



# Phase-field models for the evolution of complex structures

Summer school

Peyresq (southern France), 05/09/2022 – 16/09/2022

**Topic:** The phase-field method is a compact and elegant tool for the numerical modelling of problems that involve moving boundaries. In recent years, it has been applied to a large variety of subjects, including microstructure evolution in materials (solidification, precipitation, grain growth), multi-phase flows (fingering, droplet coalescence), fracture, soft matter and biophysics (membrane dynamics, vesicles). The key idea of this method is to represent the moving surfaces by an auxiliary field, the phase field, which exhibits a steep but smooth (diffuse) interface. The evolution of this field is governed by equations that can be obtained from the fundamental principles of out-of-equilibrium thermodynamics.

**Goal and scope:** This school is mainly intended for Ph.D. students and young researchers that already have a first experience with the phase-field method (on any topic) and who wish to deepen their understanding of the fundamentals, and/or wish to see applications in other domains to broaden their knowledge about the possibilities of the method. Complete beginners in phase field can be accepted if they have a strong background in at least one of the following fields: statistical physics, materials science, thermodynamics and phase transitions. The school will last two weeks. In the first week, the focus will be on the fundamentals; in the second week, various applications will be presented. Practical sessions on several numerical examples of model problems will also be offered. Participants will be given the opportunity to present their work by a poster. The lecturers will be available for discussions with the participants during the entire session.

**Lecturers:** Benoît Appolaire (Université de Lorraine, Nancy, France)  
Janin Eiken (Access, Aachen, Germany)  
Hervé Henry (CNRS/Ecole Polytechnique, Palaiseau, France)  
Yann Le Bouar (CNRS/ONERA, Châtillon, France)  
Mathis Plapp (CNRS/Ecole Polytechnique, Palaiseau, France)  
Tamás Pusztai (Wigner RCP, Budapest, Hungary)  
Robert Spatschek (Research Center Jülich, Germany)  
Axel Voigt (TU Dresden, Germany)

**Fee:** 750 € for Ph.D. Students, 850 € for postdocs, 950 € for seniors (includes meals and lodging)

**Important dates:** 15/02/2022: Application starts – for application procedure, see web page  
01/04/2022: End of early application period  
01/05/2022: Notification of acceptance  
(late applications will be accepted if space permits - in total, 32 participants)

**Note on COVID:** There are no plans for a hybrid format, so the event will either take place 'in-person', or will get cancelled. The decision will be taken after an evaluation of the pandemic situation in June 2022. The official French sanitary rules will apply for the school.

**Further information :** <http://pmc.polytechnique.fr/~mp/PFschool2022.html>

**Contact :** [phasefield2022@onera.fr](mailto:phasefield2022@onera.fr)