Preface

Additive Manufacturing (AM) is a widely used technology for the design and production of high-performance components. The layers designed by the computer are gradually added to construct 3D parts in AM process. This unique process can be used to manufacture complex or customized parts.

The fluid problem in the metal additive manufacturing process is investigated based on the Computational Fluid Dynamics (CFD) method. Chapter 1 provides the introduction. Chapters 2 to 4 present the internal flow field and tracks of spatter particles inside the printer and an innovative fluid cover and a negative pressure tube designed to optimize the internal flow field and remove spatter particles, respectively. In chapter 5, the dynamic characteristics of the molten pool is investigated. In chapter 6, the effect of the external magnetic field on the molten pool and the solidification process is studied. In chapter 7 and chapter 8, the evolution processes of single pore defects and multi-pores defects inside the workpiece are discussed respectively. In chapter 9, the laser polishing method is proposed for metal additive manufactured workpieces to control the surface roughness. Professors Hui Li and Sheng Liu contribute to the numerical simulation and experimental method, Professor Sheng Liu revises the script.

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