerospace Engr. Rep., Graduate Student Council, Texas A&M University, 2005–2008
Member, Honor Council, Texas A&M University, 2006–Present
Research Mentor, USRG/REU Summer Programs, Texas A&M University, 2004–Present
Volunteer Judge, Student Research Week, Texas A&M University, 2006
Host, E3 Teacher Summer Research Program, Texas A&M University, Summer 2005
Volunteer Judge, USRG Program, Texas A&M University, 2004–2005

Awards and Honors

William Sweet Smith Prize (Best Aerospace Paper, Journal of the Institute of Mechanical Engineers, 2007)
Best Student Paper Award, ASME-SMASIS Conference 2008
Honorable Mention–Best Student Paper Presentation Award 2008, SPIE 2008
NSF Integrative Grad. Education and Research Traineeship (IGERT) Fellowship
1st Place Research Presentation, Student Research Week, March 2007
Nat'l Defense Science and Engineering Grant (NDSEG) Fellow - 2004 through 2007
Sigma Gamma Tau Regional Senior of the Year (1 of 6 nationwide) - 2004
O'Lynn Snow Engineering Scholarship - 2003/2004, 2004/2005
B. and D. Smith Scholarship in Aerospace Engineering - 2002/2003, 2003/2004
Air Traffic Control Association Scholarship - 1999/2000, 2002/2003.
Robert Byrd - State of Texas Scholarship - 1999 through 2004
Tau Beta Pi – Engineering Honor Society
Sigma Gamma Tau – Aerospace Engineering Honor Society
Phi Kappa Phi

Graduate Coursework

Principles of Fluid Motion	Energy Methods
Continuum Mechanics	Micromechanics
Spacecraft Dynamics	Mechanics of Active Materials
Methods and Apps of Math I	Intro to Finite Element Method
Methods and Apps of PDEs	Viscoelastic Materials
Methods and Apps of Math II	Theory of Plasticity
Math. Found. of Cont. Mech.	Numerical Analysis
Intro. to Material Sci.	Intro to Nonlinear FEA
Modeling of Inelastic Systems	

Computer Skills

Fortran, L^AT_EX, Maple, LabView, ABAQUS (including formal training)