IOWA STATE UNIVERSITY

Department of Aerospace Engineering

Guest Seminar

Dr. Mark Leader

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NASA Glenn Research Center

May 1, 2024
2:00 p.m.

1235 Howe Hall

Iowa State University

Topics on Multidisciplinary Optimization, and Chemical Equilibrium with Applications

Multidisciplinary Analysis and Optimization (MDAO) is powering the next generation of aviation through enhanced design capability. Shape optimization of battery packs uses gradient-based optimization of transient thermal finite element models to generate designs that are not only light-weight, but capable of withstanding a thermal runaway event. Discussion of shape optimization methodology, including mesh deformation techniques are included. Phase-Change Materials (PCM) can also help withstand transient thermal events, so special treatment of these materials in a shape optimization framework are required. Shape optimization of propellers are given as an example as well. As an additional topic, an update on the NASA software “Chemical Equilibrium with Applications” (CEA) is provided.

Mark holds a Bachelor of Science in Aerospace Engineering from The University of Texas at Austin, and a Master of Science and a PhD in Aerospace Engineering from Georgia Institute of Technology. Mark is currently a research engineer in the Propulsion Systems Analysis branch at NASA Glenn Research Center in Cleveland, Ohio.