Andre Gouws
Curriculum Vitae

CONTACT INFORMATION

Email: agouws@ncsu.edu
Phone: 704-999-0054
Address: 10807 McAfferty Ct, Charlotte, NC 28277

EDUCATION

North Carolina State University
Bachelor of Science in Mechanical Engineering   GPA 3.63
Minor in Physics   Expected graduation Spring 2018

RESEARCH EXPERIENCE

Research and Development Intern   **Summer 2016 – Present**
Sandia National Laboratories   Albuquerque, NM

Component Science R&D
- Created finite element simulations of hermetic glass to metal seals, and analyzed response of hermetic seals to variations in material properties due to aging and thermal cycling stresses.
- Designed new strain sensing regime for embedded Fiber Bragg gratings using finite element and experimental techniques. Created finite element models of Fiber Bragg gratings in embedded configurations undergoing strains due to thermal cycling and validated using experimental techniques.
- Also created finite element models of Fiber Bragg gratings undergoing multi-directional strain loads in embedded configurations, and used analytical methods to calculate predicted wavelengths of polarized Fiber Bragg grating.
- Conducted experiments of diametric loading tests with embedded, polarized Fiber Bragg gratings within epoxy to gather birefringent wavelength peak data which was validated with aforementioned finite element model predictions combined with analytical methods.

Nuclear Weapon Summer Project Realization Institute
- Won NW SPRINT challenge to design a shock failsafe for high consequence applications. Led team utilizing multi-material additive manufacturing to experimentally prototype various forms of an irreversibly failing bi-stable beam design.
- Synergized with team members to design & prototype the beams to fail predictably in response to highly abnormal and variable shock environments, using a combination of analytical, experimental, and finite element analysis methods. Team design won the challenge besting two other teams with competing shock failsafe designs, with winning decision being made by panel of academics and industry professionals.

Nuclear Science Research Assistant   **Spring 2017 – Present**
Department of Nuclear Engineering   Raleigh, NC

- Developed MATLAB tools to analyze bubble properties from nuclear subchannel multiphase flow simulations, diagnosed mesh bias issue affecting bubble drift. Also created new data processing regimen for predicting bubble path flows within nuclear cooling subchannels with varying internal geometries.
- Improved efficiency of message pass interface routines in FORTRAN for fluid mechanics simulations.
- Modified finite element fluid mechanics models to study conjugate heat transfer within single and multiphase flow regimes.

Laboratory Research Assistant   **Spring 2016**
Department of Mechanical & Aerospace Engineering   Raleigh, NC

- Worked in Ballistic Loading and Structural Testing lab operating and maintaining helium gas cannons as well as managed data collection during experimentation
- Prepared fiber-embedded Kevlar weaves using laser cutting boards and mechanical tools for ballistics testing of fiber sensing abilities.

PROFESSIONAL SERVICE

Honors Village Fellow   **Spring 2015 – Spring 2017**
University Honors Program   Raleigh, NC

- Worked with professors in interdisciplinary seminars to manage discussions, facilitate student engagement in course materials, and promote co-curricular activities for the class members.
- Created intellectual society in the University Honors Village to promote inquiry into scholarly topics and connect honors students with faculty conducting research in relevant fields to them.
- Hosted University Honors Program official programs for students and faculty alike by organizing extra-curricular events to engage them with scientific and cultural events within the North Carolina community.

Vice President   **Spring 2015 – Spring 2017**
NC State Astronomy Club   Raleigh, NC

- Brought together students, faculty, and community members to learn about various astronomical phenomena and different astrophotography and observation techniques.
- Repaired, refurbished and corrected optics on a variety of damaged telescopes, lenses, and astrophotography equipment.

ACADEMIC PROJECTS

Fall 2014
- Constructed a light-detecting nuclear probe to measure energy output in PULSTAR nuclear reactor on NC State campus. Energy output was tracked over time by monitoring visible light levels of Cherenkov radiation.

Spring 2017
- Created an automatic controller for an unmanned aerial system using both theoretical and experimental methods. Also successfully minimized overshoot and proved successful disturbance rejection during testing

TECHNICAL SKILLS

Software Skills
- Extensive knowledge of **MATLAB/Simulink, AutoCAD, Solidworks, UNIX, LabView,** & **Python**
- Additional experience in **ANSYS, Sierra, Chef,** and **HTML/CSS/jQuery** and **Microsoft Office**

Miscellaneous Skills

- Wet lab operation, heavy equipment maintenance, mechanical repairs, literature review, control theory, strain gages, strain measurement, thermocouples, vacuum chambers, circuit and breadboard design, analog and digital controls, optics, digital photography, data analysis, prototyping

AWARDS AND MEMBERSHIPS

Memberships

- American Institute of Aeronautics and Astronautics
- American Society of Mechanical Engineers

Awards

- Dean's list, Fall 2015 – Spring 2017
- Consortium for Advanced Simulation of Light Water Reactors Undergraduate Scholar, presented by Dr. J. Michael Doster

PUBLICATIONS

A. Gouws, K. R. Ford, B. Jones. "Finite element model validation of transverse strain sensing with embedded Fiber Bragg Gratings." *In final preparation for submission to Smart Materials and Structures, December 2017; also presented by Andre Gouws at IMECE 2017*

J. Cambareri, **A. Gouws**, J. Fang, I. A. Bolotnov, "Bubble Dynamics Analysis in PWR Two-Phase Flow Simulations using Interface Tracking Methods", *To be presented by J. Cambareri at ICAPP, April 2018*

J. Fang, M. Rasquin, **A. Gouws**, I.A. Bolotnov. "High-Fidelity Bubble Tracking Simulations for Bubbly Flows in Power Subchannel." *Presented by Dr. Igor Bolotnov at NURETH, Fall 2017*

J. Fang, J. Cambareri, C. S. Brown, J. Feng, **A. Gouws**, M. Li, I. A. Bolotnov, "Fundamental numerical investigations of reactor two phase flows enabled by high-performance computing." *Under peer review for Nuclear Engineering and Design*

REFERENCES

- Kurtis Ford, Scientist, Sandia National Laboratories, krford@sandia.gov
- Dr. Igor Bolotnov, Associate Professor, NC State Department of Nuclear Engineering, iabolotn@ncsu.edu
- Dr. Katy Leonard, Allston Burr Resident Dean, Eliot House, Harvard University, eliothousedean@fas.harvard.edu
- Dr. Bradley H. Jones, Scientist, Sandia National Laboratories, bhjones3@sandia.gov
- Dr. Andre Mazzoleni, Associate Professor, NC State Department of Mechanical and Aerospace Engineering, apmazzol@ncsu.edu
- Thomas R. Easley, Director of Community Diversity, NC State College of Natural Resources, treasley@ncsu.edu