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15. Numerical Analysis and Scientific Computing

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A numerical method for the integration of backward parabolic problems

Let $A : D(A) \subset X \to X$ be the infinitesimal generator of an analytic semigroup in a Banach space. Given $T > 0$ and $u_T \in X$ the backward Cauchy problem

$$u'(t) = Au(t), \quad 0 \leq t \leq T; \qquad u(T) = u_T$$

is considered. This problem is severely ill posed: the solution, assuming that it exists, does not depend continuously on u_T. The problem is regularized by means of an a priori estimate of the form $\|u(t)\| \leq M$, for $0 \leq t \leq T$. A new method for the discretization of such problem is proposed. The method is based on a new algorithm for recovering an analytic mapping from a discrete set of corrupted samplig values.