

NAME

iludp - ILUD with column pivoting

CALLING SEQUENCE

[L,U,perm,ierr]=iludp(A,alph,drop,ptol,bloc)

PARAMETERS

A : sparse matrix (must be square)
alph : the diagonal compensation parameter (default: 0.5)
drop : threshold for dropping elements in **L** and **U** (default: $0.001 \cdot \max(A_{ij})$)
ptol : tolerance ratio used for determining whether to permute two columns (default: 0.5)
bloc : permuting can be done within the diagonal blocks of size mbloc (default: n, with n the size of **A**)
L : lower triangular sparse matrix
U : upper triangular sparse matrix
perm : contains the permutation arrays
ierr : error message

DESCRIPTION

Builds an incomplete LU factorization of the sparse matrix **A**. The two factors **L** and **U** are stored in the CSR format. The CSR format is the Compressed Sparse Row format used by Scilab. The matrix **A** must be square.

alph : The term **alph***(sum of all dropped out elements in a given row) is added to the diagonal element of **U** of the factorization. Thus:
 alph = 0 --->ILU with threshold,
 alph = 1 --->MILU with threshold.

ptol : Two columns are permuted only when $\text{abs}(a(i,j)) \cdot \mathbf{ptol} > \text{abs}(a(i,i))$ [0 --> never permute; recommended values from 0.1 to 0.01.

bloc : Useful for PDE problems with several degrees of freedom. To discard the feature, set **bloc**=n.

ierr : error flag.

 0 --> successful return.
 >0 --> zero pivot encountered at step number ierr.
 -1 --> input matrix may be wrong. (The elimination process has generated a row in **L** or **U** whose length is .gt. n.)
 -2 --> storage of the **LU** factors caused an overflow in arrays alu/jlu.
 -3 --> zero row encountered.

EXAMPLE

```
A=mmread(SCILIN+'tests/matrices/nos1.mtx')
n=size(A,1); b=ones(n,1);
alph=0;drop=0;ptol=0;bloc=3;
[L,U,iperm,ierr]=iludp(A,alph,drop,ptol,bloc);
x=U\ (L\b)
A*x-b
```

AUTHOR

Sparskit procedure interfaced by Aladin Group

SEE ALSO

ilu0, milu0, iluk, ilut, ilud, ilutp