QUALITATIVE STUDY OF EVOLUTION EQUATIONS AND APPLICATIONS TO DYNAMICAL SYSTEMS

Goal of the project

The main goal of the project is to characterize the nonuniform behavior for evolution equations in infinite-dimensional spaces and to apply the theoretical results in the study of a class of Euler equations.

Short description of the project

We characterize nonuniform (exponential) stability and nonuniform dichotomy in terms of evolution semigroup and admissibility method.

Implementation period

01.02.2020 - 15.06.2020

Budget

47.600 RON (10000 EUR)

Main activities

The research team was focus on the following activities:

- Definition of the evolution semigroup in the context of nonuniform behavior and characterization of nonuniform exponential stability in terms of invertibility of the corresponding infinitesimal generator.
- For an arbitrary noninvertible evolution family and for a large class of rate functions, we characterize to notion of general dichotomy in terms of two admissibility conditions. As a nontrivial application of our work, we establish the robustness of general dichotomies.
- Study of the local well-posedness in the smooth category for a class of Euler-Arnold equations.

Results

The main results of the project were published in:

- N. Lupa, L.H. Popescu, Admissible Banach function spaces and nonuniform stabilities, accepted in Mediterranean Journal of Mathematics (ISI journal, IF 1.181)
- E.C. Cismas, N. Lupa, A Nash-Moser approach for the Euler-Arnold equations, Monatshefte für Mathematik, DOI 10.1007/s00605-019-01344-z, 2019 (ISI journal, IF 0.807)
- D. Dragičević, N. Jurčević Peček, N. Lupa, Admissibility and general dichotomies for evolution families, submitted to Asymptotic Analysis (ISI journal, IF 0.808)

Applicability and transferability of the results:

By allowing growth rates that are not exponential, we are considered situations where the Lyapunov exponents can be zero, and since we do not need to assume the invertibility of the evolution families on the whole Banach space, our results can be applied to a large class of dynamical systems, in particular to equations defined by compact operators on infinite-dimensional spaces.

Research team

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