Nonlinear Dynamics and Systems Theory, **20** (3) (2020) 327–332

Absolutely Unstable Differential Equations with Aftereffect

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Received: March 31, 2019; Revised: May 27, 2020

Abstract: For differential equations with a finite number of delays in a finite-dimensional Banach space, the conditions for the instability of the zero solution are obtained at arbitrary constant delays.

Keywords: *differential-difference equations; absolutely unstable solutions; estimates of the spectra of operator functions.*

Mathematics Subject Classification (2010): 34K06, 34K20, 34K40, 47A10.

1 Introduction

A significant part of publications on the theory of oscillations deal with the stability of solutions of evolution equations (see [1]– [5]) and, in particular, the absolute stability of solutions of differential-difference equations (see [6], [7]– [11]). However, for such equations the instability of solutions is no less important. For example, stable evolutionary processes occurring in complex dynamic systems are possible due to the instability of some components of these systems [12]. The coexistence of stability and instability in nonlinear dynamical systems is their characteristic property.

It is natural to pay attention to the study of the absolute instability of solutions of differential equations with aftereffect. For the study of such equations see [10], [13]– [15].

In [13], sufficient conditions are obtained for the absolute instability of the zero solution of a nonlinear differential-difference equation

$$\frac{dx(t)}{dt} = Ax(t) + G(t, x(t-\Delta))$$

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