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Inverse problems in micromechanics

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We consider formulation and numerical solution of problems of identification of material parameters for hydrology or other continuum mechanics problems in domains with heterogeneous microstructure. The inverse problems use output least squares for state problems defined on domains with microstructure which geometry is known from CT scans or other analysis. The least squares cost functionals use values obtained from average of state problem quantities over parts of the boundary and corresponding measurement data. For problems with noise in the measurement data we use Tikhonov type regularization or Bayesian approach with assumed apriori statistical distributions of the measurements. The contribution involves discussion of use of solution of the state problems with more measurements on the boundary and multiple tests. An attention is also given to efficient numerical optimization techniques.