

Manuel d'Utilisation
U3.23 booklet: Thermal finite elements 2D
Document: U3.23.02

Modeling AXIS_FOURIER thermics

Summary:

This document describes for modeling AXIS_FOURIER thermics:

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

Modeling AXIS_FOURIER (Phenomenon: THERMICS) 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 OZ (in cylindrical coordinates) subjected to boundary conditions 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	TEMP : corresponds to the temperature

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

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

2 Supported loadings

The loadings available are the following:

- **SOURCE**
Allows to apply voluminal sources.
- **FLUX_REP**
Allows to apply normal flows to faces of elements.
- **EXCHANGE**
Allows to apply conditions of exchange with an outside temperature with faces of elements.

3 Non-linear possibilities

Nothing.

4 Examples of implementation: CAS-tests

- Stationary linear thermics
TPLV305A [V4.04.305]: Linear thermal analysis of a cylinder subjected to a temperature imposed on external surface, according to a harmonic function (mode 1).