List of operators and procedures of Cast3M

This list is not complete. The aim is to group by type operators and procedures.

Contents

1 Language

argu	allows to read arguments within a procedure
assi	ask the IASSISth process to execute the elementary instruction
debm	this operator introduce the definition of a method acting on an object of OBJET type
debp	this operator introduce the definition of an object of type PROCEDUR, which is a serie of instructions. The first instruction is DEBPROC (start procedure)and the last one is FINPROC (end procedure)
detr	to destroye an object. We do not advise you to use this operator
finm	end the defintion of a method which has been started by the DEBM operator
fin	a) stop the execution of Cast3M b) end defintion of a group of instructions begun by the REPETER (repeat) directive
finp	end the definition of a procedure and allows to give back results
fins	directives SI (if), SINON (else) and FINSI (endif) allow conditional execution of instructions function of the logical value following the SI (if) directive
heri	this operator is to allow an object of type OBJET to inherit methods of another object
iter	to iterate (repeat if necessary) the group of instructions defined by the REPETER (repeat) operator
meth	the operator METH gives a method to an object of type OBJET
mot	can be used to give an alias to a key-word
obje	to create an object ot type OBJET
oubl	allows to forget the name of an object or to withdraw an index of a TABLE object
quit	this operator is to stop the execution of a repeat sequence or of a procedure
repe	to repeat the execution of a group of instructions
resp	this is one way for a procedure to give back results
sino	this is the "else" of the SI...SINON...FINSI (if... else... endif) directives which allows conditional execution

si if statement of the SI .. SINON ..FINSI (if.. else.. endif) directives which allows conditional execution

text permet de donner un nom à un texte. Ce texte est fabriqué à partir des objets OBJET1, OBJET2

type give back the type of an object. Result is a MOT (word) of 8 characters

2 Logical

ega	to test the equal condition
et	this is the AND between two logical values
<eg	to test the smaller or equal condition
>eg	to test the greater or equal condition
neg	to test the non-equal condition
non	to inverse a logical value
<	to test thesmaller condition
>	to test the greater condition
ou	this is the OR between to logical values

3 Input/Output

acqu to read values in file written by another code

chau read/write operator on a given port

@excel1 this is to write an object of type EVOLUTION in a readable format by Excel(Microsoft)

exte can be used to pass a command outside Cast3M

impchi1 print a TABLE object issue by CHI1 (chemical) operator

impchi2 print a TABLE object issue by CHI2 (chemical) operator

@lireent procedure to read in an interactive mode an integer value

lireflot procedure to read in an interactive mode a real value

@lireris to read in an interactive mode "oui" ou "non" (Yes or no)

list to print an object

menu can be used to create a menu within a graphic window

mess to print a message on the output file

obte to get an object in an interactive mode

rest this is the way to restore objects which have been saved (SAUVER) on file

sauv to save objects on file

4 Mesh

affi	to perform a geometric affinity
annoimp	this procedure generates a ring mesh with imperfections around the Oz-axis
aret	gives a mesh of the sharp-edges of another mesh
bary	Creates a point at the barycentre
boa	to mesh a piping system
c	alias of CERCLE (circle)
@carene	to mesh a surface like the hull of a ship
ccon	separates the connected components of a mesh
@cdg	gives the centre of gravity of a mesh
cer3	to mesh a circle defined by three points
cerc	to mesh a circle defined by two points and the centre
conf	to merge 2 points
cong	generates a transition radius between two lines
cont	returns the contour of a meshed surface
contseg3	creates a stiffness matrix and two meshes for the purpose of unilateral contacts for seg3 elements
coor	returns coordinates of a point or a mesh
cote	for a quadrilateral surface, returns one side
coul	gives a color to a mesh
@couple	mesh a line from two EVOLUTION objects
coupler	this procedure generates the mesh GEO2 deduced from GEO1 by translating half of GEO1 thickness
cour	creates a polynomial curve
cout	returns a mesh joining two lines
cubp	constructs an arc of a cubic passing through 4 points
cubt	constructs an arc of a cubic knowing ends and tangents at ends
d	alias of DROI (straight line)
dall	to mesh a surface knowing 4 (or 3) sides

dedans	retuirns a logical true or false to the question : is a point lying inside a domain defined by a border
dedo	splits nodes into two to create cracks
dedu	deduction of a whole mesh knowing transformation of a set of nodes
dens	to define the standard density
depl	to move points
diff	executes the symmetric difference of two meshes
droi	meshs a straight line
elem	to extract some elements from a mesh
elim	to join double points
enve	returns the envelope of a solid 3D mesh
extc	extract the center or side points of a FACEL type mesh object
face	to recover the N1-ith face of a solid object
@fis_3ds	create a massive hexaedre which include an elliptic crack
fuit	splits in two pieces a closed oriented outline
gene	returns a surface created by translation of a straight line along another line
genj	generates a mesh of interface elements connecting the internal contours of another mesh
hauban	mesh of a cable subjected to its own weight
@helice	creates the mesh generated by an helicoidal transformation
homo	to perform an homothetic transformation
impf	creates a mesh for friction analysis
impo	creatzes a mesh for unilateral contacts analysis
incl	returns elements which are lying inside another mesh
indi	supplies flags to estimate the quality of a mesh
inte	mesh a line located at the intersection of two geometric surfaces
inve	returns the inverse of a line
liai	generates the set of linkage elements between two surfacic objects
lign	to construct the arc of a circle knowing the centre, the starting point, and the open-angle
mailstru	to perform a structured mesh

mesu	returns a length, a surface area or a volume of a mesh
nbel	gives back the number of elements of a mesh
nbno	gives back the number of nodes of a mesh
noeu	gives a name to point through its number
ordo	to reorder a mesh
orie	to assure that all elements liable to be oriented are oriented in the same way
para	to mesh a parabolic line
parc	to mesh a circle by means of parabolic lines
pave	to mesh a volumic area from six faces
poin	permet de récupérer un ou plusieurs points d'un maillage
pointcyl	to define a point from its cylindrical coordinates
pointsph	to define a point from its spherical coordinates
proj	projects a mesh on a geometric define space
quel	to construct a broken line
racc	to mesh joint element in 2D
raft	to remesh a mesh function of size field defined at node
@rayo	creates a symmetrical radiant mesh around the crack tip
refe	to give a list of mehes included in a mesh or to know if a mesh is included another mesh
rege	to transform elements with nodes at the same location
regl	constructs the ruled surface between two lines
@repere	to mesh a reference system
rota	constructs a surface generated by the rotation of a line
sens	calcul e sens de parcours de contours fermés
surf	automatic meshing inside a closed countour
syme	constructs the mesh stemming from the symmetry of another mesh
@tole2	to get a solid mesh of a shel from its mid-surface
@tole3	solid mesh from couple of hulls
tour	to rotate a mesh to which a chpoint or a mchaml may be attached
tran	constructs a mesh by translating a line

vers verification of the orientation of a mesh

visa to construct two meshes composed of points that faced each other

volu to construct a solid mesh by translationg or rotating a surface or to automatically mesh a volume inside an envelope

zigzag to mesh a line by succession of straight lines and curved lines

5 Multi-physics

aide	to search a character string in the user manual
anti	antisymmetrical boudary conditions in mechanic
bloq	boundary conditions on primary unknowns
cara	to read element geometric caracteristics
char	to define the loadings for PASAPAS computation
cneq	to reduce volumic field to nodes
depi	to set values to boundary condition acting on primary unknowns
erre	generates an error
et	concatenation and assembling of objects
evol	to create EVOLUTIO (evolution) object
form	to manipulate coordinates references
info	operator to print the user manual
mate	to read material and geometric properties of elements
mode	association of a mesh with a physic formulation and a finite element type
opti	to define general parameters
pasapas	to perform step by step analysis
reac	complementary "loads" to verify Dirichlet type conditions
rela	to impose relations between primary unknowns
reso	to solve the set of linear equations
rest	to restitute a set of "saved" objects
sauv	to save objects for a later restitution
sort	output of meshes and chpoints
symt	symetric conditions of Dirichlet type
titr	to give a title
vari	computes values of a field function of values of a parameter field

6 Mechanical analysis

amor	computes damping matrix
@ana_lim	to perform a limit loads analysis
anlimtre	to perform a limit loads analysis for articulated structure
anti	antisymetric Dirichlet limit conditions
appu	creates stiffness of a linear spring
autopilo	procedure to be modified to change automatic piloting of the PASAPAS procedure
bsig	calculates the nodal force field resulting from a stress field integration
cabl	computes stiffness of a cable
calp	computes stresses on the upper or lower part of a shell
capi	to change stress type (Cauchy —> Piola-Kirchoff)
cfl	computes time step for the CFL condition (Current Freidrich Levy) for DREXUS
cmct	performs a condensation of equations system for DREXUS
coller1	computes Dirichlet relations to join shell and beams
coller	computes Dirichlet relations to join shells or beams to a solid
comp	carries out the evolution of the fields relative to any physical modelling
conn	pretreatment in view of non local material
cson	computes the velocity of sound waves (drexus)
diri	to identify the Maxwell parameters
drexus	To perform an explicit step by step computation
dynamic	to compute dynamic elastic response by Newmark algorithm
elas	computes stresses from strains or vice versa
ener	tensorial product stresses * strains
ense	creates a SOLUTION object of rigid modes
epsi	to compute strain from displacements
epth	to compute strains associated to a thermal field
fiabili	to search the failure probability of a structure
finvrepa	computes the inverse value of a distribution function of a random variable
flambage	to perform buckling analysis

fofi	calculates a field of nodal forces stemming from an integration of the product of a stress field by a displacement gradient field
forc	constructs a force field which results from a localized force
frepart	this procedure imposes a distributed load along an open line
fron	follows the advance of a front on a structure whenever it propagates isotropically at a given velocity
fronabs	create absorbing boundaries used in the calculations of the ground-structure interaction
fsur	calculates the nodal forces which are equivalent to a surface force density
hook	computes Hooke's matrix
hota	calculates tangent Hooke's matrix
identi	identification of some behaviour laws
impo	allows to have automatic contacts
inva	calculates the 3 invariants of a stress or strain tensor field
kp	calculates the pressure load correction matrix
ksig	calculates the geometric stiffness matrix
ktan	calculates the tangential stiffness matrix in elasto-plasticity
limemeca	allows to determine the limit state of a structure
lump	creates a diagonal matrix (lumped)
mass	computes the mass matrix
mesm	determines the elementary collapse mechanism of a structure
mocu	computes the response of a SECTION model, associated to a cicular bi-axial bending loading program under normal force
mome	creates a bending moment field
mota	returns the field of tangent Young's moduli
nloc	It is a localization limiter (in the same way as when using the second gradient or COSSERAT media)
@ortho	creation of the field by elements of the mechanical characteristics of an orthotropic material
@otcoque	to optimise a shell structure according full stress design
@otpout	to optimise a beam structure according full stress design

pasapas	to perform a non-linear analysis step by step
pica	turns a Piola-Kirchhoff stress field of second kind into a Cauchy stress field
pmpb	decomposition into normal loads and bending loads for a stress field along a line
pola	makes the polar decomposition of a gradient field associated with a geometrical transformation
postddi	post-treatment of DDI behaviour law
prec	computes stresses along a tendon in a concrete structure
pres	returns nodal forces from pressure field
prin	computes principal stresses
ramberg	to identify Ramberg-Osgood parameters
rigi	returns the stiffness matrix
rten	rotates a stress or strain tensor
sigm	returns stresses from displacements
supe	actions for super-element
tail	to be used for Ottosen behaviour law
tres	returns Tresca's criteria
vmis	returns Von Misses's criteria
work	computes the trace of the tensorial product of both a stress field and a gradient field
@zacplus	computes the limiting state for a structure due to a fatigue test

7 Fracture mechanic

critloc	to apply one of the local criterias for rupture analysis
ctod	returns the CTOD for a crack
g_theta	returns the G parameter at the crack tip
@lispa16	propagation of crack for a line spring element
propag	propagation of crack for cracked pipe (TUFI element)
sif	returns K1 and K2 from displacements
tractufi	pre-treatment for TUFI element (cracked pipe)
weibull	returns the Weibull's fracture probability
weip	returns Weibull's parameters M and SIG0

8 Multilayer mechanic

@lacalc	To compute a multilayers structure
@lacrit	returns failure criteria for multilayers structure
@lafail	computes the ultimate breaking-strength of a multilayers structure
@lagraph	to plot stresses through thickness of a multilayers shell
@lakappa	to modify the shear moduli G13 and G23
@lalist	to print caracteristics layer by layer
@lamass	returns mass matrix of a multilayers structure
@lamat	provides homogeneized Hooke's matrix or layer by layer
@laread	to read datas for multilayers structure
@larig	returns stiffness matrix for a multilayers structure
@lasiep	computes stresses and strains layer by layer
@laverg	to plot failure criteria for a mltilayers structure
@lavis	plotting of stratification of layers

9 Thermal analysis

arcgau	returns a temperature field created by displacement of a welding arc
capa	returns the capacity matrix
chtgau	returns a temperature field created by displacement of a welding arc
cond	returns the conductivity matrix
conv	to impose boundary convection
ffor	calculates the view factors matrix for radiation
flux	to impose a thermal flux on boundary
fron	follows the advance of a front on a structure whenever it propagates isotropically at a given velocity
hrayo	calculates a linearized exchange coefficient for the treatment of radiation
htctran	thermal and hydric transfert in concrete
pasapas	to run a thermal transient analysis
raye	returns the radiation matrix
rayn	returns conductivity matrix of linearized radiation
rosent	returs the Rosenthal's solution of a welding arc displacement
sore	returns the Soret's diffusion matrix
sour	to impose a volumic heat source
thermic	for permanent thermal analysis

10 Modal analysis, seismic analysis

accevite transforms an acceleration response spectrum in frequency or period into a velocity response spectrum in frequency or period

analyser to carry out the orthogonal wavelet analysis of a signal given on a uniform grid of any length

base The BASE operator enables the user to construct an object (BASEMODA type) which includes all informations

carries out a geometric operation of translation or rotation on an object containing modes and pseudo-modes of a structure

brui to generate LISTREEL, EVOLUTIO or CHPOINT with random values

choc to prepare an object which contains the description of an impact type linkage

chsp to turn one given spectrum into one spectrum of different type

cinimod calculation of a CHPOINT of generalized coordinates (discplacement or velocity), corresponding to a CHPOINT of nodal coordinates (discplacement or velocity)

clst creates aa object (BLOQSTRU type) used for writing linkages between substructures

cmoy calculates a mean collision from a set of impacts

comt calculates the number of collisions contained in a gradual recording of impact

cosi correction of acceleration signals to ensure..

dcov if C is a covariance matrix, this operator computes M matrix as such as M*Mt = C

Deconv calculates the free field seismic response by the method of deconvolution

depb creates an object of ATTACHE type used to impose displacements upon certain points of a substructure defined by its modal base

deve constructs an ATTACHE type object which contains the data of a DEVERSOIR type linkage

dspr constructs the curve of spectral power density of a signal

dynamode calculates the dynamic response of a structure, according to the following outline :

projection onto the modal base

explicit integration in time

response modal recombination

dyne Computation of a dynamic response by means of two explicit algorithms: central differences or Fu-de Vogelaere algorithm

ec8acsis a) Generation of a spectrum of response RS (EVOLUTION type object composed of a single curve) according to EUROCODE instructions number 8

b) Generation of a spectrum of response RS for using all the linear analyses

elfe to calculate the transfer function of a plane plate in bending by means of an integral formulation in the frequency domain (Laplace)

elst creates an ELEMSTRU type object which is used for writing linkages between substructures

enrichis enables the user to generate a signal EVOL1 from a signal EVOL2 on a grid 2**ENTI1 times richer

filt to calculate PASSE-HAUT,(highpass), PASSE-BAS (lowpass) .... filters

freqperi Transfoms a signal in frequency EVOL2_F into a signal in period EVOL1_P and vice versa

gree calculates GREEN's functions associated with beams for resolving dynamic problems by integral equation

hann works out Hanning mean for the spectrum

ifre calculates FRESNEL integrals

insi performs the numerical integration of signals in accelerations

jonc creates an ATTACHE type object describing the linkage between several structure elements

lapl constructs the inverse Laplace transform for a function of sk= a + i*wk, by means of DURBIN method

lsqf to perform a Least-Squares type modeling of the signals EVOL2

lump Fabrication of a lumped matrix from a complete one

m_dampin constructs the truncated modal damping matrix in the physical space

m_damp_K constructs the truncated modal damping matrix in the physical space, completed with a stifness proportional damping

moyespec calculates the mean value FLOT1 of a curve EVOL1

multidec enables the user to "multidecompose" a signal given on a uniform grid of any length with respect to conjugated mirror filters

multirec enables the multi-recomposition of a signal from its decomposition and its residue with respect to the conjugated filters

nnor normalizes an object so that the greatest value equal 1

normalim to generate the normed functions EVOL1 associated with EVOL2

onde constructs continuous wavelet transform for a signal

osci to calculate an oscillator response X(t) to a given signal

pert The PERT(turbe) operator disrupts LREEL2 so as to produce LREEL1

pjba 1) projects forces onto an elementary or complex modal basis

2) calculates the projection of a stiffness on a complex or real eigen mode table

prns Calculation of the spectrum of response EVOL1

psrs Calculation of the N spectra of response EVOL1 associated with the power spectrum EVOL2

psmo to calculate, in the calculation of a modal recombination, the contribution of the modes which the modal basis did not take into account

reco recombines the modes and the static solutions contained in a modal basis from the modal contributions

recompom enables the recomposition EVOL1_SIGN of a signal whose orthogonal wavelet is known as modulation functions EVOL3_MDECO and as a residue function EVOL2_MRESI

recompos enables the recomposition EVOL1_SIGN of a signal whose orthogonal wavelet decomposition EVOL3_DECO and residue EVOL2_RESI are known

respowns Calculation of the power spectrum of a "virtual" stationary signal of period TE associated with a spectrum of response corresponding to a damping AMOR, and to N modulation curves at a specified frequency wavebands

respowsp Calculation of the power spectrum of a signal of period TE associated with N spectra of response corresponding to N dampings

seis creates a CHARGEMENT object from a temporal and spatial description on a seismic modal basis

siar generates a set of ENTI1 non stationary signals

signderi	adds a straight line to the accelerogram so that both the velocity and the displacement be null at initial and final times
signsynt	creates synthetic signals by the recombination of random phase sinusoids
sigs	calculates the stresses from a SOLUTION type object or a TABLE type object
sissib	calculates the seismic response of a structure by means of a spectrum analysis
sols	creates static solutions U for all of the permanent linkages that apply to the structure
spo	to calculate one or several oscillator spectra depending on the given number of dampings
spon	to calculate one or several non linear oscillator spectra depending on whether one or several damping and linear spectra are given
spplanc	calculates ground spectra by analitical approach
stru	creation of a STRUCTURE object for DYNE
suit	to create a list of fields by points (LISTCHPO)
synt	From substructure modes and fields of modal contributions on these modes, it creates a SOLUTION object containing the structure modes
tfr	constructs fast Fourier transform for a signal
tfri	constructs inverse Fourier transform for a signal
tire	to draw an object whose nature is specified in the syntax from a SOLUTION object
traduire	creates a BASE_DE_MODES subtype table from a SOLUTION object of MODE subtype
transfer	calculates the transfer function of a structure in displacement, velocity or acceleration
valnom	calculates the weighting of the wavelet coefficients and the weighting of the residue from a stationary spectrum
valspe	The stationary spectrum is computed from the weighting data of the wavelet coefficients and from the residue (as well as from the time step of the residue

11 Magnetostatic

biot	constructs the Biot et Savart induction field or vector potential
biovol	Calculation of the magnetic field by means of BIOT ET SAVART, by integration on elements of any form
cour3d	Calculation of the electric currents in a 3d-mesh inductor
ddfour	Harmonic analysis of multipoles in 2D vector potential magnetostatics
deco	calculates the eddy current density of the eddy current function solution of a MAGNETODYNAMIC problem
descour	Description of regions of electric current in vector potential magnetostatics
forbloc	In 2d potential vector magnetostatics, calculates the forces on an inductor by means of a surface integral J * B
for_cont	In 2d magnetostatics vector potential, calculation of forces on an inductor by a contour integral
h_b	gives the curve mu(h) or 1/(mu(b)
inductio	Calculation of the induction in potential vector in 2D magnetostatics
magn	présentation of electro-magnetic capabilities
mag	Calculation of non-linear vector or scalar potential for magnetostatic problems
mutu	calculates the mutual inductance matrix for eddy currents calculations with the eddy currents support
@polo	Calculation of a coloidal magnetic field generated by a set of coils
pot_scal	calculation of both the total and the reduced potential by the two-potential method
pot_vect	In 2D magnetostatics, calculation of the vector potential
resi	calculates the resistance matrix
@toro	Calculation of magnetic field created by circular coils

12 Post-treatment

afco	automatic coloring for each zone
affiche	displays, on the screen, the deformed shape of a structure subjected to a given loading
anime	constructs a DEFORME type object which is intended to be displayed in animation
animgks	preparation of deformed shape animation with a GKS graphic library
@b_tpo2d	calculates and plots principal stresses by means of arrows
@cartoon	performs the animation of the successive deformed shapes from a PASAPAS computation
cinema	generates an animation of a object according to a succession of view points
cinemb	generates an animation of a object GEO1 according to a succession of view points and directions of the observer head
courspec	Preparation for plotting a stationary power spectrum associated with a wavelet decomposition
creer_3d	3D ploting of 2D axisymetric computation
@defa2dl	visualisation de conditions d'appuis en 2D sur une ligne
@defa2dp	ploting of displacement boundary conditions of a node
defo	constructs a DEFORME type object
dess	to plot curves contained in an object of evolution type
destra	to plot the curves results of TRACHIS or TRACHIT
dfou	calculates the values of the field CH1 for a given angle FLOT1 for Fourier's analysis
@enca	ploting of clamped type boundary condition (2D)
enermode	to plot the time history of quantities after an explicit dynamic analysis on modal basis with the DYNE operator
explorer	graphical post processing of a table issued of PASAPAS
@global	creates the evolution of reactions at boundary conditions
images	ploting of PASAPAS results
@lagraph	to display the stress variation in relation to the thickness for multilayers shell
@laverg	enables the graphic checking of the "failure rate" for multilayers shell

@lavis to show the stratification of layers

montagne to display a one-component field by points in relief for 2D analysis

ntab to plot tables from objects

peche to retreive for a given time the results of a calculation carried out using PASAPAS procedure

@plotpri o plot a vectorial field of principal stresses, and the corresponding field of Von Mises equivalent stresses in interactive mode

pmpb decomposition into normal loads and bending loads for a stress field along a line

@rccm post treatment of results according RCCM rules

@relief to display the component of a field by point or field by element in relief, and to superimpose the isovalues of another component

@total calculates the resultant of a CHPOINT component on a given mesh

trac3d 3D ploting of deformed shape of shell in 2D axisymetric or Fourier's analysis

trachis post-processor of the results of DARCYTRA or PASAPAS for ploting by DESTRA

trachit post-processor of the results of DARCYTRA or PASAPAS for ploting by DESTRA

tracmeca to visualized the elementary collapse mechanism of the structure computed by MESM

trac general operator for ploting

trtrajec to plot trajectories of particles

vect constructs a VECTEUR type object for ploting

@vis3d performs an animation of the envelope of the mesh GEO1 by successive rotations

@visor visualisation of otrientations of orientable elements

13 Mathématiques

/	divides the OBJET1 object by the OBJET2 object
abs	calculates the OBJET1 absolute value
atg	calculates the arctangent of OBJET1 / OBJET2
ajuste	adjustes parameters of a function to best fit a series of given values
alea	Generation of a gaussian stationary random scalar field
cos	calculates the cosine
cosh	calculates the hyperbolic cosine
deg3	calculates the roots of a polynomial of degree 3
diag	gives the number of negative eigenvalues of a stiffness matrix
dimn	gives the dimension of the kernel of a matrix
enti	converts a real number into an integer number
erf	calculates the Gauss error function
exce	computes the minimum of a function F(Xi) satisfying conditions
exp	calculates the exponential of the OBJET1 object
factorie	computes factorial of an integer
filt	to calculate PASSE-HAUT,(highpass), PASSE-BAS (lowpass) .... filters
flot	transforms an integer into a real
fonc	allows evaluation of Bessel's or Fresnel's functions
grad	to calculate gradient of a CHPOINT field
graf	to calculate bending gradient for shell elements
gree	calculates GREEN's functions associated with beams for resolving dynamic problems by integral equation
indibeta	calculates the reliability index defined by a probability
intg	performs the integration within elements of a field component
jaco	to calculate the absolute value of Jacobians
lapl	constructs the inverse Laplace transform for a function of sk= a + i*wk, by means of DURBIN method
@lisse	creates a smooth evolution starting from an ordinary evolution and performing a deformation of a beam
log	calculates the natural logarithm of an object

mapp	constructs a Poincaré's chart
masq	creates an object of same type as the input one, the values of which are 0's or 1's
maxi	defines maximum value of an object
max1	normalizes an object
mini	defines minimum value of an object
moyespec	calculates the mean value of a curve EVOL1
mult	replies by a logical if one number is a multiple of another
nataf	computes the image of a point of physical variables space into the standardized Gaussian space or vice versa
norm	calculates the norm for the vector VEC1
-	computes difference of two objects
*	computes the procduct of two objects
**	raises the OBJET1 object to the OBJET2 exponent
+	computes the summ of two objects
ordo	reordering of listenti, listreel, evolution or mesh
orth	orthogonalizes a CHPO2 object with respect to a series of objects
parastat	calculates the statistical parameters associated with a set of values
pmix	performs the scalar triple product of 2 (in 2D) or 3 (in 3D) vectors
@pomi	determines polynomial best fit of a function
prim	computes the value of the primitive of an EVOLUTION
prob	calculates the probability that a random variable be smaller than a defined value
probabrs	calculates the failure probability of an idealized component reliability problem
probdens	calculates the probability density function and the cumulative density function
pvec	performs the vectorial product of n vectors
quadratu	calculates the points and the weights of the quadrature rule associated with the weight function defined by the probability density function
racp	calcule les racines réelles d'un polynôme du I-ème degré (I<5)

repart	calcule en un point la valeur de la fonction de répartition d'une variable aléatoire
rten	rotates a stress or strain tensor
sens	a) used with connectivity for non-local behaviour model
	b) determines how closed outlines are oriented in 2D
sign	provides the value +1 or -1 according tothe sign of the VAL2 object
simp	searches for the maximum of a linear or linearized function F(Xi) under constraints
sin	calculates the sine
sinh	calculates the hyperbolic sine
somm	calculates the integral of a function ordinates on its abscissa
@stat	computes means, standard deviation and regression coefficients or a set of reals
tagr	calculates the transposed of a gradient matrix
tanh	calculates the hyperbolic tangent
tote	calculates the sum of the intervals on which one of the abscissas of a function is greater than a predefined threshold
valp	calculates the eigenvalues for a tri-diagonal matrix
vibc	searches for the complex eigenvalues and eigen vectors of the general equation of motion
vibr	searches for the eigenvalues and eigen modes of a physical system represented by its stiffness and its mass
xtmx	calculates the quadratic form application associated with a stiffness and a field by points
xtx	calculates the norm of a field or of the linear combination of two fields of same type
xty	calculates the scalar product of two fields
xxt	calculates the matrix associated to the tensorial product of a field by points by itself
ytmx	calculates the application of the bilinear form associated with a stiffness and two fields by points
zleg	computes the zeroes and the weights of the derivative of Legendre polynomial

14 Utilitaries

@arr	returns a word containing a number
chai	to create a word from objects
chan	to change something in an object
choi	allows to choose graphically options in a set of options shown as a scoreboard
chpo	creates a CHPO1 object, its components are the initial degrees of freedom of a given RIGIDITY object
coli	linear combination of CHPOINT
comb	oes the linear combination of objects that are stored in a table indexed by POINT type objects
comm	to seize data comments
conc	performs the concatenation of two objects
coor	returns coordinates of points or meshes
copi	to duplicate an object
@coutor1	calculates the curvature and the twisting of a segment of line
@coutor2	calculates the curvature and the twisting of a line on each of its elements
dans	returns a logical value verifying the inclusion of a « listenti« in one another
diad	constructs a LISTREEL from one another
dime	returns dimension of an object
enle	to withdraw a part of an object
exco	to extract and rename a component of a field
exis	tests on the existence of an object
extr	to extract informations from an object
fdt	to create a function (EVOLUTION type) from a list of ordinates and a time step
@fix	returns a word containing a number
@frenet	calculates Frenet basis along a line
inde	to get all the indexes of a table
inse	to insert an object into another object
int_comp	Component interpolation of a field by point on a mesh

ipol	interpolation of an object with the help of two listreel
lect	constructs a LISTENTI object
ltl	scalar product of two LISTREEL
manu	hand made object
masq	creates an object of same type as the input one, the values of which are 0’s or 1’s
maxi	defines maximum value of a chpoint, listenti, listreel or mchaml
max1	normalizes an object
mesu	returns a length, a surface area or a volume of a mesh
mini	defines minimum value of a chpoint, listenti, listreel or mchaml
mots	constructs a LISTMOTS object
mulc	multiplies 2 fields by points, term by term
nomc	renames components of a field
normalim	to generate the normed functions associated with an EVOLUTION object
noti	to print the user’s manual
nuag	constructs a NUAGE type object
ordo	reordering of listenti, listreel, evolution or mesh
plac	returns information on memory space
prog	to construct a LISTREEL object
proi	projects the components of a MCHAML defined onto the nodes of a given solid geometry, onto a new geometry
psca	performs the scalar product of 2 vectors, or 2 CHPOINT
redu	reduction of an object chpoint, mchaml, modèle, nuage
remp	to replace a value into a listreel, a listenti or a listmots
resu	calculates the resultant of a field by points
rimp	to change the subtypes of a complex EVOLUTION object
sais	allows to obtain interactively a name of object or a value on the plot window
sauf	constructs a listenti (listreel) from two listenti (listreel)
saut	to skip pages or lines during the printing of data

@stbl performs the ET (and) operation on all objects in a table

syme constructs the object stemming from the symmetry of another object

tabl creates a TABLE object

temp gives informations about running time

tire to draw an object that corresponds to the loading at a given time step from a CHARGEMENT type object

tour reates an object which geometrical support is obtained from the rotation of another one

util to set a personal file containing either personal manuals or procedures

vale to retreive the values allocated to the general options of calculation

vsur to calculate the surface vectors associated with the integration points of the shell elements

zero to create a field whose components are all null