An Efficient Approach for Nonlinear Oscillator Equations Using Jumarie’s Fractional Derivative

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Abstract

In this paper, variational iteration method (VIM) is applied to solve nonlinear oscillators of fractional order. The time-fractional derivatives are described in the Jumarie’s derivative sense. The application of variational iteration method, developed for differential equations of integer order, is extended to derive explicit analytical solutions of the fractional order nonlinear oscillator’s equation. The solutions of the model equation are calculated in the form of convergent series with easily computable components. The obtained results explicitly reveal the complete reliability, efficiency, and accuracy of the proposed algorithm.

Keywords: Jumarie’s fractional derivative, Fractional differential equation, Variational iteration method, General lagrange’s multiplier, Non-linear oscillator.