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Computational Modeling and Methods for Phase-Transition Problems

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Phase-transition processes 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 phase change (*solid-liquid*, *liquid-gas*, *solid-gas*). For example, level-set methods are a popular choice for multiphase problems 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 phase-change problems and to exchange knowledge about their numerical treatment.

Topics of interest include, but are not limited to:

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

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