

## **A new formulae of variable step 3-point block BDF method for solving stiff ODEs**

### **ABSTRACT**

This paper derives a new variable step 3-point block method based on Backward Differentiation Formula (BDF) for solving stiff Ordinary Differential Equations (ODEs). The strategy involved in the developed method is to control the step size at each iteration to optimize the precision and produce three solution values simultaneously at each step. The method is analyzed in having the conditions for zero stability and found to be of order 6. The stability regions of the method are also investigated and presented in distinct graphs. The proposed method is compared to MATLAB's suite ODEs solvers, namely, ode15s and ode23s. Numerical results obtained are provided to support the enhancement of the method in terms of accuracy.

**Keyword:** Block; Backward differentiation formula; Stiff; Variable step size