International J. of Pure & Engg. Mathematics (IJPEM)
ISSN 2348-3881, Vol. 3 No. I (April, 2015), pp. 137-158

COMPUTING THE COMPLEX EIGENPAIR OF A LARGE SPARSE MATRIX IN COMPLEX ARITHMETIC

R. O. AKINOLA
Department of Mathematics,
University of Jos, P. M. B. 2084, Nigeria

Abstract

It is well known that if the largest or smallest eigenvalue of a matrix has been computed by some numerical algorithms and one is interested in computing the corresponding eigenvector, one method that is known to give such good approximations to the eigenvector is inverse iteration with a shift. For complex eigenpairs, instead of using Ruhe's normalization, it has been shown that the natural two norm normalization for the matrix pencil, yields an underdetermined system of equation and by adding an extra equation, the augmented system becomes square which can be solved by LU factorization at a cheaper rate and quadratic convergence is guaranteed. In this work, we show that the square linear system in real arithmetic can actually be converted to complex system and solved at a much cheapter rate in complex arithmetic. An algorithm is given with an example which shows that an application of Newton's method in complex arithmetic converge quadratically.
