Piecewise constant solutions of second kind volterra integral equations using collocation approach

ABSTRACT

Many physical problems are governed in terms of integral equations. Several attempts have been carried out to consider various types of piecewise polynomial functions to obtain the numerical solution of the proposed problems. Apart from these polynomial functions, the collocation method is one of the simplest methods for deriving the approximate equation to obtain highly accurate solutions. Based on the previous findings, the combination of piecewise polynomial functions and the collocation method has provided highly accurate solutions for Fredholm integral equations of the second kind. Due to the advantage of this combination, this study aims to analyse the accuracy of the piecewise constant collocation solution obtained for solving Volterra integral equations of second kind. For this purpose, the piecewise constant approximation function and the collocation method were used to derive the piecewise constant approximation equation from the discretisation process of the proposed problems. Then, this approximation equation was used to construct the system of linear equations. Based on numerical experiments, it can be seen that the approximate solutions of the piecewise constant approximation function together with the direct method applied to Volterra integral equations of the second kind have good accuracy.