MACHINE LEARNING AND DATA SCIENCE IN MATERIALS RESEARCH (MLDSMR) SEMINAR SERIES

Dr. Brandon Hearley

Aerospace Research Engineer

NASA Glenn Research Center

Tuesday, October 29, 2024; 1 pm – 2 pm

PEAC building Room 130 (250 South Forge St.)

Join the meeting now

Microsoft Teams Meeting ID: 259 878 719 76

Passcode: 698KiR

Materials Informatics at NASA GRC: Machine Learning Surrogate Modeling, Data Management, and Integrated Toolsets for Establishing/Maintaining the Digital Thread

Abstract: Integrated Computational Materials Engineering (ICME) has recently received widespread attention due to its promises in reducing dependence on physical testing for engineering design by relying on simulation, reducing both time and cost to market for various applications. ICME however requires validated multiscale material models, which heavily depend on available test data with full material and test pedigree, including material processing, test and measurement equipment, raw data collection, and analysis methodology and results that is findable and usable, along with integrated, efficient toolsets for effectively passing information across various length and time scales across such models. At the NASA Glenn Research Center under the Transformational Tools and Technologies Project, significant recent efforts have been directed towards establishing the required cyberinfrastructure to enable optimized ICME processes and the design of "fit-for-purpose" materials to achieve the goals outlined in the NASA Vision 2040 report. Such efforts include development of multiscale physics-based material models, which can be used to train highly efficient surrogate machine learning models, development of best practices and infrastructure for effective, traceable materials information management, and development of toolsets that integrate with physics-based codes, machine learning models, and an information management system to enable high throughput of materials data collection and analysis, establishment of digital twins and the digital thread, and automation of the ICME design process for material optimization.

Bio: Dr. Brandon Hearley is an aerospace research engineer at the NASA Glenn Research Center. He graduated with a bachelor's degree in aerospace engineering from North Carolina State University in 2016 and his Ph.D. in Aerospace Engineering from North Carolina State University in 2021, working on high strain rate characterization of composite materials and multiscale modeling of unreinforced fabrics. His work focuses on material informatics for composite and metals materials, including machine learning surrogate model development for multiscale physics-based models, materials data management, and development of integrated computational materials engineering tools that can enable the design of 'fit-for-purpose' materials, in support of the NASA Vision 2040 for accelerating material design and discovery.

For further information, please contact Dr. KT Tan at ktan@uakron.edu.