Compactness properties of operator of translation along trajectories in evolution equations

Władysław Klinikowski

Nicolaus Copernicus University in Toruń, Poland

`wklin@mat.umk.pl`

Abstract

Our aim is to present some results about compactness properties of operator of translation along trajectories (which is also known as Poincaré operator) which is associated with some evolution equation. Fixed points of this operator are periodic solutions of connected evolution equation. In order to apply some kind of topological degree we study just compactness properties of operator of translation. We consider two types of evolution equations: first is linked with parabolic problems and second with hyperbolic problems. In case of parabolic equations we discuss results which come from A. Ćwiszewski and R. Łukasiak ([1], [2]). Next we present approach (but not yet with specific results) to hyperbolic problems which is a part of collaboration with A. Ćwiszewski. Our method uses so-called ,,tail estimates" (which were firstly introduced by B. Wang in [4]) and is based on work of D. Fall and Y. You (see [3], but note that they looked for global attractors).

References

[1] A. Ćwiszewski, R. Łukasiak, *Forced periodic solutions for nonresonant parabolic equations on* $\mathbb{R}^N$, https://arxiv.org/pdf/1404.0256v2.pdf

[2] A. Ćwiszewski, R. Łukasiak, *A Landesman-Lazer type for periodic parabolic problems on* $\mathbb{R}^N$ *at resonance*, Nonlinear An. TMA 125 (2015), 608-625

[3] D. Fall, Y. You, *Global attractors for the damped nonlinear wave equation in unbounded domains*, https://arxiv.org/pdf/1801.00104.pdf

[4] B. Wang, *Attractors for reaction-diffusion equations in unbounded domains*, Phys. D 128 (1999), 41-52