SOLVING FREDHOLM SECOND ORDER INTEGRO-DIFFERENTIAL EQUATION WITH SINGULAR KERNEL

NEDJEM EDDINE RAMDANI
NEDJEMEDDINE.RAMDANI@YAHOO.COM

Abstract. Singular integro-differential equations, known for their analytical complexity, hold significant importance and remain a key area of interest within the scientific community. This study addresses the challenge of solving second-order integro-differential equations with singular logarithmic kernels by utilizing Airfoil polynomials. A collocation method has been developed, capitalizing on the distinctive characteristics of these polynomials to achieve both computational efficiency and accuracy. The reliability and precision of the proposed method are thoroughly analyzed through error assessments, while numerical tests are conducted to validate the theoretical findings. The results highlight the robustness and effectiveness of this approach in tackling such kind equations.

Keywords: Fredholm integro-differential equation; second order; singular kernel; logarithmic kernel; airfoil polynomials; collocation method.