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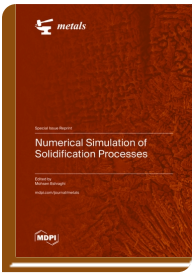
Special Issue Reprint

Numerical Simulation of Solidification Processes



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Solidification is a critical step for many manufacturing processes. The importance comes from the fact that the solidification microstructure has a significant influence on the properties of the solidified materials. The kinetics of solidification also determines the distribution of solute atoms, which eventually leads to micro-segregation, secondary phases, and formation of various defects, which exert enormous influence on mechanical properties. By combining the bedrock computational physics and informatics with systematic experiments and advanced manufacturing, we can reduce the cost, risk, and cycle time for new product development. Numerical simulation of solidification processes can help scientists to gain a better understanding of the kinetics governing the macroscopic as well as microscopic features of the solidification process. From an industrial point of view, solidification modeling enables engineers to predict the properties of the material and subsequently modify the process parameters to produce materials of higher quality. This Special Issue embraced studies on numerical simulation of solidification processes for a variety of applications and processes. In this collection, we present eleven high-quality papers authored by distinguished researchers, encompassing a diverse array of solidification modeling studies. Topics include steel casting and solidification, permeability, segregation, cracking, thermal distortion, dendrite growth, grain morphology, welding, and additive manufacturing.

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