ZZZZ358 – Validation of the keyword MODELE_THER of the operator MODI_MODELE_XFEM

Summary

This test does not have any physical meaning, it acts of a data-processing test. The keyword there is validated MODELE_THER of the operator MODI_MODELE_XFEM [U4.41.11]. This keyword makes it possible to build a mechanical model enriched "by copy" by an enriched thermal model. It is an alternative to the keyword CRACK of the operator MODI_MODELE_XFEM, useful only within the framework of thermomechanical calculations chained with X-FEM, which make it possible to ensure that cutting (in subelements and facets) remains strictly identical between the enriched thermal model, and mechanical nouveau riche.

One validates this functionality on 4 possible modelings in mechanics X-FEM:

- modeling a: '3D'
- modeling b: 'C_PLAN'
- modeling C: 'D_PLAN'
- modeling D: 'AXIS'

1 Principle of the test

The principle of this test consists in defining, starting from the same grid:

- a thermal model enriched with MODI_MODELE_XFEM/CRACK ;
- a mechanical model enriched with MODI_MODELE_XFEM/CRACK, with the same geometry fissured as for modthx ;
- a mechanical model enriched with MODI_MODELE_XFEM/MODELE_THER , in "copying" modthx .

Once these 3 models created, one carries out several checks which require the use of python, and the carrying out of the test in PAR_LOT = 'NOT'. These checks are the following ones.

1. By using the procedure IMPR_CO/NIVEAU=-1 [U4.91.11], one makes sure that these 3 models nouveau riches contain all the same number of objects.
2. One makes sure then that the description of each object '.CELV' cham_elem contents in the 3 sd_modele_xfem remain identical of a model to the other. This description corresponds to NIVEAU=-1 in IMPR_CO

2 Modeling A

It is modeling '3D', in thermics and mechanics.

2.1 Characteristics of the grid

The grid contains all the linear types of meshs being able to support finite elements X-FEM of modeling '3D'. The cracks are laid out of such kind that all elements X-FEM of modeling are tested. The grid, as well as the two cracks considered (a circular crack and an interface) are represented with the figure below.

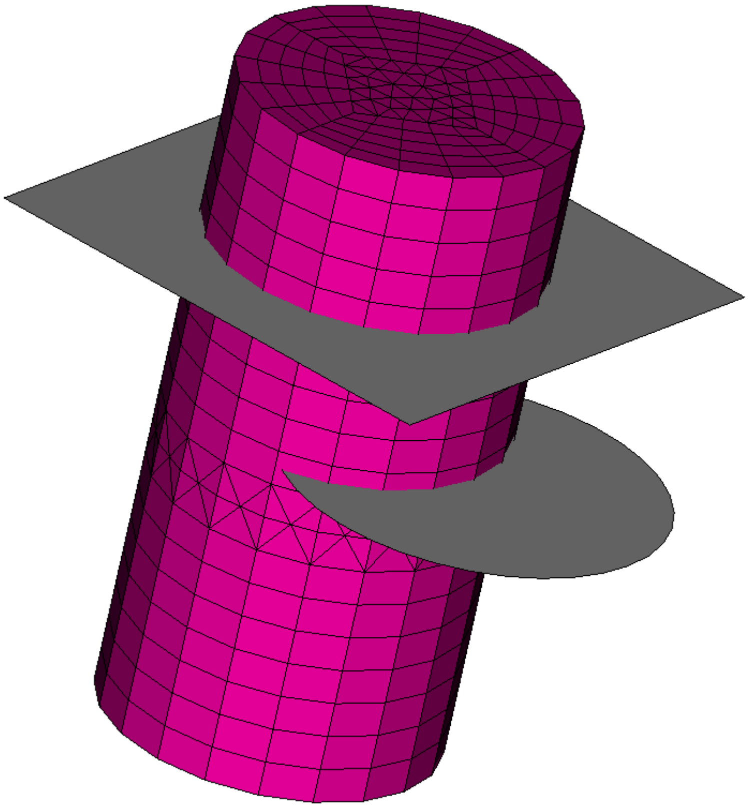

Figure 2.1-1: grid A and localizations of the cracks

The characteristics of the grid are recapitulated in the table below.

SEG2	TRIA3	QUAD4	TETRA4	PENTA6	PYRAM5	HEXA8
80	228	540	1988	918	1000	1700

The grid also contains two orphan nodes, from which two meshs of the type are built POI1 to affect two elements of the type to it MECA_DIS_TR_N.

3 Modeling B

It is modeling 'C_PLAN' in mechanics, and modeling 'PLAN' in thermics.

3.1 Characteristics of the grid

The grid contains all the linear types of meshs being able to support finite elements X-FEM of modeling 'C_PLAN' in mechanics, and modeling 'PLAN' in thermics. The cracks are laid out of such kind that all elements X-FEM of modeling are tested. Grid, as well as the 3 cracks considered are represented with the figure below.

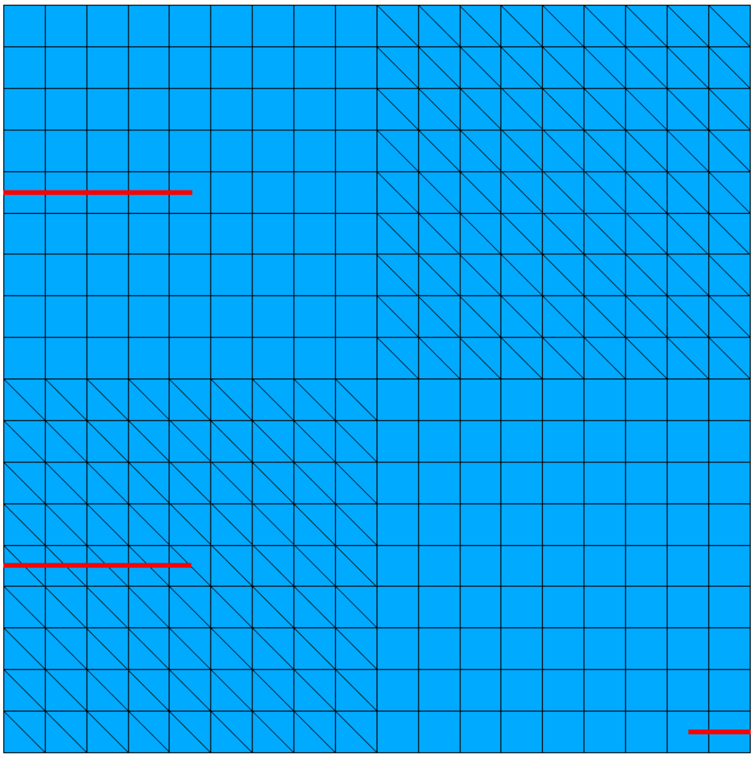

Figure 3.1-1: grid B and localizations of the cracks

The characteristics of the grid are recapitulated in the table below.

SEG2	TRIA3	QUAD4
72	324	162

The grid also contains two orphan nodes, from which two meshs of the type are built POI1 to affect two elements of the type to it MECA_2D_DIS_T_N.

4 Modeling C

It is modeling 'D_PLAN' in mechanics, and modeling 'PLAN' in thermics. One uses here the grid of modeling B.

5 Modeling D

It is modeling 'AXIS', in thermics and mechanics. One uses here the grid of modeling B.