Approximate analytical solutions of bright optical soliton for Nonlinear Schrödinger Equation of power law nonlinearity

ABSTRACT

This paper introduces the Multistep Modified Reduced Differential Transform Method (MMRDTM). It is applied to approximate the solution for Nonlinear Schrodinger Equations (NLSEs) of power law nonlinearity. The proposed method has some advantages. An analytical approximation can be generated in a fast converging series by applying the proposed approach. On top of that, the number of computed terms is also significantly reduced. Compared to the RDTM, the nonlinear term in this method is replaced by related Adomian polynomials prior to the implementation of a multistep approach. As a consequence, only a smaller number of NLSE computed terms are required in the attained approximation. Moreover, the approximation also converges rapidly over a wide time frame. Two examples are provided for showing the ability and advantages of the proposed method to approximate the solution of the power law nonlinearity of NLSEs. For pictorial representation, graphical inputs are included to represent the solution and show the precision as well as the validity of the MMRDTM.