A REFINED UNSYMMETRIC LANCZOS EIGENSOLVER FOR COMPUTING ACCURATE EIGENTRIPLETS OF A REAL UNSYMMETRIC MATRIX

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Abstract

For most unsymmetric matrices it is difficult to compute many accurate eigenvalues using the primitive form of the unsymmetric Lanczos algorithm (ULA). In this talk I present a modification of the ULA. Using the refined ULA, the calculation of accurate extremal and interior eigenvalues is feasible. The refinement we is very simple: approximate right and left eigenvectors computed using the ULA are used to form a small projected matrix whose eigenvalues and eigenvectors are easily computed. There is no re-biorthogonalization of the Lanczos vectors and no need to store large numbers of vectors in memory. The method can therefore be used to compute eigenvalues of very large matrices.