Direct solution of using three point block method of order eight with applications

ABSTRACT

This study aims to construct an implicit block method with three-point to tackle general second-order ordinary differential equations (ODEs) directly. Hermite Interpolating Polynomial is used as the fundamental function to obtain the proposed method which involved the first and second derivatives of . From the investigation done, it was found that the proposed method is consistent and zero-stable, hence it is convergent. The proposed method's efficiency was obtained and a comparison was made in terms of accuracy to some existing methods with similar order or higher than it. This new method is able to solve linear and nonlinear initial value problems of the general second-order ODEs and outperformed existing methods with impressive results. Applications of the new method such as in the Fermi-Pasta-Ulam problem and van der Pol oscillator are discussed.