Investigation of Ultrasound-Assisted Techniques on Enhancing the Mechanical Properties of FDM Parts: Modeling & Experiment

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Abstract

One of the major challenge in industrial application of Fused Deposition Modeling (FDM) 3D printing method is anisotropic properties in the printed parts. Engineering products vastly used in various forms such as machine tools, cars parts, ships and aircrafts must present uniform mechanical properties in all directions. A set of in-process techniques which address this problem by understanding the physics of the process must be developed. The purpose of this study is to mitigate FDM printed parts anisotropy and enhance adhesion strength by locally applying acoustic energy to the printed polymer tracks during deposition. Experimental results indicate improvements in the inter-layer bonding in printed parts; in that, adhesion strength depend on printing speed, substrate temperature and factor of polymer influx.

Biography of Presenter

Dr. Tofangchi received his Ph.D from the University of Illinois (UIUC) in Mechanical Engineering in 2015. He joined Prof. Saif lab as postdoc fellow at UIUC, in 2016, and continued the postdoctoral position in Dr. Keng Hsu lab, U of L, until now. Prior joining the Ph.D program, he served as a lecturer at the University of Nebraska-Lincoln (2005-2007) and also served as a research fellow at the Technische Universität Darmstadt, Germany (2004-2005). He has more than a decade of industry experience and his research area of interest include additive/micro manufacturing, biomedical device design, biomechanics, unconventional cooling systems, and renewable energy harvesting.