

Approximate analytical solutions of nonlinear Korteweg-de vries equations using multistep modified reduced differential transform method

ABSTRACT

This paper aims to propose and investigate the application of Multistep Modified Reduced Differential Transform Method (MMRDTM) for solving the nonlinear Korteweg-de Vries (KdV) equation. The proposed technique has the advantage of producing an analytical approximation in a fast converging sequence with a reduced number of calculated terms. MMRDTM is presented with some modification of the reduced differential transformation method (RDTM) which is the nonlinear term is replaced by related Adomian polynomials and then adopting a multistep approach. Consequently, the obtained approximation results do not only involve smaller number of calculated terms for the nonlinear KdV equation, but also converge rapidly in a broad time frame. We provided three examples to illustrates the advantages of the proposed method in obtaining the approximation solutions of the KdV equation. To depict the solution and show the validity and precision of the MMRDTM, graphical inputs are included.

Keyword: Adomian polynomials; Multistep approach; Nonlinear Korteweg-de vries equation; Reduced differential transform method