Regularization of nonlinear ill-posed problems by an exponential Euler method

THU/P2
10:30–10:50

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Asymptotic regularization is a well established tool for treating nonlinear ill-posed problems. For its numerical realization, an appropriate numerical method for solving differential equations is required. In this talk, we will analyze an exponential Euler method for this purpose. The scheme requires a certain approximation to the Jacobian of the Showalter differential equation and gives the exact solution for linear problems. Under a suitable discrepancy principle, the method is shown to be convergent under the same assumptions that are needed for the continuous analysis. Our convergence analysis admits variable step sizes and moreover yields optimal convergence rates.

[1] M. HOCHBRUCK, M. HÖNIG, A. OSTERMANN: *A convergence analysis of the exponential Euler iteration for nonlinear ill-posed problems*. To appear in Inverse Problems.

[2] M. HOCHBRUCK, M. HÖNIG, A. OSTERMANN: *Regularization of nonlinear ill-posed problems by exponential integrators*. To appear in Mathematical Modelling and Numerical Analysis (M2AN)