

# **A Greedy Algorithm for Optimal heating in Powder-Bed-Based Additive Manufacturing**

## **(Sim-AM 2019)**

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### **ABSTRACT**

Powder-bed-based additive manufacturing involves melting of a powder bed using a moving laser or electron beam as a heat source. In this presentation, we formulate an optimization scheme that aims to control this type of melting. The goal consists of tracking maximum temperatures on lines that run along the beam path. Time-dependent beam parameters (more specifically, beam power, spot size, and speed) act as control functions. The scheme is greedy in the sense that it exploits local properties of the melt pool in order to divide a large optimization problem into several small ones. As illustrated by numerical examples, the scheme can resolve heat conduction issues such as concentrated heat accumulation at turning points and non-uniform melt depths.