

## **Solution for nonlinear Duffing oscillator using variable order variable stepsize block method**

### **ABSTRACT**

Real life phenomena found in various fields such as engineering, physics, biology and communication theory can be modeled as nonlinear higher order ordinary differential equations, particularly the Duffing oscillator. Analytical solutions for these differential equations can be time consuming whereas, conventional numerical solutions may lack accuracy. This research propose a block multistep method integrated with a variable order step size (VOS) algorithm for solving these Duffing oscillators directly. The proposed VOS Block method provides an alternative numerical solution by reducing computational cost (time) but without loss of accuracy. Numerical simulations are compared with known exact solutions for proof of accuracy and against current numerical methods for proof of efficiency (steps taken).

**Keyword:** Duffing oscillator; Multistep method; Ordinary differential equations