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Application of Numerical Simulation in Welding

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Message from the Guest Editor

Dear Colleagues,

Many advanced structural applications require the joining of materials. Typical applications include stiffened panels for aircraft interiors, parts of car bodies, or electronic components.

Today, welding arises as a possibility, which is extraordinarily fast, secure and precise when compared to the use of adhesives, rivets, or bolts. The laser is one of the most promising welding processes and is often used with other welding processes. Despite the progress achieved, there are significant obstacles to the generalization of laser welding, not only in terms of high equipment costs but also due to the complexity of mechanical behavior after welding. In fact, there is currently no sufficiently deep knowledge of the weldability, defects and ruin, especially with regard to, for example, the 3rd generation of advanced high strength steels, the welding of thermoplastic composites or new processes like 3D printing of metals by laser.

This Special Issue is focused on the numerical simulation of the welding processes, e.g., using finite element method, computational fluid dynamic modelling, among other tools.

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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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