

## Operator COMB\_FOURIER

---

### 1 Drank

---

To result recombine the FOURIER modes of a data structure in particular directions. The modes are produced for a model "AXIS\_FOURIER" by macro command MACRO\_ELAS\_MULT [U4.51.02].

This is possible for displacements, the reactions, the strain fields and of stresses in elasticity and for the fields of temperature and flux in thermal.

The produced data structure is of type `comb_fourier`.

## 2 Syntax

---

```
comb [comb_fourier] = COMB_FOURIER (
    [fourier_elas]
    ◆RESULTAT=resu
    ◆NOM_CHAM=
        | ' DEPL'
        | ' REAC_NODA'
        | ' SIEF_ELGA'
        | ' EPSI_ELNO'
        | ' SIGM_ELNO' ,
        | ' TEMP' ,
        | ' FLUX_ELNO' ,
    ◆ANGLE=langl
    [l_R]
)
```

## 3 Operands

### Recall:

The recombination of FOURIER on displacements is written:

$$u(\theta) = \sum_{l=0}^N \left[ \underbrace{\begin{pmatrix} \cos l\theta & 0 & 0 \\ 0 & \cos l\theta & 0 \\ 0 & 0 & -\sin l\theta \end{pmatrix}}_{A^s} u_l^s + \underbrace{\begin{pmatrix} \sin l\theta & 0 & 0 \\ 0 & \sin l\theta & 0 \\ 0 & 0 & \cos l\theta \end{pmatrix}}_{A^a} u_l^a \right]$$

A symmetric harmonic is thus recombined with the matrix  $A^s$ , a skew-symmetric harmonic with the matrix  $A^a$ .

The recombination of FOURIER on the strains and the forced is written:

$$\varepsilon(\theta) = \sum_{l=0}^N \left( \begin{bmatrix} \cos l\theta I_4 & 0_{4,2} \\ 0_{2,4} & -\sin l\theta I_2 \end{bmatrix} \varepsilon_l^s + \begin{bmatrix} \sin l\theta I_4 & 0_{4,2} \\ 0_{2,4} & \cos l\theta I_2 \end{bmatrix} \varepsilon_l^a \right)$$

### 3.1 Operand RESULTAT

◆RESULTAT = resu,

Name of the concept of the `fourier_elas` type or `fourier_ther` from which one will recombine the modes.

### 3.2 Operand NOM\_CHAM

◆NOM\_CHAM = nomsymb,

Symbolic name of the recombined fields.

### 3.3 Operand ANGLE

◆ANGLE = langl,

Angle (S) in degrees of (or of) the section (S) where place the recombination of FOURIER takes.

## 4 Example

the example below carries out a computation on 2 harmonics of Fourier by `MACRO_ELAS_MULT`, enriches the concept of the type `RESULTAT` by `CALC_CHAMP` before recombining the computed fields by `COMB_FOURIER`.

Computation Fourier on the first two symmetric harmonics

```
resu = MACRO_ELAS_MULT (MODELS          = Mo,  
                        CHAM_MATER      = cm,  
                        CHAR_MECA_GLOBAL= bloqu,  
                        CAS_CHARGE= (  
                            _F (MODE_FOURIER = 1,  
                                TYPE_MODE   = "SYME",  
                                CHAR_MECA   = CH,  
                                SOUS_TITRE  = "mode Fourier 1 SYME"),  
                            _F (MODE_FOURIER = 2,  
                                TYPE_MODE   = "SYME",  
                                CHAR_MECA   = CH,  
                                SOUS_TITRE  = "mode Fourier 2 SYME"),),  
                        )
```

Computation of the stresses and the nodal reactions by `CALC_CHAMP`

```
resu = CALC_CHAMP (reuse = resu,  
                  RESULTAT = resu,  
                  FORCED = "SIGM_ELNO",  
                  FORCE = "REAC_NODA",
```

Recombination of Fourier on displacements, reactions and stresses for 45° and 135°

```
angl1 = 45.  
angl2 = 135.  
  
co_four = COMB_FOURIER (RESULTAT = resu,  
                        NOM_CHAM = ("DEPL", "REAC_NODA", "SIGM_ELNO"),  
                        ANGLE = (angl1, angl2),);
```