

## **Solitary wave solutions with compact support for the nonlinear dispersive $k(m,n)$ equations by using approximate analytical method**

### **ABSTRACT**

The study of solitons and compactons is important in nonlinear physics. In this paper we combined the Adomian polynomials with the multi-step approach to present a new technique called Multi-step Modified Reduced Differential Transform Method (MMRDTM). The proposed technique has the advantage of producing an analytical approximation in a fast converging sequence with a reduced number of calculated terms. The MMRDTM is presented with some modification of the Reduced Differential Transformation Method (RDTM) with multi-step approach and its nonlinear term is replaced by the Adomian polynomials. Therefore, the nonlinear initial value problem can easily be solved with less computational effort. Besides that, the multi-step approach produces a solution in fast converging series that converges the solution in a wide time area. Two examples are provided to demonstrate the capability and benefits of the proposed method for approximating the solution of NKdVEs with compactons. Graphical inputs are used to represent the solution and to demonstrate the precision and validity of the MMRDTM in graphic illustration. From the results, it was found that it is possible to obtain highly accurate results or exact solutions by using the MMRDTM.