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Multi-Scale Modeling in Additive Manufacturing

Guest Editor:

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Deadline for manuscript submissions:
closed (31 December 2022)

Message from the Guest Editor

Dear Colleagues,

Metal additive manufacturing (AM) has brought impressive advances in the manufacture of bespoke parts with complex geometries. However, it also poses many technical barriers due to the highly transient and varying physical phenomena which occur on a broad range of length and time scales difficult to observe and characterize.

The development of fully integrated multi-physics and multi-scale computational models in AM is highly desirable and still a key challenge, with an important requirement in AM modelling being the ability to predict and control the microstructure (and, therefore, the mechanical properties) of the component. However, the microstructure is strongly dependant on thermal history during processing, which in turn results from several independent and diverse physical phenomena interacting at disparate spatial and temporal scales.

This Special Issue aims to contain articles reporting on new and progressive research into multi-scale strategies for metal additive manufacturing, the scope including methods to integrate/link sequential multiple physics-based models, as well as concurrent frameworks to couple micro-scale and macro-scale models.

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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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