Code_Aster

Version default

Titre : Opérateur PROJ_SPEC_BASE
Responsable : BERRO Hassan

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3353fd370932

Operator `PROJ_SPEC_BASE`

1   Goal

To project one or more spectra of turbulence on one (or several) bases (S) modal (S). The spectra are defined by the operator `DEFI_SPEC_TURB` [U4.44.31]. (Or them) bases (S) modal (S) can or (can) to be defined by:

- a concept of the type `melasflu` product by the operator `CALC_FLUI_STRU` [U4.66.02],
- a concept of the type `mode_meca` product by the operator `CALC_MODES` [U4.52.02],
- a list of concepts of the type `cham_no_depl_r` corresponding to the deformations.

Allows to calculate for each definite modal base a matrix interspectrale of generalized excitations. An option makes it possible if necessary to calculate only the autospectres.

The produced concept is of type `interspectre`.

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2   Syntax

```
tinsp [interspectre] = PROJ_SPEC_BASE

    (   ♦   SPEC_TURB            =       l_spec,             [l_spectre]

        ♦   /   BASE_ELAS_FLUI   =       baseflui,       [melasflu]
                ♦   VITE_FLUI    =       vitefl          [R]
                ◊   PRECISION    =   /   1.E-3           [DEFECT]
                                     /   prec            [R]
            /   MODE_MECA        =       basemeca,       [mode_meca]
            /   CHAM_NO          =       l_cham ,            [l_cham_no_DEPL_R]

        ◊   MODELE_INTERFACE     =       model   ,           [model]

        ♦   /   GROUP_MA         =       grma,               [gr_maille]
            /   ALL              =       'YES',

        ◊   VECT_X               =       l_cmpx,             [l_R]
        ◊   VECT_Y               =       l_cmpy,             [l_R]
        ◊   ORIG_AXE             =       l_coor,             [l_R]

        ♦   FREQ_INIT        =       fi,                 [R]
        ♦   FREQ_FIN         =       FF,                 [R]
        ♦   NB_POIN          =       Np,                 [I]

        ◊   TOUT_CMP             =   /   'YES'               [DEFECT]
                                     /   'NOT',

        ◊   OPTION               =   /   'ALL'              [DEFECT]
                                     /   'DIAG',

        ◊   TITLE                =       title,          [TXM]

    )
```

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3   Operands

3.1   Operand SPEC_TURB

♦   SPEC_TURB = l_spec

List of concepts of the type spectrum products by the operator DEFI_SPEC_TURB [U4.44.31] defining several spectra of turbulent excitation.

Note:

1) *The operand SPEC_TURB the taking into account of several spectra of turbulent excitation allows. The interspectres of generalized excitations are calculated for each provided physical spectrum then are added.*
2) *The spectra of turbulence of type "length of correlation" apply only to the tubes of steam generators. It is possible simultaneously to project several spectra of turbulence of type "length of correlation", but the zones of excitation of each spectrum must be strictly disjoined from/to each other. The zones to which these excitations apply are defined for each spectrum, with the order DEFI_SPEC_TURB [U4.44.31].*
3) *The spectra of turbulence of type "length of correlation" cannot be combined with spectra of another type.*
4) *In the case of a spectrum of the type SPEC_CORR_CONV_3, double projection is very consuming resources, because it is necessary to buckle on the directions, the meshs, their points of gauss and the modes (double loop), and each time to evaluate the analytical function having defined the spectrum. One advises to use this kind of spectrum on the reduced grids (less than 1000 degrees of freedom), while starting with a small number of points of frequential discretization to evaluate the computing time.*

3.2   Operand BASE_ELAS_FLUI

The operand BASE_ELAS_FLUI is employed when one wishes to carry out the projection of a spectrum defined by one of the keywords factors SPEC_LONG_COR_n, SPEC_FONC_FORME or SPEC_EXCI_POINT of the operator DEFI_SPEC_TURB [U4.44.31]. In this case, one must inform the speed of the fluid vitefl.

♦   /   BASE_ELAS_FLUI = baseflui

Concept of the type melasflu product by the operator CALC_FLUI_STRU [U4.66.02], which defines one or a set of modal bases on which or (which) the spectra are projected, as well as the discretization of speed.

The operator calculates a matrix of interspectres of generalized excitations $S^k_{fifj}(\omega)$ corresponding at the speed of the fluid vitefl that one must inform.

The concept melasflu provides moreover the name of the concept type_flui_stru product at the beginning of study by the order DEFI_FLUI_STRU [U4.25.01]. The concept type_flui_stru contains all information characteristic of the studied configuration: one finds there inter alia the data necessary to the dimensionnalisation of the projected excitation.

3.3   Keyword VITE_FLUI

The operand VITE_FLUI must be well informed if a base of the type is used melasflu.

♦   VITE_FLUI = vitefl

Rate of flow of the fluid for the calculation of answer.

3.4   Keyword PRECISION

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◊   PRECISION = prec

Precision on the rate of flow of the fluid (by default 1.E-3).

3.5   Operands MODE_MECA or CHAM_NO

Operands MODE_MECA or CHAM_NO are employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31].

/   MODE_MECA = basemeca

Concept of the type mode_meca product by the operator CALC_MODES [U4.52.02], which defines the modal base on which the spectra are projected. This modal base was possibly calculated by taking account of an effect of added mass fluid, by recourse to the operator CALC_MATR_AJOU [U4.66.01] or MACRO_MATR_AJOU [U4.66.11].

/   CHAM_NO = l_cham

List of concepts of the type cham_no_depl_r, which defines the deformations of the modal base on which the spectra are projected.

This manner of defining the modal base makes it possible to impose on the structure a particular type of movement; a similar approach is adopted in the operator CALC_MATR_AJOU [U4.66.01], where figure also the operand CHAM_NO.

Note:

> *The operator determines the matrix of mutual acceptance connecting the spectrum of pressure to the matrix interspectrale of generalized excitations acting on the structure:*
>
> $$S_{fifj}(\omega) = S_p(\omega) \times J_{Aij}(\omega)$$
>
> *where*
> - $S_p(\omega)$ *is the spectral concentration of power of pressure,*
> - $J_{Aij}(\omega)$ *is the matrix of mutual acceptance,*
> - $S_{fifj}(\omega)$ *is the matrix of the interspectres of generalized excitations.*

Note:

> - *If the modal base is defined by a list of the fields in the nodes (keyword CHAM_NO), it is imperative to inform the mechanical model associated with the elements to which the projection of the spectrum must apply (by the keyword MODELE_INTERFACE).*
> - *If a modal base of type mode_meca is given and if the structure is modelled in thin hulls of type DKT , it is not obligatory to inform the keyword MODELE_INTERFACE .*

The theoretical precise details are given in internal report HP-51/97/027/B.

3.6   Operand MODELE_INTERFACE

The operand MODELE_INTERFACE is employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31].

◊   MODELE_INTERFACE = model

Concept of the type model product by the operator AFFE_MODELE [U4.41.01], defining:

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1. That is to say the model (thermal) of interface enters the structure and the fluid used beforehand for calculation of the matrices added by CALC_MATR_AJOU [U4.66.01] or MACRO_MATR_AJOU [U4.66.11].
2. That is to say the mechanical model of the structure if this one is modelled by elements of thin hull (DKT).

Note:

If a thermal model of interface is defined, the calculation of the coefficients of acceptance is carried out using this model, which characterizes the wet surface of the structure, by making the assumption of a homogeneous turbulence on all the interface fluid-structure.

If the model given is mechanical, the coefficients of acceptance can be calculated on the structure, provided that this one is modelled in thin hulls of type DKT .

If the keyword MODELE_INTERFACE is not informed, the mechanical model used is that which is associated with the matrix of rigidity, referred in the modal base of projection.

Note:

If the spectrum were defined analytically with the option SPEC_CORR_CONV_3 , the model of interface must obligatorily be indicated, because projection is done by using the functions of form carried by the elements of the model.

3.7   Operand GROUP_MA/TOUT

The operand GROUP_MA is employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31].

♦ GROUP_MA/TOUT

List of groups of meshs or totality of the grid, on which projection will be carried out. The groups of meshs must be part of the grid associated with the model (thermal or mechanical) used for calculation with the coefficient with acceptance.

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3.8 Operand **VECT_X**

The operand VECT_X is employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31], if correlations of CORCOS or of AU_YANG are used.

◊   VECT_X = l_cmpx

List of three components of an unit vector x defining:

- direction of the flow on the surface of the plane structure, in the case of a correlation of CORCOS,
- direction of the axis of revolution of the cylindrical structure of circular section, in the case of a correlation of AU_YANG.
  (see diagrams hereafter)

3.9 Operand **VECT_Y**

The operand VECT_Y is employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31], if the correlation of CORCOS is used.
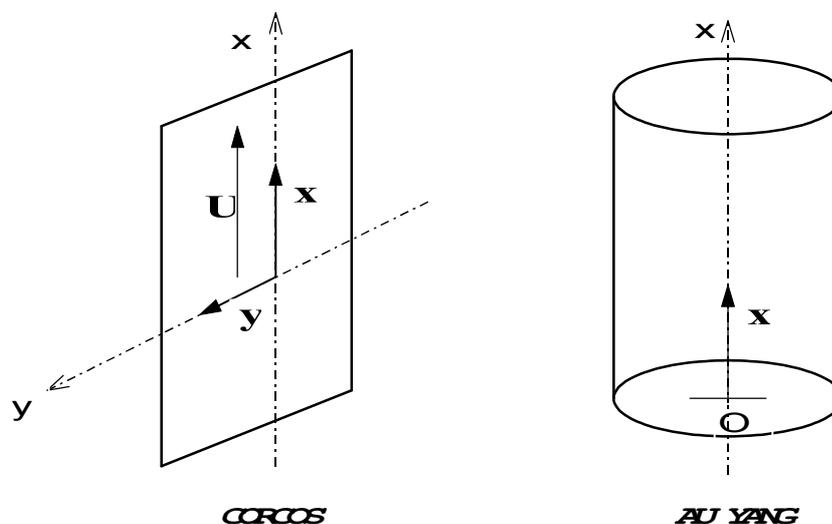
◊   VECT_Y = l_cmpy

List of the three components of an unit vector y defining the orthogonal direction in the direction of the flow on the surface of the plane structure (see diagrams hereafter).

3.10 Operand **ORIG_AXE**

The operand ORIG_AXE is employed when one wishes to carry out the projection of a spectrum of pressure defined by one of the keywords factors SPEC_CORR_CONV_n of the operator DEFI_SPEC_TURB [U4.44.31], if the correlation of AU_YANG is used.

◊   ORIG_AXE = l_coor

List of the three coordinates defining the position of an origin O on the axis of revolution of the cylindrical structure of circular section (see diagrams hereafter).

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3.11 Operands `FREQ_INIT`, `FREQ_FIN` and `NB_POIN`

- ♦ FREQ_INIT = fi
- ♦ FREQ_FIN = FF
- ♦ NB_POIN = Np

These operands define the waveband and the number of points of frequential discretization of the interspectres to be calculated. The number of points of discretization must be equal to a power of 2, in order to allow postprocessings of type FFT (Fast Fourier Transform). It is recommended to calculate these three elements according to the following method.

If $\left(f_1^k, ..., f_N^k \right)$ the frequencies of the modes indicate of k ème base structure then:

$$\text{FREQ\_INIT} = \min_k \left(\frac{f_1^k}{2} \right) \quad \text{FREQ\_FIN} = \max_k \left(f_N^k + \frac{f_1^k}{2} \right)$$

The number of points of discretization can then be deduced from the minimum step in frequency defined by:

$$df = \min_{i,k} \left(2 \times \pi \times \mu_i^k \times f_i^k \right)$$

where μ_i^k indicate the reduced damping of i ème mode of k ème base modal.

3.12 Operand `TOUT_CMP`

◊ TOUT_CMP = 'YES' or 'NOT'

Indicator of the components of the modal deformations which one adopts to calculate them inter - spectra of excitation on modal basis:

- • 'YES'   one uses the three components in translation,
- • 'NOT'   one uses only the component in translation which was defined prior to the assistance of the operator DEFI_FLUI_STRU.

3.13 Operand `OPTION`

◊ OPTION = 'ALL' or 'DIAG'

Indicator of the choice of calculation to be realized:

- • 'ALL'   if one wishes to calculate all the interspectres of generalized excitations (option by default),
- • 'DIAG'   if one wishes to calculate only the autospectres of generalized excitations.

3.14 Operand `TITLE`

◊ TITLE = title

Argument of type text defining the title attached to the concept interspectre at exit.