Jok M. Tang

A probing method for computing the diagonal of a matrix inverse

University of Minnesota
Department of Computer Science and Engineering
4-192 EE/CS Building
200 Union Street SE
Minneapolis
MN 55455
USA
jtang@cs.umn.edu
Yousef Saad

A probing method is presented to find the diagonal of the inverse of a sparse, diagonal dominant, matrix. First, some properties of the matrix inverse are established. This suggests several ways to determine effective probing vectors. An iterative method is then applied to solve the resulting sequence of linear systems, from which the diagonal of the matrix inverse is extracted.

The algorithm is applied to the solution of Dyson's equation in Dynamic Mean Field Theory (DMFT). DMFT has recently emerged as a very powerful and reliable tool in physics for the investigation of lattice models of correlated electrons in a quantum many-body system.