Family of Gander's methods and approximation of matrices

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Abstract

The polar decomposition of a complex matrix $A \in \mathcal{C}^{m\times n}$ is defined as follows (see for example Ben-Israel and Greville (2003), p. 220)

$$A = EH,$$

where H is Hermitian nonnegative definite matrix of order n, $E \in \mathcal{C}^{m\times n}$ is a subunitary matrix (partial isometry). Here we assume that $m \geq n$.

The polar factors E and H have interesting applications (see for example Higham (1990)). We consider the following approximation problems for matrices:

P1: minimal rank approximation,

P2: approximation by subunitary matrices.

There are known several iterative methods for computing the unitary polar factor E of full rank matrix A (see for example Gander (1995) and the review paper Zieliński and Ziętak (1995)). In the talk we show how Gander's methods can be adapted for solving the approximation problems P1 and P2.

Keywords

Polar decomposition, Approximation by subunitary matrices, Minimal rank approximation, Numerical algorithms.

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