Modelings D_PLAN_HM, D_PLAN_HHM, D_PLAN_THM, D_PLAN_THH, D_PLAN_THHM, AXIS_HM, AXIS_HHM, AXIS_THM, AXIS_THH, AXIS_THHM

Summary:

This document describes for modelings D_PLAN and AXIS into thermo_hydro_mecanic:

- 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 the post treatments,
- nonlinear possibilities as well as the options of the breaking process if they exist.

Modelings D_PLAN_HM, D_PLAN_HHM, D_PLAN_THM, D_PLAN_THH, D_PLAN_THHM, AXIS_HM, AXIS_HHM, AXIS_THM, AXIS_THH, AXIS_THHM, (Phenomenon: MECHANICS) correspond to finite elements whose meshs supports are surface.

1 Discretization

1.1 Degrees of freedom

DX, DY 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.

Modeling	Degrees of freedom (with each node top)
D_PLAN_HM AXIS_HM D_PLAN_HMD AXIS_HMD D_PLAN_HMS AXIS_HMS	DX, DY, PRE1
D_PLAN_HHM AXIS_HHM D_PLAN_HHMD AXIS_HHMD D_PLAN_HHMS AXIS_HHMS	DX, DY, PRE1, PRE2
D_PLAN_THM AXIS_THM D_PLAN_THMD AXIS_THMD D_PLAN_THMS AXIS_THMS	DX, DY, PRE1, TEMP
D_PLAN_THHD AXIS_THHD D_PLAN_THHS AXIS_THHS	PRE1, PRE2, TEMP
D_PLAN_THHMD AXIS_THHMD D_PLAN_THHMS AXIS_THHMS	DX, DY, PRE1, PRE2, TEMP

1.2 Mesh support of the matrices of rigidity

The meshs support of the finite elements can be tetrahedrons, pyramids, prisms or hexahedrons. The elements are isoparametric. Notations (_, S, D) relate to the type of integration which can be classical, lumpé ('Of) or selective (').

Modeling	Mesh	Interpolation	Remarks
D_PLAN_HM (_, S, D) AXIS_HM (_, S, D)	QUAD8	Serendip 8 nodes in bilinear displacement on 4 nodes in pressure	The pressure of a node medium is the average of the nodes tops of the segment
D_PLAN_HHM (_, S, D) AXIS_HHM (_, S, D)	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

D_PLAN_THM (_, S, D) AXIS_THM (_, S, D)	QUAD8	Serendip 8 nodes in bilinear displacement on 4 nodes in pressure and temperature	The pressure and the temperature of a node medium are the average of the nodes tops of the segment
D_PLAN_THH (S, D) AXIS_THH (S, D)	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
D_PLAN_THHM (S, D) AXIS_THHM (S, D)	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
D_PLAN_HM(_, S, D) AXIS_HM(_, S, D)	TRIA6	Quadratic in linear displacement in pressure	The pressure of a node medium is the average of the nodes tops of the segment
D_PLAN_HHM (_, S, D) AXIS_HHM (_, S, D)	TRIA6	Quadratic in linear displacement in pressure	The pressures of a node medium are the averages of the nodes tops of the segment
D_PLAN_THM(_, S, D) AXIS_THM(_, S, D)	TRIA6	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
D_PLAN_THH(S, D) AXIS_THH(S, D)	TRIA6	Linear	The pressures and the temperature of a node medium are the average of the nodes tops of the segment
D_PLAN_THHM(S, D) AXIS_THHM(S, D)	TRIA6	Quadratic in linear displacement 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
D_PLAN_HM(_, S, D) AXIS_HM(_, S, D)	SEG3	Quadratic in displacement, linear in pressure	The pressure of the node medium is the average of the nodes tops of the segment
D_PLAN_HHM (_, S, D) AXIS_HHM (_, S, D)	SEG3	Quadratic in displacement, linear in pressure	The pressures of the node medium are the averages of the nodes tops of the segment
D_PLAN_THM(_, S, D) AXIS_THM(_, S, D)	SEG3	Quadratic in displacement, linear in pressure and temperature	The pressure and the temperature of the node medium are the average of the nodes tops of the segment
D_PLAN_THH(S, D) AXIS_THH(S, D)	SEG3	Linear	The pressures and the temperature of the node medium are the average of the nodes tops of the segment
D_PLAN_THHM(S, D) AXIS_THHM(S, D)	SEG3	Quadratic in displacement, linear in pressure and temperature	The pressures and the temperature of the node medium are the average of the nodes tops of the segment

2 Significance of the symbols

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

3 Supported materials

DEFI_MATERIAU	D_PLAN_HM AXIS_HM	D_PLAN_HHM AXIS_HHM	D_PLAN_THM AXIS_THM	D_PLAN_THH AXIS_THH	D_PLAN_THHM AXIS_THHM
THM_LIQU	WTNV113B	WTNV112A	WTNV109B	•	WTNV118A
THM_GAZ	WTNV113A	WTNV112A	WTNV109B	•	WTNV118A
THM_VAPE_GAZ		WTNV112A		•	WTNV118A
THM_INIT	WTNV113A	WTNV112A	WTNV109B	•	WTNV118A
THM_DIFFU	WTNV113A	WTNV112A	WTNV109B	•	WTNV118A
ELAS	WTNV113A	WTNV112A	WTNV109B		•
CJS	•	•	•		•
ELAS_THM			WTNV120A		WTNV118A
SURF_ETAT_SATU			WTNV120B		
CAM_CLAY_THM			•		
SURF_ETAT_NSAT					WTNV118A

4 Supported loadings

4.1 AFFE_CHAR_MECA

	All elements of this note	Remarks
DDL_IMPO	WTNV113A	
FACE_IMPO	•	
LIAISON_DDL	WTNV109C	
LIAISON_OBLIQUE	•	
LIAISON_GROUP	•	
LIAISON_UNIF	•	
LIAISON_SOLIDE	•	
LIAISON_ELEM	•	
LIAISON_CHAM_NO	•	
GRAVITY	•	
ROTATION		
FORCE_NODALE	WTNV120A	
FORCE_FACE		
FORCE_ARETE		
FORCE_INTERNE	•	
PRES_REP	•	
EPSI_INIT		
FLUX_THM_REP	WTNV114A	
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	D_PLAN_HM AXIS_HM	D_PLAN_HHM AXIS_HHM	D_PLAN_THM AXIS_THM	D_PLAN_THH AXIS_THH	D_PLAN_THHM AXIS_THHM
	KIT_HM	WTNV113A				
	KIT_HHM		WTNV112A			
	KIT_THM			WTNV109B		
	KIT_THH				•	
	KIT_THHM					WTNV118A

6 Elementary calculations of matrices

OPTIONS		Remarks
'RIGI_MECA_TANG'	•	
'FULL_MECA'	•	
'RAPH_MECA'	•	

7 Postprocessing of calculation

7.1 Options CALC_CHAMP with the elements

OPTIONS		Remarks
'SIEF_ELNO'	WTNV109C	Except for elements having for support of TRIA6
'VARI_ELNO'	•	
'EPSI_ELNO'		
'EPSI_ELGA'		

7.2 Options CALC_CHAMP with the nodes

	D_PLAN	Remarks
'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