ADDITIVE
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Additive Manufacturing & Design Seminar Series

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Zoom link available in notification email

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Role of Ultrasonic Nondestructive Characterization in the Implementation of Additive Manufacturing Processes

ABSTRACT

Advancements in manufacturing processes such as metal 3D printing are deeply reliant on our understanding of the resulting internal features and microstructures that dictate material behavior. Microstructure characterization is often relegated to techniques that require extensive sample sectioning and surface preparation, which are inherently limited to a small portion of the bulk material. In this presentation, I will show how elastic wave propagation methods (namely, ultrasonic testing) can be combined with physics-based models to extract microstructural parameters in fit-for-service parts. Example results are given for binder jet printed metals where microstructure is characterized over large volumes nondestructively. In closing, I will provide a broader outlook for the impact these techniques may have on the development and implementation of quality assurance protocols for additively manufactured parts.

BIOGRAPHY

Dr. Andrea P. Argüelles joined the Pennsylvania State University as an Assistant Professor in Engineering Science and Mechanics in 2018. She obtained her bachelor's and master's degrees in Mechanical Engineering from the University of Texas Rio Grande Valley in 2011 and 2012, respectively, and received her doctorate degree in Mechanical Engineering and Applied Mechanics from the University of Nebraska-Lincoln in 2016. Prior to her academic appointment, Dr. Argüelles was a nondestructive testing (NDT) research lead at two small businesses with NDT innovation research thrusts. Her interests focus on wave propagation and scattering in heterogeneous media with applications in ultrasonic testing for materials characterization. Her work is supported by the National Science Foundation, the Department of Energy, 3M Company, Intel Corp., and the Center for Dielectrics and Piezoelectrics and the College of Engineering at Penn State.

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