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Smart Vehicle Concepts Center

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Short course on physics-based modeling of additive manufacturing processes

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David Hoelzle is an associate professor in the Department of Mechanical and Aerospace Engineering at the Ohio State University. He received his MS and PhD from the University of Illinois at Urbana-Champaign in 2007 and 2011, respectively, in mechanical science and engineering and his BS from the Ohio State University in 2005 in mechanical engineering. Between his PhD and current position, he completed a postdoc in the Department of Integrative Biology and Physiology at the University of California, Los Angeles and held the position of assistant professor in the Department of Aerospace and Mechanical Engineering at the University of Notre Dame. His research interests lie in applied control theory and dynamics for applications in additive manufacturing robotics and microsystems for mechanobiology research. Prof. Hoelzle is a recipient of the 2016 CAREER Award, the 2016 Society of Manufacturing Engineers Outstanding Young Manufacturing Engineer Award, and 2019 Lumley Research Award.

Abstract

As defined by ASTM Standard F2792-12a, additive manufacturing (AM) is defined as "a process of joining materials to make objects from three dimensional (3D) model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies." More conventionally known as 3D printing, AM tools commonly use a thermally- or chemically-driven material phase transition, adhesives, evaporation, or physical contact to adhere material in a layer-by-layer fashion. This short course will provide an overview of the important physics-based models that have been used to describe and analyze AM processes. The short course will assume an undergraduate level of understanding of differential equations, heat transfer, fluid mechanics, and system dynamics and demonstrate the application of core theory in these topics to a select group of AM processes. There will be a focus on how physics-base predictions explain common material addition and defect modes in AM.

Hosted by Prof. Marcelo Dapino

Thursday, March 18

9:00am – 11:00am

Short Course

via Zoom

THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING