

STEPHEN R. CORNELL

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EDUCATION **Master of Science**, Aerospace Engineering *Expected: August 2014*
Texas A&M University, College Station, TX
Thesis Title: *Experimental Characterization of Shape Memory Alloys using
Digital Image Correlation and Infrared Thermography*
Advisors: *Drs. Dimitris C. Lagoudas and Darren J. Hartl*
GPA: *3.00 / 4.00*

Bachelor of Science, Aerospace Engineering *Graduated May 2012*
Texas A&M University, College Station, TX
GPA: *3.25 / 4.00*

PROFESSIONAL **Graduate Research Assistant** *Aug 2012 – Present*
EXPERIENCE Texas A&M University, Aerospace Engineering
Texas Institute for Intelligent Materials and Structures (TiMS)
Project Title: *“Advanced Methods for Characterization of Shape Memory Alloys”*

A new method was explored for experimental characterization of shape memory alloys (SMAs) that would be used as actuators. By applying heat to an SMA strip specimen in the martensite phase, strain and temperature contours formed on the specimen indicating various levels of reverse phase transformation. Identifying parameters used in the constitutive model for SMA were calibrated from the results of this experiment.

Intern, NASA Langley Research Center *Jun 2013 – Present*
Damage Tolerance, Durability, and Reliability Branch
Mentors: *J. Hochhalter, J. Newman*
Project Title: *“Characterization of Shape Memory Alloys for use as Sensory Particles”*

Shape memory alloys (SMAs) were explored as a sensory material for the detection of crack growth in aerospace structures. Experimentation was performed on the microscopic embedded particles for calibration of the SMA identifying parameters. In order to accurately calibrate the constitutive model, experiments were performed on bulk specimens containing the particles. Microscopic digital image correlation was used to determine the strain response within the particles.

Student Exchange Research Assistant *Jun 2012 – Aug 2012*
International Institute for Multifunctional Materials for Energy Conversion (IIMEC)
University: *Arts et Metiers ParisTech, Metz, France*
Advisors: *E. Patoor, F. Meraghni, Y. Chemisky*
Project Title: *“Identification of Characteristic Parameters for the Phase Transformation of
Shape Memory Alloys Using Full Field Measurements and Inverse Methods”*

Experimentation was performed on non-standard-shaped shape memory alloy (SMA) specimens using digital image correlation (DIC). An inverse method was used with Abaqus software and DIC to calibrate the identifying material parameters.

Undergraduate Research Assistant

Jan 2012 – Jun 2012

Texas A&M University, Aerospace Engineering
Texas Institute for Intelligent Materials and Structures (TiMS)

The digital image correlation (DIC) full-field strain measurement technique was used to measure variations in the mechanical response of an elastomer material due to changes in processing and the introduction of an external fabric layer.

TEACHING EXPERIENCE

Teaching Assistant

Aug 2012 – May 2013

AERO 209: Aerospace Engineering Statics

AERO 405: Aerospace Structural Design

SKILLS

Hardware: *Mechanical testing, SEM, Specimen preparation*
Imaging Software: *Micro VIC-2D, VIC-3D, Thermal Imaging*
Programming: *C++, Matlab, Maple, LaTeX, Python, Matplotlib*
Modeling and FEA: *Solidworks, ABAQUS*
Foreign Language: *Russian: moderate proficiency*

COURSES

Graduate Courses

- Mechanics of Active Materials
- Mechanical Behavior of Materials
- Principles of Elasticity
- Fundamentals of Material Science and Engineering
- Continuum Mechanics
- Introduction to Finite Elements
- Convective Heat Transfer

RESEARCH

Papers in Refereed Journals

1. *In Progress:* S. Cornell, W. Whitten, D. Hartl, D. Lagoudas, *Experimental Characterization of Shape Memory Alloys Using Digital Image Correlation and Infrared Thermography*, Smart Materials and Structures, February 2014.

Papers in Conference Proceedings

1. S. Cornell, D. Hartl, D. Lagoudas, *Experimental Validation of a Shape Memory Alloy Constitutive Model by Heterogeneous Thermal Loading Using Infrared Thermography and Digital Image Correlation*, In Proceedings of ASME Smart Materials Adaptive Structures and Intelligent Systems (SMASIS) Conference, Snowbird, Utah, September 2013, pp. 1-10.