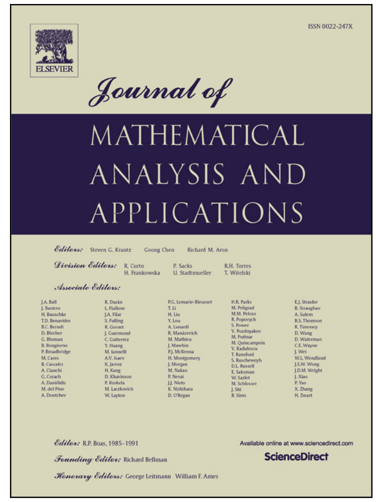

Monostable waves in a class of non-local convolution differential equation

Zhaoquan Xu, Chufen Wu

PII: S0022-247X(18)30161-6
DOI: https://doi.org/10.1016/j.jmaa.2018.02.036
Reference: YJMAA 22048

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 29 May 2017

Please cite this article in press as: Z. Xu, C. Wu, Monostable waves in a class of non-local convolution differential equation, *J. Math. Anal. Appl.* (2018), https://doi.org/10.1016/j.jmaa.2018.02.036

Monostable waves in a class of non-local convolution differential equation

Zhaoquan Xu [1] *Chufen Wu [2]
[1] Department of Mathematics, Jinan University
Guangzhou 510632, China
[2] Department of Mathematics, Foshan University
Foshan 528000, China

Abstract: The current paper is devoted to the study of wave propagation dynamics for a class of convolution equation with monostable structure. It is shown that this equation admits traveling wave solution connecting the zero steady state, even when the nonlinear term of this equation without monotonicity. A sufficient condition for the traveling wave solution converges to the positive steady state is also established.
Keywords: Convolution differential equation; monostable structure; traveling wave solution
AMS(2010) Subject Classification: 45J05, 35R10, 92A05.

1 Introduction

In the past years, there have been widely study on the wave propagation dynamics of nonlinear *integral equations* and *integro-differential equations* modeling physical and biological phenomena. Such type of equations, to some extent, describe the interaction between individuals better than ordinary differential/difference equations or reaction-diffusion equations. This is because they take into account the long-range interaction and describe the interaction via a dispersal kernel, which specifies the probability that an individual moves from one location to another in a certain time interval as function (see, e.g., [5–7, 12, 15–19, 21, 23, 25, 27–29, 33, 38, 43, 44] and the references therein).

In the study of a single-layer neutral network distributed over the real line, Ermentrout and Mcleod [8] considered the integral equation

$$u(t,x) = \int_{-\infty}^{t} h(t-s) \int_{-\infty}^{\infty} k(x-y) g(u(s,y)) dy ds. \tag{1.1}$$

and its differential form

$$u_t(t,x) = -u(t,x) + \int_{\mathbb{R}} k(x-y) g(u(t,y)) dy, \tag{1.2}$$

*Corresponding author: E-mail: xuzhqmaths@126.com(ZX). The first author's research was partially supported by the NNSF of China (No. 11701216) and the NSF of Guangdong Province (No. 2017A030313015) and the Fundamental Research Funds for the Central Universities. The second author's research was partially supported by the NNSF of China (No. 11401096).