

WAVELET-BASED NUMERICAL SCHEME COMPARED WITH VIM FOR SOLVING KAWAHARA EQUATION

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Abstract. This paper aims to introduce a comparison of variation iteration method and wavelet basis method for the numerical solution of the Kawahara equation. Test problem is used to compare between the two methods. The comparison shows that variation iteration method is efficient and easy to use. On the other hand, the wavelet method is more stable as time increases.

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1. Introduction

Nonlinear partial differential equations appear in many branches of chemistry, physics, engineering and applied mathematics. Due to the recent development of new modeling approaches, evolution equations are the subject of new mathematical interest concerning chemical reactions and electro-chemistry of corrosion, it has turned that many phenomena in engineering, chemistry and other sciences can be described very successfully by models using non-linear evolution equation.

It is important to note that a large amount of research work has been devoted to the application of variation iteration method (VIM) to a wide class of problems. The efficiency of the method has been formally proved by many researchers [6, 18] and [20]. On the other hand, VIM was used by many researchers, to investigate several scientific applications [7–9]. The main objective of this contribution is to introduce a comparative study to examine the performance of the VIM and the wavelet bases method [10–12] in solving nonlinear one-dimensional evolution equations of the form