

Justin Broughton

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EDUCATION

Georgia Institute of Technology, Atlanta, GA

Ph.D. in Mechanical Engineering, expected Fall 2021. *GPA: 4.00/4.00*

Major focus in thermal sciences with a minor focus in microsystems packaging

Vanderbilt University, Nashville, TN

B.E. in Mechanical Engineering, Spring 2016. *GPA: 3.85/4.00*

EXPERIENCE

Microelectronics and Emerging Thermal Technologies Lab, Georgia Institute of Technology, Atlanta,

Graduate Research Assistant. Fall 2016 – present

Project: "High Power Density Compact Drive Integrated Motor for Electric Transportation" – funded by ARPA-E

"Device and System-Level Thermal Packaging for Electric-Drive Technologies" – funded by DoE's EERE

- Designed and assembled flow loops for thermohydraulic characterization of cold plates utilizing metal foams
- Computationally and experimentally compared the performance of additive manufactured and stochastic metal foams in single phase convection using DI water
- Quantified and demonstrated ability of designed foams for hotspot thermal management with volume averaged simulations
- Performed computational fluid dynamics analysis of flow boiling simulations for microchannels for comparison of pressure oscillation mitigation methods

Vanderbilt Aerospace Club, Vanderbilt University, Nashville, TN

Design Engineer. Fall 2015 – Spring 2016

- Assisted in the design of a rocket with unique scientific payloads to compete in NASA's Student Launch
- Aided in the fabrication and testing of 10 N hydrogen peroxide thruster with startup time of 190 ms
- Performed aerodynamic analysis of various tail geometries to quantify changes in drag and stability
- Maintained and tracked club's \$16,000 budget
- Team won awards for payload design, project review, and overall

HERE Program, Oak Ridge National Lab, Oak Ridge, TN

Undergraduate Intern. Summer 2013

- Collaborated with an electrical engineer to design casing for circuitry
- Simulated heat transfer for the enclosed circuit board in various operating environments
- Ensured that the circuit board would maintain sufficiently low operating temperatures

QUALIFICATIONS

Proficient in Solidworks, ANSYS Fluent, ANSYS CFX, LabVIEW, Creo Parametric, MATLAB, COMSOL, EES, CFD Post, Microsoft Office Suite

Basic machining experience with mills and lathes, Registered Engineer Intern – State of Tennessee, 2016

PUBLICATIONS

1. **J. Broughton**, V. Smet, R. R. Tummala, and Y. K. Joshi, "Review of thermal packaging technologies for automotive power electronics for traction purposes," *Journal of Electronic Packaging*, vol. 140, no. 4, p. 040801, 2018.
2. K. Sikka, Y. Joshi, and **J. Broughton**, "Fundamentals of Thermal Technologies," in *Fundamentals of Device and Systems Packaging: Technologies and Applications*, 2 ed.: McGraw-Hill Education, 2019.
3. **J. Broughton** and Y. Joshi, "Thermal Management of Power Electronics Using Stochastic, Open-Cell Metal Foams," in *2019 25th International Workshop on Thermal Investigations of ICs and Systems (THERMINIC)*, 2019, pp. 1-5: IEEE.
4. **J. Broughton** and Y. Joshi, "A Numerical Investigation of Additive Manufactured Foam Structures for Single Phase Hotspot Thermal Management," in *ASME 2019 International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems*, Anaheim, CA, USA, 2019: American Society of Mechanical Engineers.
5. **J. Broughton** and Y. K. Joshi, "Comparison of Single-Phase Convection in Additive Manufactured Versus Traditional Metal Foams," *Journal of Heat Transfer*, vol. 142, no. 8, 2020.

HONORS AND AWARDS

Semifinalist for Heat Sink Design Competition (*IEEE ITherm 2020*), Top 20 poster presentation (*ASME InterPACK 2019*), President's Fellowship Recipient (*awarded 2016, Georgia Institute of Technology*), Graduated Magna Cum Laude (*2016, Vanderbilt University*), Dean's List (*Fall 2012 – Spring 2016, Vanderbilt University*)