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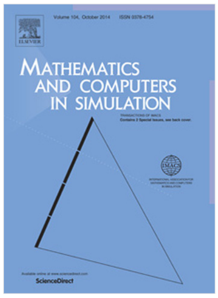

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Traveling wave solutions for the dispersive models describing population dynamics of Aedes Aegypti.

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Abstract

In recent decades the global incidence of dengue has grown dramatically by increased human mobility and urbanization. The study of the mosquitoes population is of great importance for public health in countries where climatic and environmental conditions are favorable for the propagation of this disease. Therefore, this work is based on the study of mathematical models dealing with the life cycle of the mosquito using partial differential equations. We investigate the existence of traveling wave solutions using semi-analytical method combining dynamical systems techniques and numerical integration. Obtained solutions is validated through direct numerical simulations using finite difference schemes. We also present initial study concerning structural stability of traveling wave solution.

Keywords: Traveling wave, Partial differential equations, Aedes aegypti, Dengue

1. Introduction

The *Aedes Aegypti* mosquito is currently showing great dispersion in urban areas of the planet. It proliferates in close proximity to human communities using artificial water deposits as breeding place [6]. The female *Aedes Aegypti* mosquito is the primary vector for spreading viral diseases like dengue, zika, yellow fever and chikungunya affecting millions of humans [3, 12]. Dengue is considered by the World Health Organization (WHO) as one of the major public health problems in the world [1]. Its incidence is concentrated in tropical regions, however, it was detected in more than 100 countries worldwide. Urbanization and international travels are key factors that facilitate the spread of dengue. Studying the mosquitoes and virus propagation has important implications for understanding the hyperendemicity patterns of dengue and the severity of disease facilitating the design and development strategies of the vaccine [10]. As no vaccine has yet been validated, it is necessary to develop new products with new modes of action and cause less environmental impact. In this context to determine the density, seasonality, geographic dispersion, and other characteristics of dengue vectors is extremely important to prevent the emergence of new cases and even a dengue epidemic [2].

Any feasible public policy for controlling the dengue epidemics in tropical climates must necessarily include appropriate strategies for minimizing the mosquito population factor [14]. Therefore, there's a big effort in searching

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