Modelings 3D_HM, 3D_HHM, 3D_THM, 3D_THH, 3D_THHM

Summary:

This document describes for modelings 3D_HM, 3D_HHM, 3D_THM, 3D_THH and 3D_THHM :

- degrees of freedom carried by the finite elements which support modeling,
- the related meshs supports,
- supported materials and loadings,
- options of calculations for the elementary matrices and postprocessings,
- nonlinear possibilities as well as the options of the breaking process if they exist.

Modelings 3D_HM, 3D_HHM, 3D_THM, 3D_THH, 3D_THHM, (Phenomenon: MECHANICS) correspond to finite elements whose meshs supports are voluminal.

1 Discretization

1.1 Degrees of freedom

DX, DY and DZ the degrees of freedom of displacement indicate.
PRE1 and PRE2 two degrees of freedom of pressure indicate, whose precise significance depends on the laws of behavior used. TEMP indicate the temperature.

Finite element	Degrees of freedom
3D_HM	DX, DY, DZ, PRE1
3D_HHM	DX, DY, DZ, PRE1, PRE2
3D_THM	DX, DY, DZ, PRE1, TEMP
3D_THH	PRE1, PRE2, TEMP
3D_THHM	DX, DY, DZ, PRE1, PRE2, TEMP

1.2 Mesh support of the matrices of rigidity

The meshs support of the finite elements can be only hexahedrons. The elements are parametric Iso -.

Modeling	Mesh	Interpolation	Remarks
3D_HM	HEXA20	Serendip 20 nodes in trilinear displacement on 8 nodes in pressure	The pressure of a node medium is the average of the nodes tops of the segment
3D_HHM	HEXA20	Serendip 20 nodes in trilinear displacement on 8 nodes in pressure	The pressures of a node medium are the averages of the nodes tops of the segment
3D_THM	HEXA20	Serendip 20 nodes in trilinear displacement on 8 nodes in pressure and temperature	The pressure and the temperature of a node medium are the average of the nodes tops of the segment
3D_THH	HEXA20	Trilinear on 8 nodes in pressure and temperature	The pressures and the temperature of a node medium are the average of the nodes tops of the segment
3D_THHM	HEXA20	Serendip 20 nodes in trilinear displacement on 8 nodes in pressure and temperature	The pressures and the temperature of a node medium are the average of the nodes tops of the segment

1.3 Mesh support of the loadings

Modeling	Mesh	Interpolation	Remarks
3D_HM	QUAD8	Serendip 8 nodes in bilinear displacement on 4 nodes in pressure and temperature	The pressure of a node medium is the average of the nodes tops of the segment
3D_HHM	QUAD8	Serendip 8 nodes in bilinear displacement on 4 nodes in pressure	The pressures of a node medium are the averages of the nodes tops of the segment
3D_THM	QUAD8	Quadratic in linear displacement in pressure and temperature	The pressure and the temperature of a node medium are the average of the nodes tops of the segment
3D_THH	QUAD8	Bilinear on 4 nodes in pressure and temperature	The pressures and the temperature of a node medium are the average of the nodes tops of the segment
3D_THHM	QUAD8	Serendip 8 nodes in bilinear displacement on 4 nodes in pressure and temperature	The pressures and the temperature of a node medium are the average of the nodes tops of the segment

2 Significance of the symbols

•	corresponds to a functionality available
	corresponds to a functionality which could exist but noncurrently available
Name of CAS-test	corresponds to a test implementing the functionality

3 Supported materials

DEFI_MATERIAU	3D_HM	3D_HHM	3D_THM	3D_THH	3D_THHM
THM_LIQU	SSNV134C	WTNV112B	WTNV109A	•	•
THM_GAZ	SSNV134C	WTNV122B	WTNV109A	•	•
THM_VAPE_GAZ		WTNV112B		•	•
THM_INIT	SSNV134C	WTNV112B	WTNV109A	•	•
THM_DIFFU	SSNV134C	WTNV112B	WTNV109A	•	•
ELAS	SSNV134C	WTNV112B	WTNV109A		•
CJS	SSNV134C	•	•		•
ELAS_THM			WTNV115A		•
SURF_ETAT_SATU			WTNV116A		
CAM_CLAY_THM			WTNV117A		
SURF_ETAT_NSAT					•

4 Supported loadings

4.1 AFFE_CHAR_MECA

	All elements of this note	Remarks
DDL_IMPO	SSNV134C	
FACE_IMPO	SSNV134C	
LIAISON_DDL	•	
LIAISON_OBLIQUE	•	
LIAISON_GROUP	•	
LIAISON_UNIF	•	
LIAISON_SOLIDE	•	
LIAISON_ELEM	•	
LIAISON_CHAM_NO	•	
GRAVITY	•	
ROTATION		
FORCE_NODALE	•	
FORCE_FACE		
FORCE_ARETE		
FORCE_INTERNE	•	
PRES_REP	SSNV134C	
EPSI_INIT		
FLUX_THM_REP	WTNV114C	
PRES_CALCULEE	•	
EPSA_CALCULEE		

4.2 AFFE_CHAR_MECA_F

	All elements of this note	Remarks
DDL_IMPO	•	
FACE_IMPO	•	
LIAISON_DDL	•	
LIAISON_OBLIQUE	•	
LIAISON_GROUP	•	
LIAISON_UNIF	•	
LIAISON_SOLIDE	•	
FORCE_NODALE	•	
FORCE_FACE	•	
FORCE_ARETE		
FORCE_INTERNE	•	
PRES_REP	•	
EPSI_INIT		
FLUX_THM_REP	•	

5 Non-linear possibilities

5.1 STAT_NON_LINE

BEHAVIOR	RELATION	3D_HM	3D_HHM	3D_THM	3D_THH	3D_THHM
	KIT_HM	SSNV134C				
	KIT_HHM		WTNV112B			
	KIT_THM			WTNV109A		
	KIT_THH				•	
	KIT_THHM					•

6 Elementary calculations of matrices

OPTIONS		Remarks
'RIGI_MECA_TANG'	•	
'FULL_MECA'	•	
'RAPH_MECA'	•	
'FORC_NODA'	•	If FORC_NODA is called from REAC_NODA only the terms of mechanics are calculated

7 Postprocessing of calculation

7.1 Options CALC_FIELD

OPTIONS	All elements of this note	Remarks
'SIEF_ELNO'	SSNV134C	
'VARI_ELNO'	•	
'EPSI_ELNO'		
'EPSI_ELGA'		
'FORC_NODA'	•	If FORC_NODA is called from REAC_NODA only the terms of mechanics are calculated
'REAC_NODA'	•	Only the terms of mechanics are calculated