

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

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

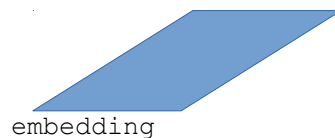
1.1 Geometry



Legend



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

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

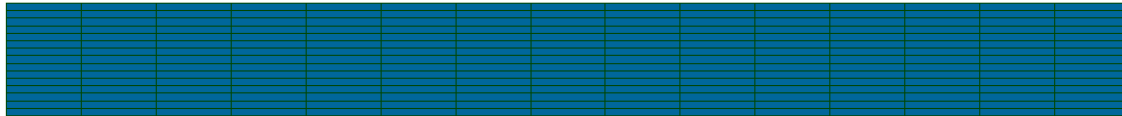
If the delamination of the layers does not intervene, the results of reference vary between [79.2; 82.1] Hz. Thus one seeks to obtain the first Eigen frequency in this beach.

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

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

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