Survey of extrapolation methods for linear algebra problems

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Keywords: extrapolation, projection, sequence transformation, numerical linear algebra.

In the first part of this talk, we give a general idea about what sequence transformations are, in particular those for vector sequences. We explain why these sequence transformations are extrapolation methods [1] and why some of them are also projection methods [2].

In the second part of the talk, we show how these procedures can be used for solving a system of linear equations and for computing the eigenvalues of a matrix. We focus, in particular, on the $\varepsilon$-algorithms [3].

The last part of the talk is devoted to applications of extrapolations methods in the context of some linear algebra problems. In particular, we show that they can be used for estimating the norm of the error for the solution of systems of linear equations [4], and we apply these estimates to the choice of the best parameter in Tikhonov regularization method [5]. Another application is the computation of the trace of powers of matrices [6] and another one concerns web search and the PageRank algorithm [7]. Finally we show how to accelerate the convergence of Kaczmarz method for linear systems [8]. Numerical examples illustrate these applications.

This talk presents several results obtained in joint works with M. Redivo-Zaglia and others researchers.

References