

Date & Time

29th March 2019, Friday @ 3.15 pm

Venue

Al-Farabi Seminar Room, Second Floor,
INSPEM

Presenter

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Topic

**Four Types of Solution of Hypersingular Integral Equations
of the First Kind**

ABSTRACT

In this note, hypersingular integral equations (HSIEs) of the first kind is considered on the interval $[-1, 1]$ with the assumption that kernel of the hypersingular integral is constant on the diagonal of the domain $D = [-1, 1] \times [-1, 1]$. Projection method together with Chebyshev polynomials of the first, second, third and fourth kinds are used to find bounded, unbounded and semi-bounded solutions of HSIEs respectively. Exact calculations of hypersingular and singular integrals for Chebyshev polynomials allow us to obtain high accurate approximate solution. Gauss-Chebyshev quadrature with Gauss-Lobatto nodes are presented as the high accurate computation of kernel regular integrals. Existence of inverse of hypersingular integral operator leads to the convergence of the proposed method in the case of bounded and unbounded solution. Norm convergence are obtained in Hilbert space. Many examples are provided to verify the validity and accuracy of the proposed method. Comparisons with other methods are also given. Numerical examples reveal that approximate solutions are exact if solution of HSIEs is of the polynomial forms with corresponding weights. It is worth to note that proposed method works well for large value of node points n and errors are drastically decreases. SPU times are also shown to present effectiveness of the method and less complexity computations.

Keywords: Integral equations, Hypersingular integral equations, Chebyshev polynomials, Approximation, Convergence.