INEXACT INVERSE ITERATION.

JOERG BERNS-MUELLER

Inexact inverse Iteration is inverse iteration where the arising shifted linear systems are not solved by direct methods like using an LU-decomposition but are approximated usually by using some sort of iterative technique. In contrast to inverse iteration which is a well known and well studied technique the convergence of inexact inverse iteration is not well established. Recent works on the convergence of inexact inverse iteration restricts either to specific methods or to specific eigenvalue problems like the smallest eigenvalue of a positive definite matrix. As inexact inverse iteration is an inner outer type method the interest is not only in the convergence but also in how to choose stopping conditions and other parameters for the inner iterations to obtain a more efficient method. A first result of this type is by Golub and Ye (2000) who studied this for a fixed shift method using a residual like update equation.

In this talk a convergence analysis valid for various implementations of inexact inverse iteration will be shown. This analysis provides convergence results for previously not considered cases like methods using a variable shift. In order to obtain results on the efficiency we need to restrict to a specific linear solver. Here we consider GMRES and show how the choice of shift, the inner stopping tolerance and the choice of right hand side effects the performance of GMRES and of inexact inverse iteration.

University of Frankfurt.
E-mail address: J.Berns-Mueller@mathematik.uni-frankfurt.de