

Computable Analysis of the Abstract Cauchy Problem in a Banach Space and Its Applications (I)

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We study computability of the abstract linear Cauchy problem

$$(1) \quad du(t)/dt = Au(t), \quad u(0) = x \in X,$$

where A is a linear operator, possibly unbounded, on a Banach space X . We give necessary and sufficient conditions for A such that the solution operator $K : x \mapsto u$ of the problem (1) is computable. For studying computability we use the representation approach to Computable Analysis developed by Weihrauch and others. This approach is consistent with the model used by Pour-El/Richards.