Quadrature-piecewise collocation solutions to the fredholm integral equation of II kind using ESOR iteration

ABSTRACT

The Fredholm integral equations (FIEs) II kind describe as the most versatile areas of study in history in which being utilized in various fields such as biology, chemistry, engineering, mathematics and physics. Thus, several numerical methods have been imposed to discretize the mentioned equations in order to get their corresponding approximation equations. In this article, the first-order piecewise polynomial collocation scheme and first-order Quadrature method have been put in order to derive the first-order quadrature-piecewise collocation approximation equation via the discretization process. The approximation equation eventually developed a dense linear system. To get the quadrature-piecewise collocation solution of this linear system, we also ascertain the performance of Extrapolated Successive Over-Relaxation (ESOR) iterative method applied to this dense linear system. Therefore, the formulation and application of iterative methods as described are also presented. Based on the numerical computational derived from the first-order quadrature-piecewise collocation approximation equation, it shows that ESOR iteration has significantly least computational efforts in terms of number of iterations and CPU time when compared with Gauss-Seidel (GS) and Successive Over-Relaxation (SOR) iterative schemes.