

## 10th GACM

Colloquium on Computational Mechanics  
for Young Scientists from Academia and Industry  
September 10 to 13, 2023 in Vienna, Austria

## Computational Modeling and Methods for Multiphase Problems

Leonardo Boledi<sup>1,2,\*</sup>, Benjamin Terschanski<sup>1</sup>, Donat Weniger<sup>3</sup>

<sup>1</sup> Chair of Methods for Model-based Development in Computational Engineering (MBD)  
RWTH Aachen University, 52056 Aachen, Germany

<sup>2</sup> Aachen Institute for Advanced Study in Computational Engineering Science (AICES),  
RWTH Aachen University, 52056 Aachen, Germany

<sup>3</sup> Research Lab for Applied and Computational Mathematics (ACoM),  
RWTH Aachen University, 52056 Aachen, Germany

Multiphase problems are at the center of many engineering and scientific applications. Metal welding and alloy solidification, for instance, are important research topics in production engineering. In geoscience, understanding the melting of ice and permafrost is an ongoing challenge. The underlying multiphysics processes are complex and their modeling results in coupled systems of partial differential equations, which require efficient and robust numerical methods.

Challenges arise both at the modeling and numerical stages, so that a variety of problem-tailored methods are available for different types of systems (*liquid-liquid*, *solid-liquid*, *liquid-gas*, *solid-gas*). For example, level-set methods are a popular choice for multiphase flows with sharp interfaces. To model solidification of aqueous solutions and alloys featuring a continuous solid-liquid transition, mixture models and enthalpy methods have proven to be effective. For sublimation and deposition problems, standard equilibrium models fail to accurately describe the phase transition in rarefied environments.

This Minisymposium aims to bring together researchers and experts working on multiphase problems and to exchange knowledge about their numerical treatment.

Topics of interest include, but are not limited to:

- Mathematical models for multiphase problems
- Model hierarchies and reduced-order techniques
- Advances in numerical methods
- Application-oriented simulations

---

\*Corresponding author: Leonardo Boledi (✉ [boledi@mbd.rwth-aachen.de](mailto:boledi@mbd.rwth-aachen.de))