

# Adaptive finite element methods for phase transition computations

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Most phase transition problems show a special behaviour. While solutions are usually smooth in the bulk, we observe rapid variations or a reduction of smoothness near the interface region. Efficient numerical methods should take this into account and use discretizations which are adapted to the solution, especially when aiming at 3-D simulations.

During the last few years, mathematical theory of a posteriori error estimates and numerical methods for adaptive finite element methods for such problems have lead to promising results, like criteria for local mesh refinements and proven error bounds.

We present some details and simulations for a range of phase transition problems, from Stefan problems up to phase field models. This talk presents joint work with Z. Chen, D. Kessler, R.H. Nochetto, K.G. Siebert, and C. Verdi