

TTNL04 – Thermics with non-linear flow in transient 2D

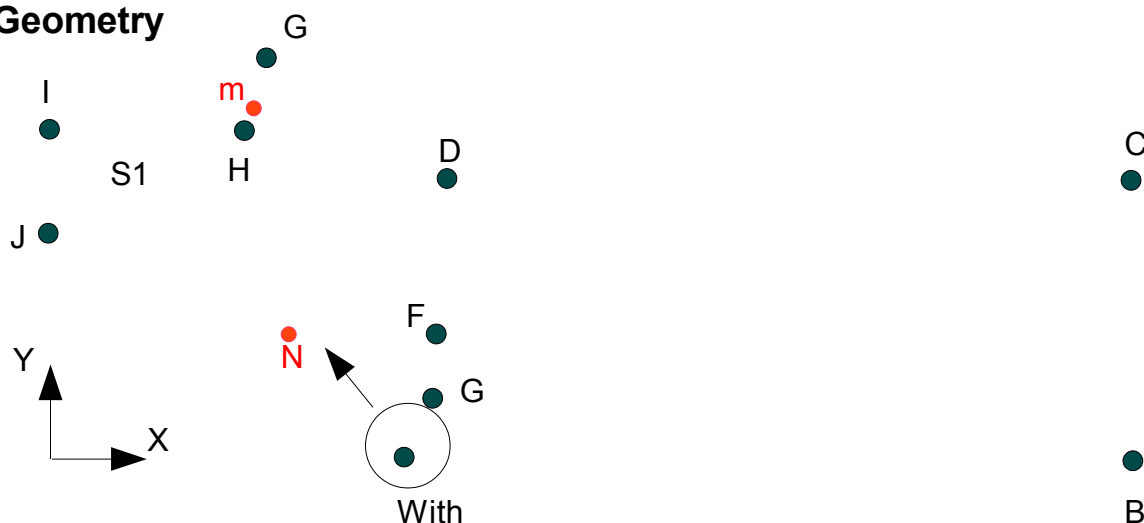
Summary:

The objective of this test is to validate the taking into account of non-linear flow in thermics 2D. This CAS-test is inspired by the CAS-test htna100a.

A modeling PLAN is proposed.

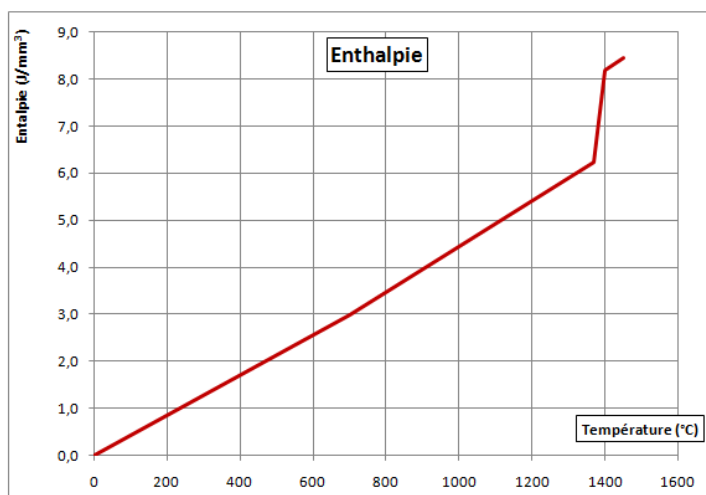
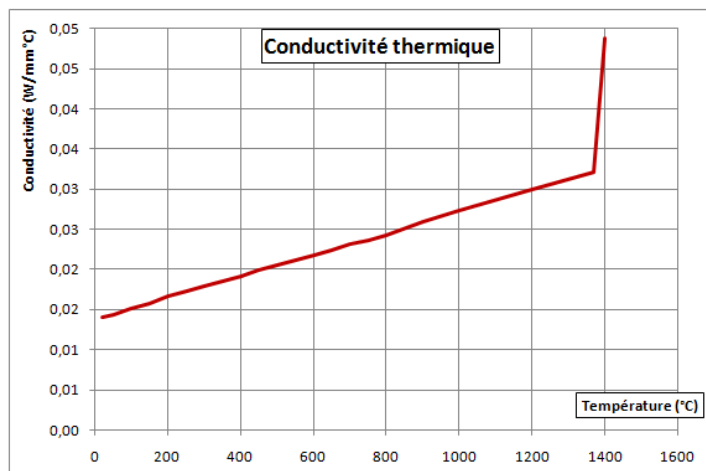
1 Problem of reference

1.1 Geometry



1.2 Properties of material

The thermal properties (conductivity and enthalpie) vary with the temperature and are represented on the figures below.



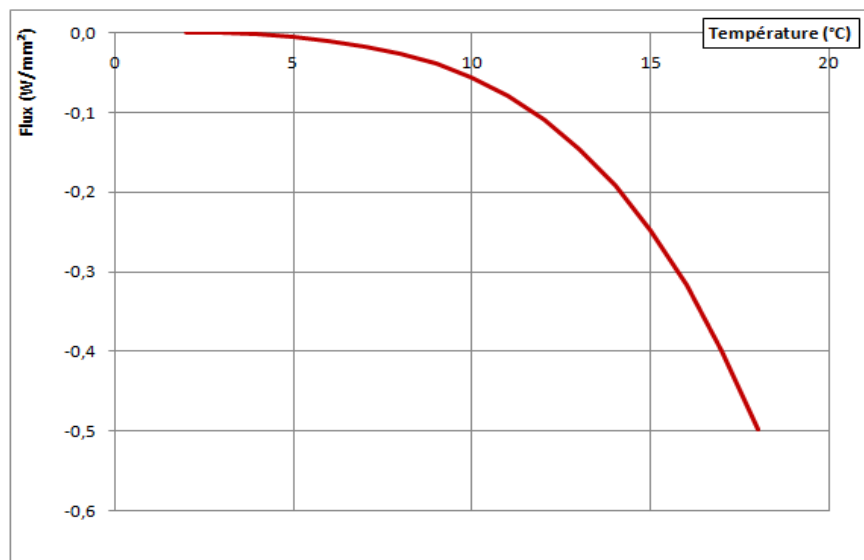
1.3 Boundary conditions and loadings

1.3.1 Stage 1: time interval $0 \leq t \leq 3.2s$

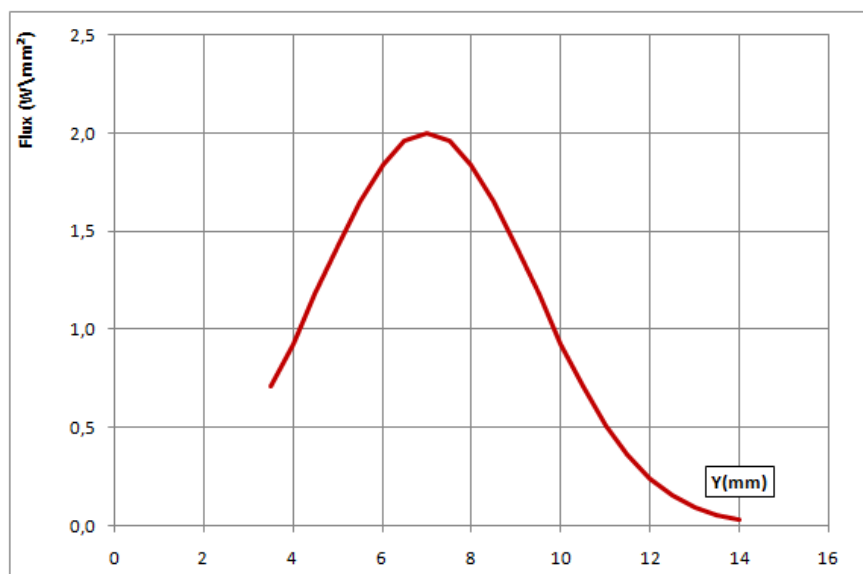
- Temperature imposed on surface SI

Time (S)	Temperature (°C)
0.0	20.
1.0	1700.
3.2	1700

- Non-linear flow imposed on with dimensions ones AB, CD, DF

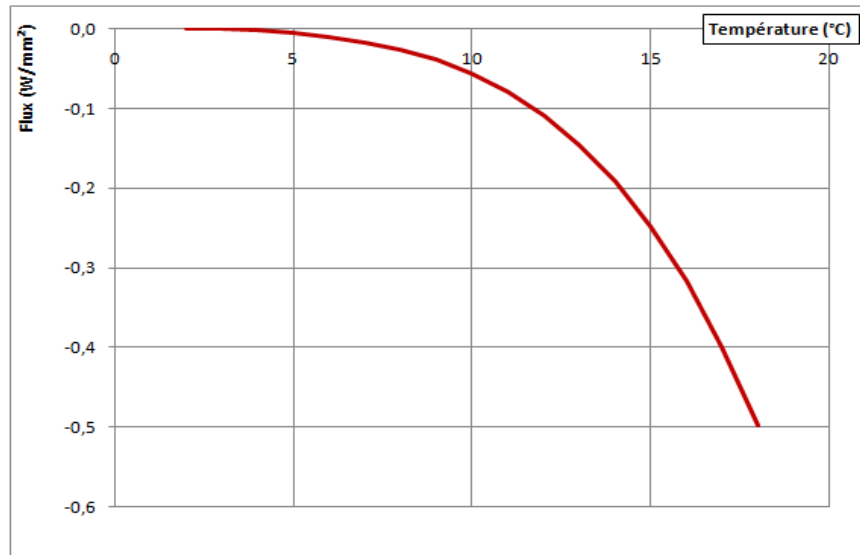


- Flow imposed on with dimensions ones FG, GH, HI .



1.3.2 Stage 2 time interval: $3.2s < t \leq 600.s$

- Non-linear flow imposed on with dimensions ones AB , CD , DF , FG , GH , HI



1.4 Initial conditions

Initial temperature = 20°C

2 Reference solution

2.1 Method of calculating

The reference solution corresponds to a solution of not-regression

2.2 Sizes and results of reference

The temperature is tested.

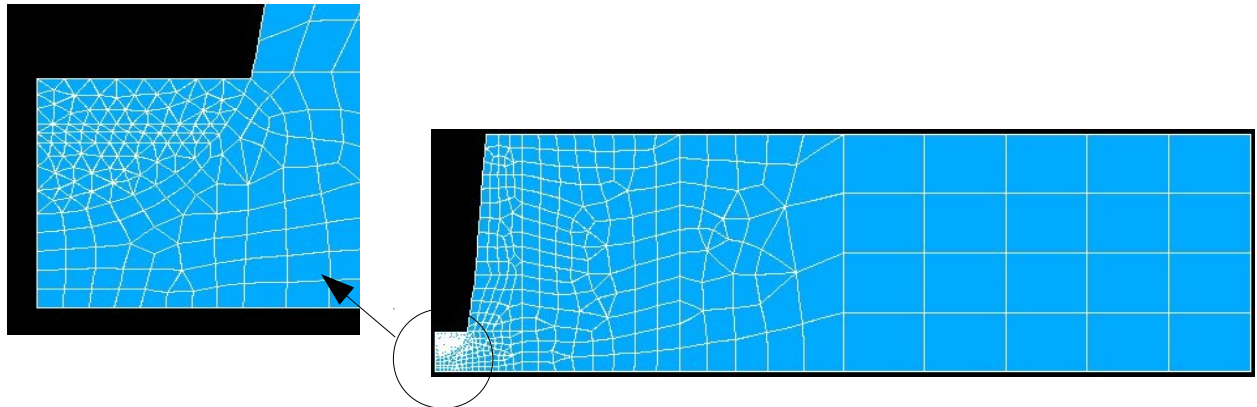
2.3 Uncertainties on the solution

Digital solution

3 Modeling A

3.1 Characteristics of modeling

A modeling is used PLAN.



3.2 Characteristics of the grid

The grid contains 1643 nodes and 836 meshes of which:

- 282 SEG3
- 210 meshes of the type TRIA6,
- 344 meshes of the type QUAD8.

3.3 Sizes tested and results

Identification			Type of reference	Value of reference (°C)
Node	Size	Moment (S)		
N939 (8.1, 24.6)	TEMP	3.	'NON_REGRESSION'	20,016
		64.	'NON_REGRESSION'	79,290
		290.	'NON_REGRESSION'	49,603
N1334 (8.3, 12.0)	TEMP	3.	'NON_REGRESSION'	60,950
		64.	'NON_REGRESSION'	96,810
		290.	'NON_REGRESSION'	49,912
N1498 (6,5,5,0)	TEMP	3.	'NON_REGRESSION'	526,990
		64.	'NON_REGRESSION'	108,008
		290.	'NON_REGRESSION'	49,920

4 Summary of the results

This CAS-test makes it possible to validate the taking into account of a non-linear flow in thermics 2D, and to check the not-regression of the results.