A NOVEL RATIONAL INTERPOLATION METHOD FOR SOLVING FREDHOLM INTEGRAL EQUATIONS

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In this talk, we present a novel discrete collocation method for the numerical solution of Fredholm integral equations of the second kind in $C[-1,1]$ equipped with the uniform norm. The method is based on a recently introduced rational interpolation scheme developed in the general framework of reproducing kernel Hilbert spaces [3]. This rational approximation has no real poles, uniformly bounded Lebesgue constants and interpolates the target function at arbitrary Jacobi nodes. Moreover, it achieves uniform convergence for all continuous functions with an approximation rate that matches at least that of the best uniform polynomial approximation. These interesting properties are inherited by the numerical method for which stability, convergence and good conditioning are established under minimal assumptions on the integral kernel. A series of numerical experiments confirm the theoretical results and indicate that the proposed method offers a robust and effective alternative in several challenging cases for Nyström-type and polynomial collocation methods based on the same nodes (see, e.g., [1, 2]).

References

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