

**Meerbergen, Karl; Spence, Alastair**

**Implicitly restarted Arnoldi with purification for the shift-invert transformation.** (English)

Zbl 0864.65020

Math. Comput. 66, No. 218, 667-689 (1997).

Summary: The need to determine a few eigenvalues of a large sparse generalised eigenvalue problem  $Ax = \lambda Bx$  with positive semidefinite  $B$  arises in many physical situations, for example, in a stability analysis of the discretised Navier-Stokes equation. A common technique is to apply Arnoldi's method to the shift-invert transformation, but this can suffer from numerical instabilities as is illustrated by a numerical example. In this paper, a new method that avoids instabilities is presented which is based on applying the implicitly restarted Arnoldi method with the  $B$  semi-inner product and a purification step. The paper contains a rounding error analysis and ends with brief comments on some extensions.

**MSC:**

**65F15** Numerical computation of eigenvalues and eigenvectors of matrices

**65F50** Computational methods for sparse matrices

Cited in **20** Documents

**Keywords:**

sparse generalised eigenvalue problems; shift-invert; semi-inner product; implicitly restarted Arnoldi method; numerical example

**Software:**

eigs

**Full Text:** [DOI](#)