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An integrated model for dendrite growth simulation in selective laser melting

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In Selective Laser Melting (SLM) process, metal powder is melted by laser and rapidly solidified into solid. The most common microstructure observed during rapid solidification process is the dendritic morphology. Real-time observation of the dendritic forming process by experiment becomes difficult due to its invisibility. Modeling of the microstructure could evaluate the transient grain growth and assist to control the melting condition for better mechanical performance. In this work, two sub models are integrated to simulate the transient grain growth during SLM process. A macroscale three-dimensional thermal model is first used to generate the temperature field. The temperature field is then imported to the two-dimensional integrated Cellular Automata and Phase field (CAPF) model, which calculates the microscale dendritic growth feature and associated solute redistribution. The simulation result exhibits the dendrite growth behavior verified by literature.

Biography

Chen Wenhao is pursuing his Master of Philosophy degree in Hong Kong University of Science and Technology focusing on the laser sintering field. He completed his Undergraduate in HKUST Mechanical and Aerospace Engineering. He is experienced in mechanical design, manufacturing and building robot system.

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