

An efficient method for the regularized solution of nonlinear ill-posed problems, based on an algorithm for non-convex trust region subproblems

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Abstract:

In this talk we will present a method for the regularized solution of nonlinear inverse problems, based on Ivanov regularization (also called method of quasi solutions). This leads to the minimization of a non-convex cost function under a norm constraint, where non-convexity is caused by nonlinearity of the inverse problem. Minimization is done by iterative approximation, using (non-convex) quadratic Taylor expansions of the cost function. This leads to repeated solution of quadratic trust region subproblems with possibly indefinite Hessian. Thus the key step of the method consists in application of an efficient method for solving such quadratic subproblems, developed by Rendl and Wolkowicz [1]. We will present a convergence analysis of the overall method as well as numerical experiments.

This is joint work with Franz Rendl and Elena Resmerita, both Alpen-Adria-Universität Klagenfurt.

[1] F. Rendl and H. Wolkowicz, A semidefinite framework for trust region subproblems with applications to large scale minimization, *Mathematical Programming* 77 (1997) 273-299.