Modelings 2D_FLUIDE, 2D_FLUI_STRU, AXIS_FLUIDE, AXIS_FLUI_STRU

Summary:

This document describes for modelings 2D_FLUIDE, 2D_FLUI_STRU, AXIS_FLUIDE, AXIS_FLUI_STRU :

- degrees of freedom carried by the finite elements which support modeling,
- the related meshs supports,
- supported loadings,
- nonlinear possibilities,
- CAS-tests implementing modelings.

Modelings 2D_FLUIDE (elements in a plan) and 2D_FLUI_STRU (elements 1D of fluid interaction - structure) correspond to the formulation in 2D in linear assumption of the coupled problem allowing the study of the vibratory behavior of a structure in the presence of a nonviscous, compressible fluid [R4.02.01]. Currently, the taking into account of free surface is not developed.

Modelings AXIS_FLUIDE (elements in a plan) and AXIS_FLUI_STRU (elements 1D of interaction fluid-structure) correspond to the formulation in axisymetry in linear assumption of the coupled problem allowing the study of the vibratory behavior of a structure in the presence of a nonviscous, compressible fluid [R4.02.01]. Currently, the taking into account of free surface is not developed.

1 Discretization

1.1 Degrees of freedom

Finite element	Degrees of freedom (with each node top)
MEFLTR3, MEFLTR6, MEFLQU4, MEFLQU8, MEFLQU9	NEAR : pressure PHI : potential of displacement
MEFLSE2, MEFLSE3	PHI : fluid potential of displacement
MEFSSE2, MEFSSE3	DX, DY : components of structure displacement PHI : fluid potential of displacement
MEAXFLT3, MEAXFLT6, MEAXFLQ4, MEAXFLQ8, MEAXFLQ9	NEAR : pressure PHI : potential of displacement
MEAXFLS2, MEAXFLS3	PHI : fluid potential of displacement
MEAXFSS2, MEAXFSS3	DX, DY : components of structure displacement PHI : fluid potential of displacement

1.2 Mesh support of the matrices of rigidity

Modeling	Mesh	Finite element	Remarks
2D_FLUIDE	TRIA3	MEFLTR3	
	TRIA6	MEFLTR6	
	QUAD4	MEFLQU4	
	QUAD8	MEFLQU8	
	QUAD9	MEFLQU9	
2D_FLUI_STRU	SEG2	MEFSSE2	
	SEG3	MEFSSE3	
AXIS_FLUIDE	TRIA3	MEAXFLT3	
	TRIA6	MEAXFLT6	
	QUAD4	MEAXFLQ4	
	QUAD8	MEAXFLQ8	
	QUAD9	MEAXFLQ9	
AXIS_FLUI_STRU	SEG2	MEAXFSS2	
	SEG3	MEAXFSS3	

1.3 Mesh support of the loadings

Modeling	Mesh	Finite element	Remarks
2D_FLUIDE	SEG2	MEFLSE2	
	SEG3	MEFLSE3	
AXIS_FLUIDE	SEG2	MEAXFLS2	
	SEG3	MEAXFLS3	

2 Supported loadings

The supported loadings are the following:

1) VITE_FACE

Allows to specify the field normal speed real, vibratory imposed in loading on elements of border.

Supported modelings: 2D_FLUIDE, AXIS_FLUIDE

1) IMPE_FACE

Allows to specify the map of normal impedance imposed in boundary condition on elements of border.

Supported modelings: 2D_FLUIDE, AXIS_FLUIDE

1) ONDE_FLUI

Allows to specify an amplitude of pressure of sinusoidal real incidental wave arriving normally at a face.

Supported modelings: 2D_FLUIDE, AXIS_FLUIDE

3 Non-linear possibilities

3.1 Laws of behaviors

The only relation of behavior available in DYNA_NON_LINE, for modelings **2D_FLUI_STRU** and AXIS_FLUI_STRU under BEHAVIOR is RELATION 'ELAS' (Cf [U4.51.11]).

3.2 Deformations

Only linearized deformations keyword 'SMALL' under DEFORMATION are available in the relations of behavior (cf [U4.51.11]).

4 Examples of implementation: CAS-tests

1) 2D_FLUIDE

FDLV111B [V8.01.111]: Calculation of the absorption of a wave of pressure created by a piston, in a fluid column.

1) AXIS_FLUIDE

AHLV101C [V8.22.101]: Calculation of the acoustic field of pressure of the harmonic response of a rectilinear guide of wave to anechoic exit, rigid walls, whose propagation medium is “normal” air, excited by a harmonically vibrating piston.

1) 2D_FLUI_STRU

FDLV111B [V8.01.111]: Calculation of hasbsorption of a wave of pressure created by a piston, in a fluid column.

1) AXIS_FLUI_STRU

ADLV100C [V8.21.100]: Piston coupled to a fluid column: calculation in acoustic fluid coupling - structure of the first mode of a system fluide1 - piston fluid 2.