Code_Aster

Version default

Titre : Opérateur CALC_FERRAILLAGE
Responsable : Jacques PELLET

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Clé : U4.81.42 Révision : 6751

Operator `CALC_FERRAILLAGE`

1 Drank

Compute the densities of reinforcement in elements shells and plates according to the requests: generalized forces, obtained beforehand by option `EFGE_ELNO`.

The command enriches data structure of the type `result`, provided under key word `RESULTAT`, of a field of variables reinforcement, whose components are described in chapter 4.

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2   Syntax

```
resu [*] = CALC_FERRAILLAGE    (

        ♦reuse=resu

        ♦RESULTAT=resu                        [evol_elas, evol_noli, dyna_trans]


        ♦ TYPE_COMB =        "ELS",
                      /  "ELU",

        ♦#Sélection     of sequence number:
                /TOUT_ORDRE    =      ' OUI',
                /NUME_ORDRE    =l_nuor            ,              [l_I]
                /LIST_ORDRE    =l_nuor            ,              [listis]
                /♦/INST          =l_inst          ,                [l_R]
                     /LIST_INST    =  l_inst,        [listr8]
                     /FREQ          =  l_inst,        [listr8]
                     /LIST_ FREQ =    l_freq,        [listr8]
                  ◊ |  accuracy =    prec,
                                     /1.0E-6,        [DEFAULT]
                     |  CRITERE =     "RELATIF",      [DEFAULT]
                                     /"ABSOLU",


        ♦AFFE=_F        ( ♦  /TOUT  = "OUI'
                                    /"NON"
                      /GROUP_MA  = l_grma,              [l_gr_maille]
                      /MAILLE      = l_maille,              [l_maille]

                  ♦ ENROBG=      enrobg,              [R]

                  ◊ CEQUI=       cequi,              [R]

                  ♦ SIGM_ACIER= sigaci ,            [R]

                  ♦ SIGM_BETON= sigbet,              [R]

                  ◊ PIVA=          piva,              [R]

                  ◊ PIVB=          pivb              [R]

                        )
```

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3   Operands

3.1   Operand RESULTAT

♦   RESULTAT =resu

Name of a result concept of the type `result`. It is necessarily reentrant.

3.2   Operand TYPE_COMB

♦/   "ELS"

reinforcement is parameterized for a computation in Absolute limit of Service.

/   "ELU"

reinforcement is parameterized for a computation in Ultimate Absolute limit.

3.3   Selection of the sequence numbers

the use of key words TOUT_ORDRE, NUME_ORDRE, INST is described in the document [U4.71.00].

3.4   Operand AFFE

3.4.1   Selection of meshes concerned with computation

the key keys TOUT, GROUP_MA and MESH make it possible to the user to meshes choose on whom it wishes to do his elementary computations of postprocessing.

/TOUT all = "OUI'

meshes (carrying finite elements) will be treated. It is the value by default.

/ | GROUP_MA=l_grma
   | MAILLE=l_maille

Only meshes included in l_grma and/or l_maille will be treated.

Note: So the model is not solely formed by shell elements (3D, beams,…), one should not use key word TOUT=' OUI'. It is necessary to indicate the shell elements using key keys GROUP_MA and MESH.

3.4.2   Operand ENROBG

♦ ENROBG = enrobg,   [R]

Distance between the concrete surface and the axis of reinforcements of reinforcement

3.4.3   Operand CEQUI

◊ CEQUI = cequi,   [R]

Coefficient of equivalence steel/concrete (computation with the Absolute limit of Service, ELS)

3.4.4   Operand SIGM_ACIER

♦ SIGM_ACIER = sigaci

Forced elastic acceptable in steel

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3.4.5 Operand SIGM_BETON

♦ SIGM_BETON = sigbet

Stress working in the concrete

3.4.6 Operands PIVA/PIVB

◊ PIVA = piva,   [R]

Value of the pivot A (computation to the Ultimate Absolute limit)

◊ PIVB = pivb,   [R]

Value of the pivot B (computation to the Ultimate Absolute limit)

4   Composition of the field produces

result is enriched by new field (named "FERRAILLAGE" in data structure) whose components are:

- one density of longitudinal reinforcement in the meaning X of the element for the lower face of the element ($DNSXI$);
- the equivalent for the upper face ($DNSXS$);
- one density of longitudinal reinforcement in the meaning Y of the element for the lower face of the element ($DNSYI$);
- the equivalent for the upper face ($DNSYS$);
- density of transverse reinforcement ($DNST$);
- the stress in the concrete $SIGMBE$;
- strain in the concrete $EPSIBE$.

The densities of reinforcement are calculated according to the method of CAPRA and MAURY [R7.04.05]. These densities are expressed in unit of area by linear length of shell. For example, if the mesh is in meters (with data of characteristics elementary and material in coherence), the densities will be expressed in m^2/m .

The field of reinforcement is calculated for all the times specified by the user (by default: all). If one wants to calculate the field containing the values "max" during the transient, one can carry out the command:
```
FERMAX=CRÉA_CHAMP (  OPERATION=' EXTR', TYPE_CHAM=' ELEM_FER2_R',
                 NOM_CHAM=' FERRAILLAGE', RESULTAT=Solution,
                 TYPE_MAXI=' MAXI_ABS', TYPE_RESU=' VALE',
                   )
```

5   Examples use

See the cases tests ssls134a, ssls135a and sslx100d.