

ON THE ROBUSTNESS OF SOME GENERAL CONCEPTS OF DICHOTOMY AND TRICHOTOMY FOR EVOLUTION OPERATORS IN BANACH SPACES

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The aim of this paper is the study of robustness of a general trichotomy concept for evolution operators in Banach spaces. This concept contains particular cases of well-known trichotomy concepts such as uniform and nonuniform, exponential respectively polynomial trichotomy. The robustness means that under sufficiently small perturbation, the new evolution operator preserves the same asymptotic behavior.

The first step in obtaining the robustness of a nonuniform trichotomy, is to prove the robustness of dichotomy. The approach is based on the fixed point theorem. Some arguments are inspired by the work of M. L. Diagne and O. Seydi [3] for strong exponential dichotomy. The robustness of nonuniform dichotomy with different growth rates was obtained in [2] for difference equations.

For the second step we use an already known result [4]: the equivalence between the trichotomy of an evolution operator $T : \Delta = \{(t, s) \in \mathbb{R}_+, t \geq s \geq 0\} \rightarrow \mathcal{B}(X)$ - where X is a Banach space and $\mathcal{B}(X)$ the Banach algebra of all linear and bounded operators on X - and the dichotomy of two evolution operators associated $T_1, T_2 : \Delta \rightarrow \mathcal{B}(X)$.

Finally, we apply the dichotomy robustness result to the dichotomic operators T_1, T_2 and then, we use again the equivalence between two dichotomies and a trichotomy. A similar approach on the robustness of exponential trichotomy is given by Luis Barreira and Claudia Valls [1], but they obtain the robustness of exponential dichotomy based on the notion of admissibility.

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- [3] M. L. DIAGNE, O. SEYDI, Robustness of strong exponential dichotomy in Banach spaces, to appear.
- [4] M. KOVACS, M. MEGAN, C. MIHIT, On (h, k) -Dichotomy and (h, k) -Trichotomy of Noninvertible Evolution Operators in Banach Spaces, *Analele Universitatii de Vest, Timisoara Seria Matematica Informatica* 2 (2014), 127-143.