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Title: Multiaxial fracture of additively manufactured 316L stainless steel

Abstract:

The unique thermal histories (i.e., rapid solidification followed by repeated thermal cycles with the addition of layers) seen in additive manufacturing (AM) of metal alloys results in microstructures that may contain phases, grain morphologies, or internal pores different from those seen in their conventionally processed counterparts. These microstructures dictate the resulting mechanical properties of the alloys; thus, to enable the adoption of AM for structural applications, an understanding of the links between microstructure and deformation and/or fracture is required in order to safely and reliably design against failure. In this talk, I will present our work on experimentally and computationally investigating the impact of these unique microstructures on the deformation and failure behavior of additively manufactured 316L stainless steel. I will discuss our efforts in measuring and modeling the multiaxial plasticity and fracture of this material as well as the impact of internal defects on its failure behavior.