

Computational methods for parameter identification in PDEs

Organizers:

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A large variety of applications in science and industry leads to the problem of determining non-constant coefficients in systems of partial differential equations. Such parameter identification problems are typically non-linear and ill-posed in the sense of unstable dependence of the searched for quantity on the given data. Moreover, any solution strategy for inverse problems of that type requires repeated numerical solution of the underlying PDEs. Therefore it is essential to

- use fast solvers for the large scale forward problem (i.e., the PDE);
- apply stable and efficient solution methods for the inverse problem;
- combine forward solution with regularization in an appropriate way.

The talks in this minisymposium will discuss approaches taking into account all of these three issues, by using

- all-in-one solution strategies
- adaptive regularization methods
- preconditioning techniques for inverse problems

Applications that will be presented together with numerical results are, among others,

- single photon emission tomography (SPECT)
- geophysical exploration
- three dimensional inverse scattering
- nondestructive testing by thermal waves

Planned talks:

- Hend Ben Ameer, Université de Tunis: *Refinement indicators and different applications*
- Eldad Haber, Emory University: *Algorithms for space-time electromagnetic inverse problems*
- Frank Bauer and Thorsten Hohage, University of Göttingen: *Iterative regularization methods for large scale inverse problems with random noise*
- Ronny Ramlau, University of Bremen: *Adaptive regularization methods for nonlinear inverse problems*