Special Issue

Numerical Simulation and Data-Driven Modeling of Metallic Materials Formed by Laser Additive Manufacturing

Message from the Guest Editors

Additive manufacturing (AM) is well known for its rapid integrated forming ability for complex geometry, and as the AM industry flourishes, it is receiving increasing attention. Unlike traditional casting and other forming techniques, AM involves a rapid nonequilibrium melting and solidification process, which occasionally generates defects, such as pores, deformation, cracks, etc. Even though significant research and experiments on various alloy systems and AM processes have been carried out to study melting and solidification behavior, some mechanisms remain unclear. In this context, numerical simulation and data-driven/physics-informed machine learning modeling are important approaches to computing the dynamic evolution of multiphysics fields or establishing relationships between process, microstructures, and mechanical properties. These approaches can help us understand the fundamental principles and rules of AM processes and provide guidance for optimizing these processes and improving product quality.

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Message from the Editorial Board

Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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