

# DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

## WILLIAM MAXWELL REED SEMINAR SERIES

### “Understanding and Controlling Failure Behavior in Additive Manufactured Metals.”

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#### Abstract:

The rise of additive manufacturing has rapidly expanded the flexibility in topological design and low production capabilities. An unfortunate byproduct of the layer-by-layer deposition in laser powder bed fusion is the introduction of large defects greatly reducing the final component's mechanical properties. A print-and-check approach relies heavily on institutional knowledge and results in wasted material and energy, limiting the adoption of additive manufacturing technologies. However, many improvements in the process parameter space have reduced the quantity of defects. Gas porosity, although small in size, still persists and is particularly detrimental to fatigue life as it serves as a preferential crack initiation site. Our work has focused on understanding the role of these process-induced defects within additive manufactured metals, specifically their impact on mechanical behavior. Using these insights, we have explored both traditional and nontraditional approaches to enhance additive manufactured components. These approaches are necessary to move forward with certifying their use in critical conditions.

#### Speaker Bio:



Dr. Garrett J. Pataky is an Associate Professor in the Department of Mechanical Engineering at Clemson University in Clemson, SC. He obtained his BS degree from the University of Florida, and his MS and PhD degrees from the University of Illinois at Urbana-Champaign before his faculty appointment in 2015. His research focuses on experimental solid mechanics to understand fatigue and fracture phenomena to support predictive modeling and the development of advanced materials. He was awarded an NSF CAREER award in 2021, and his research is supported by NSF, DOE, and NASA. He currently serves as the Vice-Chair of the Fracture and Fatigue technical division for the Society for Experimental Mechanics and is an active organizer of the Fatigue in Materials symposium within The Minerals, Metals & Materials Society (TMS).

**Date:** Friday, February 17, 2023  
**Place:** Whitehall Classroom Building 110

**Time:** 3:00 PM EST  
**Contact:** Dr. Jesse Hoagg

Attendance open to all interested persons