Chair of Computational Modeling and Simulation
TUM School of Engineering and Design
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Neural network based laser shape optimization

Project Characteristics

Modeling:

Mathematics:

Programming:

Science:

Task

- **Objective**: Optimize laser beam shapes for precise performance in 3D additive manufacturing

- Optimization of laser beam shape utilizes the heat equation. We employ neural network as a discretization of the laser shape that needs to be optimized.

- The weights of neural network represent the laser beam shape and these weights are optimized over iterations using the adjoint method.
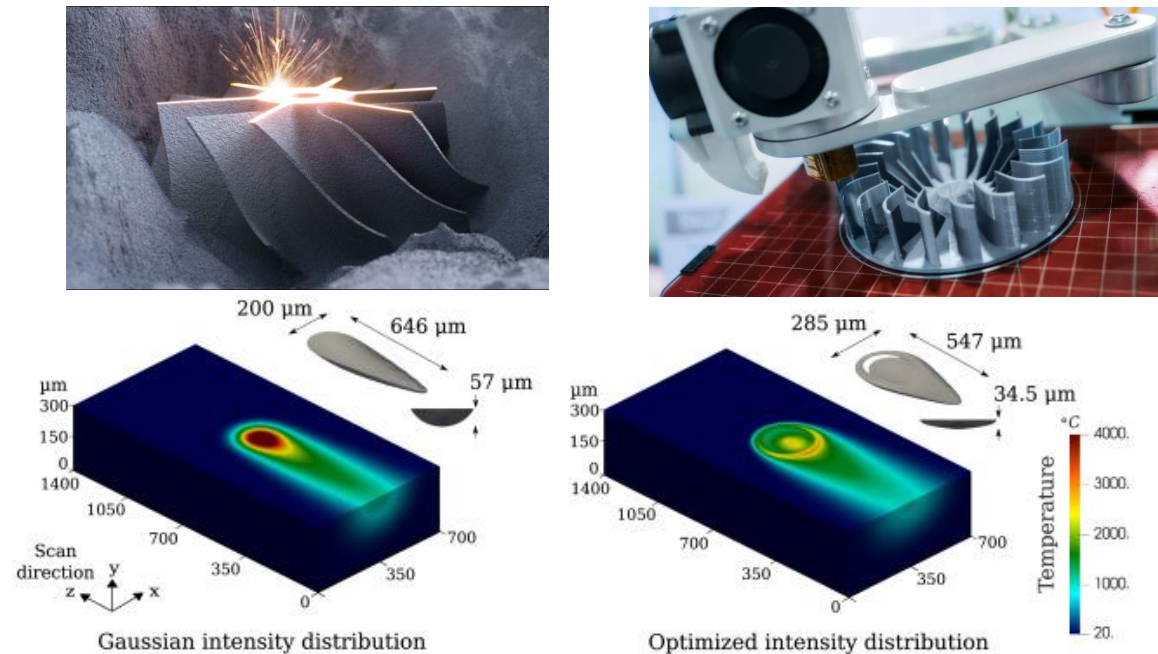

Fig: 3D powder bed fusion of metals

[1] Holla, Vijaya, et al. "Laser beam shape optimization in powder bed fusion of metals." *Additive Manufacturing* 72 (2023): 103609.
[2] Herrmann, Leon, et al. "On the use of neural networks for full waveform inversion." *Computer Methods in Applied Mechanics and Engineering* 415 (2023): 116278.

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