

Block hybrid method with trigonometric-fitting for solving oscillatory problems

ABSTRACT

In this paper, we develop algebraic order conditions for two-point block hybrid method up to order five using the approach of B-series. Based on the order conditions, we derive fifth order two-point block explicit hybrid method for solving special second order ordinary differential equations (ODEs), where the existing explicit hybrid method of order five is used to be the method at the first point. The method is then trigonometrically fitted so that it can be suitable for solving highly oscillatory problems arising from special second order ODEs. The new trigonometrically-fitted block method is tested using a set of oscillatory problems over a very large interval. Numerical results clearly showed the superiority of the method in terms of accuracy and execution time compared to other existing methods in the scientific literature.

Keyword: B-series; Explicit block hybrid method; Oscillatory problems