Numerical Hermite Projection Method in Fourier Analysis and its Applications

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The Hermite functions as the eigenfunctions of the Fourier transform are widely used in the Fourier analysis. Expansions into series of the Hermite functions in Fourier analysis applications can be found in image coding and analysis, statistics, electrophysiology, Monte-Carlo computations, diffraction structure investigations and other areas of science. The Hermite functions have also attracted considerable interest in applications as real functions minimizing the Gabor uncertainty for the Fourier transform.

The report will include the justification of the convergence of the proposed Hermite projection method based on an estimate the number of terms to be used for the expansion. Fast Hermite projection method ideas will be also given.

Practical use of the method will be illustrated with diffraction data treatment, image processing and iris biometry applications.