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## SDLS130 – Fnatural réquence of a laminated composite plate made up of 8 folds

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### Summary:

This test validates the solution in Eigen frequency of a composite plate made up of 8 folds. The solution obtained by code\_aster is compared with a solution resulting from an article.

MODELING WITH : Eigen frequency of one plate composite of 8 folds DKT.

## 1 Problem of reference

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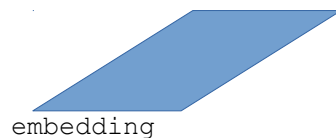
### 1.1 Geometry



Legend



The plate is rectangular dimensions  $L=127\text{ mm}$ ;  $l=12,7\text{ mm}$  . The thickness of the plate is of  $1.01\text{ mm}$  .



### 1.2 Properties of material

Each layer behaves in manner orthotropic rubber band (definite via `DEFI_COMPOSITE`).

- $E_L = 134400\text{E}6$ ;  $E_T = 10340\text{E}6$ ;  $\nu_{LT} = 0,33$ ;  $G_{LT} = 5100\text{E}6$ ;  $G_{TN} = 1999\text{E}6$
- $\rho = 1477$

### 1.3 Boundary conditions and loadings

It is a question of studying the Eigen frequencies of the plate embedded on one on its sides (see figure).

### 1.4 Initial conditions

Nothing.

## 2 Reference solution

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### 2.1 Method of calculating

It is about a test of reference in the literature to validate the modal analysis of a laminated plate. The literature provides results of reference starting from the experimental data and results of other codes like Nastran3D.

### 2.2 Sizes and results of reference

One compares the solution in Eigen frequency obtained by code\_aster if it there is no delamination.

### 2.3 Uncertainties on the solution

If the delamination of the layers does not intervene, the results of reference vary between [79.2; 82.1] Hz. Thus one seeks to obtain the first Eigen frequency in this beach.

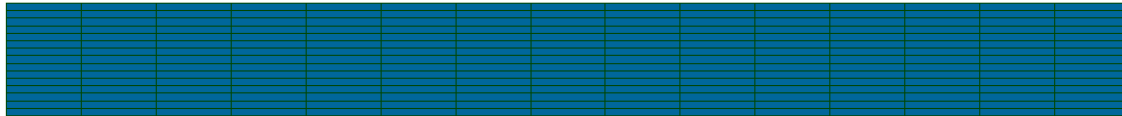
### 2.4 Bibliographical references

- 1 Jinho Oh has, Maenghyo Cho, Jun-Sik, Kim G., "Dynamic analysis of composite multiple punt with delaminations based one higher-order zigzag theory", International Newspaper of Solids and Structures 42 (2005) 6122-6140.

## 3 Modeling A

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### 3.1 Characteristics of modeling



### 3.2 Characteristics of the grid

The grid contains 225 elements of the type QUAD4.

### 3.3 Sizes tested and results

Identification	Type of reference	Value of reference	Tolerance
Eigen frequency in Hz	`SOURCE_EXTERNE`	79.8	15 %

Table 3.3-1

## 4 Summary of the results

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Calculation carried out gives a result close to what one hoped for the first Eigen frequency.