

## **Leonie Schmeller: Gel models for phase separation at finite strains**

*lundi 19 juin 2023 14:50 (30 minutes)*

Hydrogels are crosslinked polymer networks saturated in a liquid solvent and can be modeled as a two-phase system employing the phase field approach. During swelling and squeezing, they undergo enormous volume changes, which requires finite strain models for realistic considerations. We analytically investigate the two-phase model for phase separation in a geometrically nonlinear elastic material. The coupled system of PDEs consists of a Cahn-Hilliard equation and a quasi-static mechanical force balance of the deforming gel. The phase field and the mechanics are coupled by a multiplicative decomposition of the deformation gradient, and time-dependent Dirichlet boundary conditions are imposed on the deformation field. Based on a time-incremental scheme, we derive existence theory of solutions in a suitable weak formulation. Using techniques from the calculus of variations and nonlinear PDE theory, we obtain further an existence result for the time-continuous problem under suitable assumptions.

This is a joint work with Marita Thomas within the DFG priority program SPP 2171 Dynamic wetting of flexible, adaptive and switchable substrates, project \# 422786086 and within the MATH+ project AA2-9.