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Operator TO FACTORIZE

1 Goal

To factorize an assembled matrix or to manufacture a matrix of pre-conditioning.

The matrix produced by this operator is provided to the operator TO SOLVE[U4.55.02] to solve the linear systems.

This operator allows:

- 1. That is to say to factorize the matrix assembled (in a product of two triangular matrices) for the direct methods,
- 2. That is to say to build a matrix of pre conditioning for the iterative methods with an aim of accelerating convergence at the time of the resolution.

This order is an obligatory precondition before calling the ordering of resolution TO SOLVE.

Product (or enriches) a structure of data of the type matr asse.

Code Aster

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Syntax 2

chechmate [matr_	asse_^]	10 111010111111		
(# ⊂ ♦	bligatc reuse	ery (except if G = chechmate,	CPC + LI	DLT_INC: prohibited then)
•	MATR_AS	SSE = chechmate	· ,	
	<u># If me</u>	thod <u>mult_front</u> .	<u>MUMPS , I</u>	LDLT:/[matr_asse_DEPL_R]/[matr_asse_DEPL_C]/[matr_asse_TEMP_R]/[matr_asse_TEMP_C]/[matr_asse_PRES_R]/[matr_asse_PRES_C]
	<u># If met</u>	thod gere or petse	÷	
				/ [matr_asse_DEPL_R] / [matr_asse_TEMP_R] / [matr_asse_PRES_R]
	<u># If met</u>	thod MULT_FRONT :		
	\diamond	STOP_SINGULIER	=	/ 'YES', [DEFECT]
	^	PENIIM -		/ 'NOT'. / 'MONGREI' [DEFECT]
	V	KENOM -		/ 'MDA',
				/ 'MANDELEVIUM'
	\diamond	NPREC = / np	rec ,	[I]
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		/ 8.		[DEFECT]
	# If me	/ 8. thod mumps: [defe	CT]	[DEFECT]
	<u># If me</u> ! ♦	/ 8. thod <u>MUMPS:</u> [DEFE RENUM= / / / / /	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI	[DEFECT] (DEFECT] () EL',
	<u># If me</u> t ♦	/ 8. thod <u>mumps:</u> [DEFE RENUM= / / / STOP_SINGULIER	CT] 'CAR', 'AMD', 'MFA', 'QAMD' 'PORD' 'MONGRI 'SCOTC! = /	[DEFECT] , , , EL', H TAPE' 'YES', [DEFECT] WORK
	<u># If me</u> ! ♦ ♦	/ 8. thod <u>MUMPS:</u> [DEFE RENUM= / / / STOP_SINGULIER TYPE_RESOL	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTC! = / = / / = / / /	[DEFECT] (DEFECT] , , , , , , , , , , , , ,
	<u># If me</u> ♦ ♦	/ 8. thod <u>MUMPS:</u> [DEFE RENUM= / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTC! = / / = / / = / / = / / = /	[DEFECT] [DEFECT] , , , , , , , , , , , , ,
	<u># If me</u> ♦ ♦ ♦ ♦	<pre>thod MUMPS: [DEFE RENUM= / / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT PRETREATMENTS =</pre>	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTCI = / / = / / / (CAR', `AMD', `MFA', `QAMD' `PORD' `CAR', `AMD', `AMD', `MFA', `QAMD' `PORD' `CAR', `AMD', `AMD', `AMD', `MFA', `QAMD' `SCOTCI = / / / / / / / / / / / / / /	[DEFECT] [DEFECT] , , , , , , , , , , , , ,
	<u># If me</u> ♦ ♦ ♦ ♦ ♦	<pre>thod MUMPS: [DEFE RENUM= / / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT PRETREATMENTS = ELIM_LAGR</pre>	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTC! = / / = / / / = / / / CA / = / / / / = / / / / CA	[DEFECT] [DEFECT] , , , , , , , , , , , , ,
	<u># If me</u> ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦	<pre>thod MUMPS: [DEFE RENUM= / / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT PRETREATMENTS = ELIM_LAGR GESTION_MEMOIRE</pre>	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTC! = / / = / / / CA = / / = / / = / / / = / / / = / / / (CAR',	[DEFECT] [DEFECT] (())) ()) ()) ()) ())) ())) ())) ())) ())))) ()))) ()))))))))))))
#Parameters limited t	# If me	thod MUMPS: [DEFE RENUM= / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT PRETREATMENTS = ELIM_LAGR GESTION_MEMOIRE versions of MUMPS	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTCI = / / / = / / / CA = / / (CA / = / / / (CA / - - / - / - / - / - / - / - / - - - - - - - - - - - - -	[DEFECT] [DEFECT] , , , , , , , , , , , , ,
#Parameters limited t	# If me	thod MUMPS: [DEFE RENUM= / / STOP_SINGULIER TYPE_RESOL PCENT_PIVOT PRETREATMENTS = ELIM_LAGR GESTION_MEMOIRE versions of MUMPS RATION =	CT] `CAR', `AMD', `MFA', `QAMD' `PORD' `MONGRI `SCOTCI = / / = / / / CAR' = / / / CAR' (`CAR',	[DEFECT] [DEFECT] , , , , , , , , , , , , ,

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<pre>/ /`FR+', / /`LR', / /`LR', / /`LR+'</pre>	3/6 >n : 7e50d93
<pre>/ /'LR', / /'LR+'</pre>	
<pre> Low_RANK_SEUIL= / 0.0 [DEFECT] / lr_seuil [R] # If method GCPC or PETSC: 0 / PRE_COND = / `LDLT_INC', [DEFECT] 0 NIVE_REMPLISSAGE = / 0, [DEFECT] 0 FILLING = / 1., [DEFECT] 0 FILLING = / 1., [DEFECT] / Cr. [R] / PRE_COND = / `LDLT_SP',</pre>	
<pre> LOW_RANK_SEUIL= / 0.0 [DEFECT] / lr_seuil [R] # If method GCPC or PETSC:</pre>	
<pre># If method GCPC OF PETSC :</pre>	
<pre>(DEFECT)</pre>	
<pre>/ niv [I]</pre>	
<pre>/ PRE_COND = / `LDLT_SP',</pre>	
<pre>/ LDHT_DF ,</pre>	
<pre>/ pcent [R]</pre>	
<pre> GESTION_MEMOIRE = / 'CAR', [DEFECT]</pre>	
<pre> LOW_RANK_SEUIL = / 1.E-08 [DEFECT]</pre>	
<pre>() Ir_seuil [R]</pre>	
<pre>[DEFECT] / ` PARMETIS `</pre>	
<pre> / PRE_COND = / 'JACOBI', / 'SOR', # If method LDLT :</pre>	
/ `SOR', <u># If method LDLT :</u>	
<pre> STOP_SINGULIER = / 'YES' , [DEFECT] / 'NOT' , NPREC = / nprec . [I] / 8 , [DEFECT]</pre>	
♦ NPREC = / nprec . [I] / 8 , [DEFECT]	
♦ / BLOC_DEBUT = comic , [I]	
$/ DDL_DEBUT = dd$, [I] $\land / BLOC FIN = bf$. [I]	
/ DDL_FIN = df., [I]	
<pre>\$ TITLE = title , [1_K80]</pre>	
)	
<pre>if MATR_ASSE: [matr_asse_DEPL_R] then [*] ->DEPL_R [matr_asse_DEPL_C] DEPL_C [matr_asse_TEMP_R] TEMP_R [matr_asse_TEMP_C] TEMP_C [matr_asse_PRES_R] PRES_R </pre>	

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3 Operands

The choice of the method of resolution is made as a preliminary in the order $\tt NUME_DDL$ (keyword <code>METHOD</code>).

Five methods are possible: `MULT FRONT', `MUMPS', `GCPC', `PETSC' and `LDLT'.

3.1 Keyword reuse = subdued

By preoccupation with a simplification of the programming and also to gain disk space, factorization "in place" of the matrix (use of reuse) is in general obligatory.

The exception is the couple ('GCPC','LDLT INC'). In this case, it is interdict to use reuse.

3.2 Operand MATR ASSE

♦ MATR ASSE = chechmate

Name of the matrix assembled to factorize or with pre conditioning according to the method.

For the methods `LDLT', `MULT_FRONT' and `MUMPS', this matrix can be real or complex, symmetrical or not. On the other hand for methods `GCPC' and `PETSC', this matrix must be real. For 'GCPC', the matrix must also be symmetrical.

3.3 Operands STOP SINGULIER, NPREC, TYPE RESOL, PCENT PIVOT, PRETREATMENTS, GESTION MEMOIRE, ACCELERATION, LOW RANK SEUIL, PRE COND, NIVE REMPLISSAGE, FILLING, RENUM, REAC PRECOND and ELIM LAGR

These keywords are described in [U4.50.01].

3.4 Operand TITLE

◊ TITLE = title

Title which one wants to give to the result [U4.02.01].

3.5 **Operand INFORMATION**

- ♦ INFORMATION =
 - 1 : no impression

3.6 Partial factorization (method LDLT)

For the method `LDLT', the operator allows to factorize only partially the matrix. This possibility makes it possible to factorize the matrix in several times (several work) to even modify with the flight the last lines of this factorized. Today, this functionality presents little interest except for certain *Warning : The translation process used on this website is a "Machine Translation". It may be imprecise and inaccurate in whole or in part and is*

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methods (known as discrete) of contact-friction where one has, intentionally, placed in the last lines of the matrix the terms concerning the nodes likely to be in contact. Thus, as iterations of pairing, the relations between these nodes changing, one erases then recomputes that these last contributions of factorized. It is a typical example where the astute use of an algorithm enough frustrates little to bring major profits (in time).

♦ / BLOC DEBUT = comic

comic : partial factorization since comic^{-ième} block included.

/ DDL DEBUT = dd

dd: partial factorization since dd^{-ieme} equation included (in internal classification established by the operator NUME_DDL [U4.61.11]).

◊ / BLOC_FIN = bf

bf: partial factorization until bf^{-ième} block included.

/ DDL FIN = df

df: partial factorization until df^{-ième} equation included (in internal classification established by the operator NUME_DDL [U4.61.11]).

BLOC DEBUT and DDL DEBUT

- in the absence of the keywords BLOC_DEBUT and DDL_DEBUT, the matrix will be factorized starting from its first line.
- if the argument comic keyword BLOC_DEBUT is negative or null, the matrix will be factorized starting from the first block. If not, one carries out a partial factorization from comic^{- ième} block included.
- if the argument dd keyword DDL_DEBUT is negative or null, the matrix will be factorized starting from the first equation. If not, one carries out a partial factorization from dd^{- ième} equation included.



4 Examples

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See the examples in the documentation of the order TO SOLVE [U4.55.02].