

Remarks on Nonconvex Minimisation Problems

☺ \exists FE solutions (FE space finite-dimensional).
☺ \exists convergence rates (for global energy, for volume fractions, for displacements, ... proved by design of infimising FE functions) [Luskin, Collins, Chipot, Prohl, Bartels, ...] for model problems.

☹ \nexists minimiser of nonconvex E in Sobolev spaces. Problem (M) ill-posed on continuous level.

☹ Global Nonconvex Minimisation Causes Numerical Analysts' Nightmares:

☞ Computations on Tartar's 4-Well Example still pending: [Chipot-Lecuyer (1999)] 'Oscillations do not really appear yet.'

☞ 1D Evidence for small cluster of a large number of local minimisers around some (global) FE solution (i.e. global discrete minimiser) [C. (2000)].

☞ Interesting layers within layers by [Nicolaidis-Walkington-Wang (1997)] with ad hoc algorithms: 'However, as far as we can tell, the minimisers illustrated in the paper are close to global minimisers.'

Success possible by using extremely good initial values or meshes aligned with layers or other a priori unknown details of induced microstructures.