

Modeling AXIS_FOURIER mechanics

Summary:

This document describes for modeling AXIS_FOURIER mechanics:

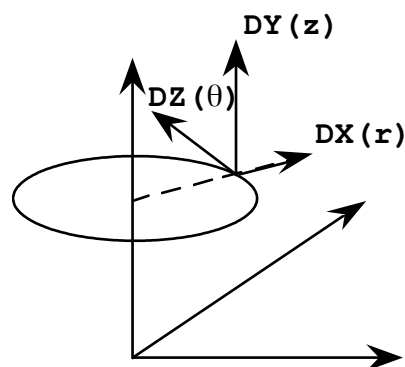
- degrees of freedom carried by the finite elements which support modeling,
- the related meshes supports,
- supported loadings,
- nonlinear possibilities,
- CAS-tests implementing modeling.

Modeling AXIS_FOURIER (Phenomenon: MECHANICS) corresponds to finite elements whose meshes supports are plane and make it possible to model the longitudinal section of parts of revolution around the axis OY , (in cylindrical coordinates (r, z, θ)) and subjected to loadings whose space distribution breaks up into Fourier series around this axis.

1 Discretization

1.1 Degrees of freedom

Modeling	Degrees of freedom (with each node top)
AXIS_FOURIER	DX : corresponds to radial displacement DY : corresponds to longitudinal displacement DZ : corresponds to ortho-radial displacement



1.2 Mesh support of the matrices of rigidity

Modeling	Mesh	Interpolation	Remarks
AXIS_FOURIER	TRIA3	Linear	
	QUAD4	Bilinear	
	TRIA6	Quadratic	
	QUAD8	Serendip	
	QUAD9	Biquadratic	

1.3 Mesh support of the loadings

The grid must be carried out in the half-plane $(X > 0, Y)$.

Modeling	Mesh	Interpolation	Remarks
AXIS_FOURIER	SEG2	Linear or Bilinear	
	SEG3	Quadratic, Serendip or Biquadratic	

2 Supported loadings

The loadings available are the following:

- ``FORCE_CONTOUR'`
Allows to apply forces linear at the edge of a 2D field.
- ``FORCE_INTERNE'`
Allows to apply voluminal forces.
- ``GRAVITY'`
Allows to apply a loading of type gravity.
- ``PRES_REP'`
Allows to apply a pressure to a field of continuous medium.
- ``ROTATION'`
Allows to define a number of revolutions and the direction of the vector of rotation.

3 Non-linear possibilities

No non-linear possibility exists, this modeling can be used only with `MECA_STATIQUE` or by a manual assembly.

4 Examples of implementation: CAS-tests

Linear statics

- HSLV304A [V7.14.304]: Static analysis of a cylinder subjected to a decomposable thermal loading in 2 harmonics.
- SSLV303A [V3.04.303]: static analysis of a cylinder embedded under its weight actual and subjected to an internal pressure.
- SSLV139A [V3.04.139]: Buckling of a circular plate subjected to a compressive force uniformly distributed on its contour.