

MODELING AND SIMULATION FOR ADDITIVE MANUFACTURING

Albert To*¹ and Yuichiro Koizumi² and Stefan Kollmannsberger³ and Andreas Lundback⁴ and Ashley Spear⁵ and Gregory J. Wagner⁶ and Yaoyao Fiona Zhao⁷ and Thorsten Bartel⁸ and Michele Chiumenti⁹
and Christoph Meier³

¹University of Pittsburgh

²Osaka University

³Technical University of Munich

⁴Lulea University of Technology

⁵University of Utah

⁶Northwestern University

⁷McGill University

⁸Technical University of Dortmund

⁹UPC Barcelona

MINISYMPOSIUM

Various additive manufacturing (AM) techniques including 4D printing have been developed to manufacture complex-shaped components with well-controlled precision. Sophisticated AM techniques often require systematic modeling and simulation efforts during the design stage and for the purpose of part qualification/certification. The objective of this minisymposium is to provide a platform to discuss recently developed modeling and simulation techniques for AM, including experimental calibration and validation efforts for the process. The topics include (but are not limited to):

- Simulation of the manufacturing process to predict heat transfer, residual stress/distortion, surface topology, composition, and microstructure including defects at multiscale length and time scales
- Data-driven approaches for simulation acceleration
- Combined simulation and in-situ monitoring for rapid build qualification
- Effects of microstructure and defects on mechanical properties
- Feedback control for minimizing defects and residual stress in as-built structures
- AM-oriented topology optimization
- Analysis of lattice and cellular structures
- Modeling and simulation of functionally graded materials, tissue engineering scaffolds, bioinspired composites, bi-material joints, etc

Computational modeling and simulation for any AM processes (e.g. laser power bed fusion, electron beam melting, form deposition modeling, stereolithography, binder jetting) and materials (e.g. metals, plastics, ceramics and their composites as well as biological materials) are welcome.