

NAME

wathen - a random N-by-N finite element matrix

CALLING SEQUENCE

[A] = wathen(nx, ny, k)

PARAMETERS

nx : number of points in x

ny : number of points in y

k : 0 = normal

1 = (diag(diag(A)) A) is returned

A : the "consistent mass matrix" for a regular NX-by-NY grid of 8-node elements in 2 space dimensions.

DESCRIPTION

Makes a random N-by-N finite element matrix where $N = 3 \cdot NX \cdot NY + 2 \cdot NX + 2 \cdot NY + 1$. A is precisely the "consistent mass matrix" for a regular NX-by-NY grid of 8-node (serendipity) elements in 2 space dimensions. A is symmetric positive definite for any (positive) values of the "density", $RHO(NX,NY)$, which is chosen randomly in this routine. In particular, if $D=DIAG(DIAG(A))$, then $0.25 \leq EIG(INV(D)*A) \leq 4.5$ for any positive integers NX and NY and any densities $RHO(NX,NY)$. This diagonally scaled matrix is returned by `WATHEN(NX,NY,1)`.

BEWARE - this is a sparse matrix and it quickly gets large!

EXAMPLE

nx=10;ny=10;k=1;

[A] = wathen(nx, ny, k)

SEE ALSO

makefish, lehmer, matgen