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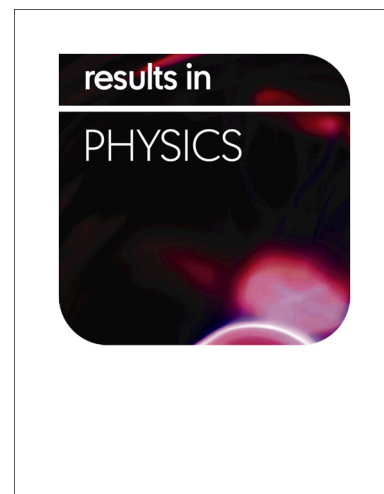
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Dispersive traveling wave solutions of the Equal-Width and Modified Equal-Width equations via mathematical methods and its applications

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Abstract: The Equal-Width and modified Equal-Width equations are used as a model in partial differential equations for the simulation of one-dimensional wave transmission in nonlinear media with dispersion processes. In this article we have employed extend simple equation method and the $\exp(-\varphi(\xi))$ expansion method to construct the exact traveling wave solutions of equal width and modified equal width equations. The obtained results are novel and have numerous applications in current areas of research in mathematical physics. It is exposed that our method, with the help of symbolic computation, provides a effective and powerful mathematical tool for solving different kind nonlinear wave problems.

Keywords: Equal-width equation (EWE), Modified equal-width equation (MEWE), Extended simple equation method, $\text{Exp}(-\varphi(\xi))$ expansion method, Exact solutions, Solitary wave solutions.

1 Introduction

Nonlinear equations are extensively used to explain complex phenomena in different fields of science, such as fluid mechanics, plasma physics, solid-state physics, nonlinear Schrödinger equations and optical fibers. Equal width equation are used as a model in the field of fluid mechanics, if in a shallow water a extensive wave of elevation travels it steepens and forms a bore. If the change in surface elevation of the wave is less than 0.28 of the original depth of water, then bore is undular. The development of an undular bore from a long wave which forms a gentle transition between a uniform flow and still water. This physically account of its development is followed by nonlinear systems which is handled by model of equal width equation. The modified equal width (MEW) equation occurring from the nonlinear media with dispersion process has been paid special concentration in the past decades [1–3]. Hence, penetrating and constructing exact solutions for nonlinear differential equations is a trendy research area. Since due to its large applications and important mathematical properties, many methods have been presented to study the different solutions and physical phenomena related to nonlinear wave equations. It is in detention that all of these methods are problem dependent, some approaches work well with influenced problems but not suitable for the others different problems.

Various effective methods were discussed to obtain solutions of nonlinear wave equations in different aspect. Recently many new powerful methods have been intended for find the exact traveling waves solution of nonlinear evolution equations such as, the inverse scattering transform method [4], Backlund transformation [5], the homogeneous balance method [6], modified simple equation method [7–11], modified extended direct algebraic method [12], the tanhsech method and the extended tanhcoth method [13–15], the soliton ansatz method [16–24], functional variable method [25], the first integral

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