

Modeling microstructure 316L stainless steel by laser powder bed fusion process

Lingbin Meng, Jian Zhang, Yi Zhang, Jing Zhang*

Department of Mechanical and Energy Engineering

Indiana University-Purdue University Indianapolis, Indianapolis, IN 46202

Corresponding author: jz29@iupui.edu

Abstract

In this study, the prediction of grain microstructure of powder bed fused 316L stainless steel is presented. Using a coupled fluid-thermal computational fluid dynamics model, the melt pool and its temperature profile are computed. Then a cellular automaton code is employed to predict the microstructural evolution. The simulation results are qualitatively consistent with experimental observation in terms of grain size and misorientation angle.

Keywords: laser powder bed fusion; stainless steel; microstructure; cellular automata; computational fluid dynamics