True*Grid*®Output Manual For ANSYS®

A Guide and a Reference

by

Robert Rainsberger

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XYZ Scientific Applications, Inc.

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I. ANSYS® Output Guide

This manual teaches the use of **True*Grid*®** when applied to a model to serve as input to the ANSYS® finite element simulation code. The generation of the geometric model is covered extensively in the **True*Grid*®** User's Manual and is not repeated here. There are many other features needed for a complete input to ANSYS® which are covered in this manual. Below is a list of some of the non-geometry commands that you may require to build a complete model.

title to set the problem title
plane to define symmetry planes
rotation to assign rigid body rotation
velocity to assign rigid body velocity
mate to select a material number for a part
jd to define numbered shared nodal degrees of freedom
spd to define the properties of numbered springs and dampers
bsd to define beam cross section properties
quadratic to generate 2nd order brick and shell elements
linear to return to generating 1st order brick and shell elements
mt to select a material for a region of a part
b to constrain nodal degrees of freedom
n to orient shell elements
or to orient local material coordinate systems within the element
fc to specify nodal forces (use 0 for the load curve)
mom to assign nodal moments (use 0 for the load curve)
fd to specify fixed nodal displacements (use 0 for the load curve)
fa to specify fixed nodal rotations
ndl for distributed nodal loads
pr to generate surface pressures (use 0 for the load curve)
pramp to specify pressure amplitude
dom to specify the domain of pramp
th to set shell thickness in a region different from the default
te to define constant nodal temperatures for temperature dependent materials
vhg to generate heat generating elements (use 0 for the load curve)
cvt to generate convection thermal loads
hfl to generate nodal flux, flow, amps, and heat conditions
mp to set the scalar magnetic potential
v to set the electrostatic potential
pm to assign mass to a existing node
npm to create a node and assign a mass to it
nset to assign nodes to named nodal sets
mpc to assign shared nodal (multiple point) constraints for a nodal set

jt to specify nodes shared degrees of freedom
spdp to specify a face to form a surface of springs/dampers
spring to create a numbered spring

The following commands are specific to the interface to ANSYS® and are discussed in detail below:

ansys to select the ANSYS® output format
ansyopts to define analysis options
ansymats to define element and material properties

You may want to view some of the properties graphically using the **condition** (**co**) command in the merge phase. The **tmm** command can be used to calculate the mass of each part. Be sure to merge the nodes using one of the merging commands such as **stp** and, finally, use the **ansys** command to select ANSYS® as the output option and the **write** command to actually create the input deck for ANSYS®.

The follow ANSYS® cards are generated using the commands listed above:

ACEL
ADAMS
ADAPT
ADDAM
ALPHAD
ANTYPE
ARCLEN
ARCTRM
AUTOTS
BETAD
BFE
BUCOPT
CGLOC
CGOMGA
CM
CMATRIX
CNVTOL
CP
CQC
CRPLIM
CSYS
/COM
CUTCONTROL
CYCOPT

D
DCGOMG
DDSOPT
DELTIM
DMPRAT
DOMEGA
DSUM
DSYM
EMATWRITE
EMORE
EN
EQSLV
ERESX
ESEL
ET
EXPASS
F
FINISH
FREQ
FSRS
GAUGE
GRP
HARFRQ
HFEIGOPT
HFPCSWP
HFSCAT
HFSWEEP
HREXP
HROPT
HROUT
KEYOPT
LMATRIX
LNSRCH
LOCAL
LUMPM
LVSCALE
MAT
MDAMP
MODOPT
MONITOR
MP
MPDATA
MPTEMP

MSAVE
MXPAND
N
NCNV
NEQIT
NLGEOM
NRLSUM
NROPT
NSEL
OMEGA
OPNCONTROL
PRECISION
PRED
PSDSPL
PSDUNIT
PSDWAV
PSOLVE
PSTRES
R
RATE
REAL
RIGID
RMODIF
RMORE
ROCK
SECNUM
SECOFFSET
SECREAD
SECTYPE
SED
SEEXP
SEOPT
SF
SFE
SOLCONTROL
/SOLU
SPOPT
SRSS
SUBOPT
SV
SVTYP
TB
TBDATA

TBTEMP
TIME
TIMINT
TINTP
/TITLE
TOFFST
TRNOPT
TYPE
VDDAM

In case a keyword command is not generated by **True*Grid***®, use the **verbatim** command to create the exact line to be replicated in the output file. You may also wish to contact XYZ Scientific Applications at (925) 373-0628 or at info@truegrid.com to request that this feature be supported in later versions of **True*Grid***®. The **verbatim** command saves you from inserting the keyword command into the ANSYS® input deck. This is particularly useful if you are rerunning the **True*Grid***® session file as you evolve the model or make parametric changes to it.

There are a number of ANSYS® specific properties that can be specified. These properties are not explained here because they are explained in the **True*Grid***® User's Manual. These properties include:

bsd to define beam cross section properties
sid to define the property of a contact surface
offset to start the number of nodes and elements from a number other than 1

II. ANSYS® Output Example

III. ANSYS® Output Reference

The syntax for commands are described below were literals are highlighted in bold. Symbols to be substituted are italicized. Square brackets indicate repetition of an argument list. Each command is described by an entry like the following:

command summary description

command *arguments* brief description of functionality
with brief descriptions of what the *arguments* should be. Indentation is used to indicate a list of options.

Remarks

When present, the Remarks section describes the command in even greater detail. It may describe the context in which the command is normally used, and other commands used in association with this command. It may describe side effects. It may describe other, similar commands. In many cases, it includes a description of where to find the command in the menus.

ansymats ANSYS® materials

ansymats *mat_no stifn* [*material_option list_of_values*] ; **ko***n m* ;
where

mat_no user-defined material number to be associated with the material and element (using **mate** or **ma**t commands to set a material type within **True*Grid***® will automatically invoke the element type of this command along with its material properties).

stifn element type

stif4	for beam4 elastic
stif5	for solid5 3-d multi-field solid
stif16	for pipe16 elastic straight pipe
stif18	for pipe18 elastic curved pipe (elbow)
stif20	for pipe20 plastic straight pipe
stif24	for beam24 3-d thin-walled plastic beam
stif28	for shell28 shear/twist panel
stif30	for fluid30 3-d isoparametric acoustic fluid
stif41	for shell41 3-d membrane shell
stif43	for shell43 plastic quadrilateral shell
stif44	for beam44 3-d tapered unsymmetrical beam
stif45	for solid45 3-d isoparametric solid

stif46 for solid46 8-node layered solid
stif57 for shell57 isoparametric quadrilateral thermal shell
stif58 for hyper58 u-p hyperelastic
stif59 for pipe59 immersed pipe or cable
stif60 for pipe60 plastic curved pipe
stif62 for solid62 magnet-structural
stif63 for shell63 elastic quadrilateral shell
stif64 for solid64 3-d anisotropic solid
stif65 for solid65 reinforced concrete solid
stif69 for solid69 3-d thermal-electrical solid
stif70 for solid70 thermal isoparametric solid
stif80 for fluid80 3-d fluid element
stif86 for hyper86 3-d hyperelastic solid
stif89 for visco89 viscoelastic
stif90 for solid90 thermal
stif91 for shell91 8-node layered shell
stif93 for shell93 structural
stif95 for solid95 structural
stif96 for solid96 magnetic scalar
stif97 for solid97 magnetic
stif99 for shell99 linear layered structural
stif107 for visco107 large strain
stif117 for solid117 magnetic
stif120 for hf120 high-frequency
stif122 for solid122 electrostatic
stif128 for solid128 electrostatic p-element
stif142 for fluid142 fluid-thermal
stif143 for shell143 fluid-thermal
stif147 for solid147 structural p-element
stif150 for shell150 structural p-element
stif157 for shell157 thermal-electric
stif185 for solid185 structural brick
stif186 for solid186 quadratic structural brick
stif188 for beam188 finite strain beam

material_option can include some, all or none of the following (depending on element type - see the ANSYS User's Manual or use a dialogue box).

ex *elastic_young's_modulus* (x-direction)
ey *elastic_young's_modulus* (y-direction)
ez *elastic_young's_modulus* (z-direction)
alpx *coefficient_of_thermal_expansion* (x-direction)
alpy *coefficient_of_thermal_expansion* (y-direction)
alpz *coefficient_of_thermal_expansion* (z-direction)

nuxy *poisson's_ratio*
nuyz *poisson's_ratio*
nuxz *poisson's_ratio*
prxy *major_poisson's_ratio* (in the xy-dir)
pryz *major_poisson's_ratio* (in the yz-dir)
prxz *major_poisson's_ratio* (in the xz-dir)
gxy *shear_modulus* (x-stress, y-strain)
gyz *shear_modulus* (y-stress, z-strain)
gxz *shear_modulus* (x-stress, z-strain)
dens *density*
mu *coefficient_of_friction*
damp *damping_coefficient*
kxx *thermal_conductivity* (x-direction)
kyy *thermal_conductivity* (y-direction)
kzz *thermal_conductivity* (z-direction)
ch *specific_heat*
emis *emissivity*
hf *convection_film_coefficient*
visc *viscosity*
rsvx *electrical_resistivity* (x-direction)
rsvy *electrical_resistivity* (y-direction)
rsvz *electrical_resistivity* (z-direction)
qrate *heat_generation_rate*
perx *electric_relative_x-permeabilities*
pery *electric_relative_y-permeabilities*
perz *electric_relative_z-permeabilities*
murx *magnetic relative x-permeabilities*
mury *magnetic_relative_y-permeabilities*
murz *magnetic_relative_z-permeabilities*
mgxx *magnetic_coercive_x-forces*
mgyy *magnetic_coercive_y-forces*
mgzz *magnetic_coercive_z-forces*
lsst *dielectric_loss_tangent*
reft *reference_temperature* (1 value with no semi-colon)
dth *default_shell_thickness* (1 value with no semi-colon)

list_of_values is a list of as many as 5 numbers associated with the *material_option*. Enter just one value for a non temperature-dependent property. The list must be terminated by a semi-colon. The *material_option* and *list_of_values* may be repeated as many times as desired.

ko*n m* is the same as the "keyopt(n)=m" ANSYS options for the element types (see the ANSYS User's Manual); the permissible values of n and m depend on the element type. This option may be repeated as

many times as desired. Remember to terminate the command by a semi-colon. The possible options are hard-wired into the dialogue box for **ansymats** so that you will be unable to choose invalid options for a given element type.

Remarks

ansyopts ANSYS® analysis option

ansyopts *options* ;
where an *option* can be
antype *key* for analysis type
where *key* must be one of

0	for structural analysis
1	for buckling analysis
2	for modal analysis
3	for harmonic analysis
4	for transient analysis
7	for substructure analysis
8	for spectrum analysis

acel *x y z*	for linear acceleration
cgloc *x y z*	for origin location
cgomga *x y z*	for velocity
dcgomg *x y z*	for acceleration
omega *x y z*	for rotational velocity
domega *x y z*	for rotational acceleration
eqslv *label*	for equation solver

where *label* must be one of

front *tolerance*	for frontal direct equation
sparse *tolerance*	for sparse direct
jcg *tolerance*	for jacobi cg (in memory)
jcgo *tolerance*	for jacobi cg
iccg *tolerance*	for incomplete cholesky cg
pcg *multiplier tolerance*	for pre-conditioned cg (in memory)
pcgo *multiplier tolerance*	for pre-conditioned cg
amg *tolerance*	for algebraic multigrid
dds *tolerance*	for distributed domain
ddsb *tolerance*	for distributed domain beta
iter *tolerance*	for automatic selection

adams *options* ;	for solves & writes flexible body info

where *options* can be

nmodes *n*
kstress *key*
kshell *key*

adapt *options* ; for adaptively meshes & solves

where *options* can be

nsoln *n*
stargt *v*
ttargt *v*
facmn *v*
facmx *v*
kypsm *key*
kymac *key*

cmatrix *options* ; for electrostatic field & capacitance

where *options* can be

symfac *f*
condname *name*
numcond *n*
grndkey *key*
capname *name*

cutcontr *options* ; for time step cutback

where *options* can be

pls *strain*
crp *ratio type*
dsp *d*
npoint *n*
noiter *key*

cycopt *options* ; for cyclic nodal diameter solution

where *options* can be

status
default
noddia *(start end [inc [key]] ;)*;
dof *(id [c1 c2 c3 c4 c5 c6] ;)* ;
cyctoler *t*
cycmove *key*

ddsopt *options* ; for distributed domain server

where *options* can be

config *mode*
ndomains *n*

ematwr *key* for write element matrices

eresx *key* for extrapolation of integration point

expass *key* for expansion pass

fsrs *option* for restart fluid-structure interaction

where the *option* can be

time *f*

ldstep *n*

gauge *option* for domain of edge-element formulation

where the *option* can be

tree

off

hfeigopt *cavity* for high frequency electromagnetic

hfscat *option* for high frequency scattering

where the *option* can be

off

scat

total

hfpcswp *f1 f2 fi n* for propagating constants

hfsweep *f1 f2 fi n p1 p2 p3 p4 a d n1 n2 vf vc* for harmonic response to hf wave guide

lmatrix f *name1 name2 name 3* for differential inductance matrix

lumpm *n1 n2 key* for lumped mass matrix

monitor *n1 n2 key* for contents of monitor file

where *key* can be one of the following

ux

uy

uz

rotx

roty

rotz

temp

fx

fy

fz

mx

my

mz

heat

msave *key* for memory saving for pcg

opncontr *temp v n* for automatic time step

precisio *key* for machine precision

psolve *keys* ; for partial solution

where keys can be

cgsol

eigdamp

eigexp

eigfull
eiglanb
eigreduc
eigunsym
elform
elprep
redwrite
triang

rate *key* — for creep strain rate usage

seexp *type dof switch flag* — for substructure expansion pass

where *type* can be

file name

elenum n

where *flag* can be

on

off

seopt *file key_m key_p key_ss* — for substructure analysis

solcontr *key_opt key_ts option t* — for nonlinear solution defaults

where *option* can be

nopl

default

incp

toffset *t* — for temperature offset

arclen *options* ; — for activating the arc-length method.

where *options* can be

on — to activate arc-length method

off — to deactivate arc-length method

maxarc *max* — for maximum multiplier of ref. arc-length radius

minarc *min* — for minimum multiplier of ref. arc-length radius

arctrm *options* ; — for arc-length solution control.

where *options* can be

off — to not use arctrm to terminate analysis

l — to terminates analysis when first limit point is reached

u — to terminates analysis when displacement exceeds maximum

val *displacement* — for maximum desired displacement

node *node_number* — for displacement comparison node number

dof *label* — for degree of freedom

where *label* can be

ux

uy

uz

rotx

roty
rotz

bucopt *method options* ;
where *method* must be one of the following
subsp for subspace iteration
lanb for block lanczos
where *options* can be
nmode *#_modes* for number of modes to extract
shift *node_number* for shift point
ldmulte *multiplier* for upper end of load multiplier range

cnvtol *label options* ; for nonlinear analyses convergence.
where *label* must be one of the following
stat
u
rot
f
m
temp
heat
pres
v
flow
vf
volt
emf
curr
amps
curt
mag
a
curm
flux
csg
vltg
off
l
u
where *options* can be
value *value* for typical value for label
toler *tolerance*
norm *type*
where *type* is

2 for l2 norm
1 for l1 norm
0 for infinite norm

minref *minimum* for minimum for allowed reference value

crplim *type cvalue* ; for creep criterion.

where *type* must be one of the following

on for implicit creep analysis

off for explicit creep analysis

where *cvalue* must be

crcr value for creep criteria value for creep limit ratio control

lnsrch *key* ; for newton-raphson line search.

where *key* must be one of the following

off to no use a line search

on to use a line search

auto for ansys to automatically switch line search on and off

ncnv *options* ; for analysis termination.

where *options* can be

kstop *key*

where *key* is

0 to not terminate analysis if solution fails to converge

1 to terminate the analysis and the program execution

2 to terminate the analysis but not the program execution

dlim *limit* for nodal degrees of freedom limit

itlim *limit* for iteration count limit

etlim *limit* for elapsed time limit

cplim *limit* for cpu time limit

neqit *niters* ; for maximum number of equilibrium iterations

nlgeom *key* ; for including large deformation effects.

where *key* must be one of the following

off to ignore large-deflection effects

on to include large-deflection effects

nropt *option switch* ; for newton-raphson options.

where *option* can be

auto to let the program choose the option

full to use full newton-raphson

modi to use modified newton-raphson

init to use the previously computed matrix

unsym to use full newton-raphson with unsymmetric matrices

where *switch* can be

off to not use adaptive descent

on to use adaptive descent

pred *options* ; for predictor in a nonlinear analysis.

where *options* can be

offs for subset predictor off

ons for subset predictor on

offl for load set predictor off

onl for load set predictor on

pstres *key* ; for prestress effects.

where *key* must be one of the following

off

on

sstif *key* ; for stress stiffness effects.

where *key* must be one of the following

off to not calculate (or include) prestress effect

on to calculate (or include) prestress effect

alphad v for mass matrix multiplier for damping

betad v for stiffness matrix multiplier for damping

dmprat v for constant damping ratio

harfrq *options* ; for frequency range

where *options* can be

harfrqb *v*

harfrqe *v*

hrexp *v* for phase angle

hropt *options* ; for harmonic analysis options

where *options* can be

method *type* for solution method with options

where *type* can be

full for full method

reduc for reduced method

msup for mode superposition method

maxmode n for largest mode number

minmode *n* for smallest mode number

hrout *options* ; for harmonic analysis output options

where *options* can be

reimky *key* for real/imaginary print:

where *key* can be

on for print complex displacements as real and imaginary

off for print complex displacements as amplitude/phase angle

clust *key* for cluster option:

where *key* can be

on for uniform spacing of frequency solutions

off for cluster frequency solutions about natural frequency

mcont *key* for mode contributions:

where *key* can be

on for no print of mode contributions at each frequency
off for print mode contributions at each frequency

lvscale *v* for scales load vector for mode superposition

mdamp *options* ; for damping ratios as a function of mode

where *options* can be

stloc *n* for starting location in table for entering data
v1 *v1* for first datum
v2 *v2* for second datum
v3 *v3* for third datum
v4 *v4* for fourth datum
v5 *v5* for fifth datum
v6 *v6* for sixth datum

modopt *options* ; for modal analysis options

where *options* can be

method *label* for mode extraction method for the modal analysis

where *label* can be

lanb for block lanczos
subsp for subspace iteration
reduc for householder (reduced)
unsym for unsymmetric matrix
damp for damped system
qrdamp for damped system using qr algorithm

nmode *n* for number of modes to extract
freqb *f* for beginning, or lower end, of frequency range
freqe *f* for ending, or upper end, of frequency range
prmode *n* for number of reduced modes to print
nrmkey *key* for mode shape normalization key:

where *key* can be

off for normalize the mode shapes to the mass matrix
on for normalize the mode shapes to unity

cekey *n* for constraint equation (ce) processing key

where *n* can be

0 for lagrange multiplier method - accurate solution
1 for lagrange multiplier method - quick solution
2 for lagrange multiplier method - accurate solution
3 for direct elimination method

mxpand *options* ; for the number of modes to expand/write

where options can be

nmode *n* for number of modes to expand and write
freqb *f* for beginning, or lower end, of frequency range
freqe *f* for ending, or upper end, of frequency range
elcalc *key* for element calculation key:

where *key* can be

no for do not calculate element results and reaction forces

yes for calculate element results and reaction forces

signif *n* for significance level

rigid *dof1 dof2 dof3 dof4 dof5 dof6* for rigid body modes

subopt *options* ; for subspace iteration eigenvalue extraction

where *options* can be

subsiz *s* for subspace working size

npad *n* for the number of extra vectors used in the iterations

nperbk *n* for the number of modes per memory block

numssi *n* for the maximum number of subspace iterations

nshift *n* for the minimum number of subspace iterations completed

strmck *key* for sturm sequence check key:

where *key* can be

all to perform check at all shift points

part to perform check only at all shift points

none for do not perform sturm sequence check

jcgitr *n* for the number of jacobi iterations per subspace iteration

timint *options* ; for turns on transient effects

where *options* can be

key *switch* for transient effects:

where *switch* can be

off for no transient effects (static or steady-state)

on for include transient (mass or inertia) effects

lab *lab* for degree of freedom:

where *lab* can be

all to apply this key to all appropriate labels

struc to apply this key to structural dofs

therm to apply this key to thermal dofs

elect to apply this key to electric dofs

mag to apply this key to magnetic dofs

fluid to apply this key to fluid dofs

tintp *options* ; for transient integration parameters

where *options* can be

gamma *v* for amplitude decay factor for 2nd order transient

alpha *v* for 2nd order transient integration parameter

delta *v* for 2nd order transient integration parameter

theta *v* for 1st order transient integration parameter

oslm *v* for specifying the oscillation limit criterion

tol *t* for tolerance applied to oslm. Defaults to 0.0

avsmooth *flag* for smooth flag option:

where *flag* can be

0 to include smoothing of initial velocity/acceleration
1 to not include smoothing

trnopt *options* ; for transient analysis
where *options* can be
method *label* for solution method with options
where *label* can be
full for full method
reduc for reduced method
msup for mode superposition method
maxmode *n* for largest mode number
dmpkey *key* for damping option (for method = reduc)
where *key* can be
damp to include the effects of damping if present
nodamp to ignore the effects of damping
minmode *n* for smallest mode number

addam *options* ; for accel. spectrum computation constants
where *options* can be
af *coef* for direction-dependent accel. coeff.
aa *coef* for coeff. for ddam accel. spectrum equations
ab *coef* for coeff. for ddam accel. spectrum equations
ac *coef* for coeff. for ddam accel. spectrum equations
ad *coef* for coeff. for ddam accel. spectrum equations
amin *min* for minimum accel. value

cqc *option label* ; for quadratic mode combination method
where *option* can be
signif *threshold* for significance level for combining modes
where *label* can be
disp for displacement
velo for velocity
acel for acceleration

dsum *options label* ; for double sum mode combination method.
where *options* can be
signif *threshold* for significance level for combining modes
td *time* for time duration for earthquake or shock spectrum
where *label* can be
disp for displacement
velo for velocity
acel for acceleration

svfreq [*load damp*] ; for sv vs freq definition (up to 4 pairs)
where *load* is the load curve for spectrum value .vs. frequency
where *damp* is the damping ration for this curve (ansys sv damping)

grp *option label*; for grouping mode combination method.

where *option* can be

signif *threshold* for significance level for combining modes

where *label* can be

disp for displacement

velo for velocity

acel for acceleration

nrlsum *option label* ; for nrl sum mode combination method.

where *option* can be

signif *threshold* for significance level for combining modes

where *label* can be

disp for displacement

velo for velocity

acel for acceleration

psdspl *options* ; for partially correlated excitation in psd

where *options* can be

tblno *n* for input psd table number defined with psdval command

rmin *v* for minimum distance between excitation points

rmax *v* for maximum distance between excitation points

psdunit *options* ; for type of psd/multi-pt response spectrum

where *options* can be

tblno *n* for input table number

type *label* for identifying the type of spectrum:

where *label* can be

disp for displacement spectrum

velo for velocity spectrum

acel for acceleration spectrum

accg for acceleration spectrum

forc for force spectrum

pres for pressure spectrum

gvalue *v* for acceleration due to gravity for accg psd table

psdwav *tblno vx vy vz* for wave propagation excitation in a psd analysis

tblno the input psd table number defined with psdval command

vx the global cartesian x-velocity of traveling wave

vy the global cartesian y-velocity of traveling wave

vz the global cartesian z-velocity of traveling wave

rock *cgx cgy cgz omx omy omz* for a rocking response spectrum

cgx cgy cgz for the x, y, and z location of center of rotation

omx omy omz for the angular velocity components

sed *sedx sedy sedz* for excitation direction for a single-pt. response spectrum

sedx sedy sedz coordinates of a point that defines a line

spopt *options* ; for spectrum type and other spectrum options

where *options* can be

sptype *arg* for the spectrum type:
where *arg* can be
sprs for single point excitation response spectrum
mprs for multiple point excitation response spectrum
ddam for dynamic design analysis method
psd for power spectral density
nmode *n* to use the first n modes from the modal analysis
elcalc *key* for element calculation key (for sptype = psd only):
where the *key* can be
no for do not include stress responses in the calculations
yes for include stress responses in the calculations
srss *options* ; for square root of sum
where *options* can be
signif *n* for the significance level
label *label* for identifying the combined mode solution output
where *label* can be
disp for displacement solution
velo for velocity solution
acel for acceleration solution
svtyp *options* ; for the type of single-pt. response spectrum
where *options* can be
ksv *n* for response spectrum type:
where *n* can be
0 for seismic velocity response spectrum loading
1 for force response spectrum loading
2 for seismic acceleration response spectrum loading
3 for seismic displacement response spectrum loading
4 for psd loading
fact *sf* for scale factor applied to spectrum values
vddam *options* ; for velocity spectrum constants
where *options* can be
vf *c* for direction-dependent velocity coefficient
vabc *a b c* for coefficients for the ddam velocity spectrum

Remarks

IV. INDEX