

## **Constitutive Modelling and advanced simulation techniques for the simulation of AM processes**

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The development of Additive Manufacturing (AM) towards a standard industrial application requires accurate modelling and simulation techniques. More precisely, the effect of process parameters on the properties of additively manufactured workpieces and structures needs to be captured accurately in order to increase the process understanding and to help to improve these processes. In this regard, AM is intrinsically very complex due to the underlying interactions between many different physical phenomena such as a strong thermomechanical coupling, occurring changes of aggregate states as well as possible solid-solid phase transitions and microstructural changes. The complexity of these processes and their combination thus require sophisticated modelling and simulation techniques.

Topics:

- Modelling of transitions between powder, molten, and (re-)solidified material
- Modelling of process-induced solid-solid phase transformations
- Modelling of fluid-structure interactions during AM
- Modelling of process-induced microstructure/grain structure evolution and resulting mechanical properties
- Modelling of powder materials
- Modelling techniques for thermomechanical couplings
- Modelling and simulation of long-term behaviors of additively manufactured workpieces