Instituto Tecnológico de Matemática Industrial

OPERPER

Mono and Multi-Component Polymeric Materials for Thermal and Acoustic Protection

SUCCESS STORIES

PRODUCTIVE SECTOR: Material, Automotive

PROBLEM DESCRIPTION

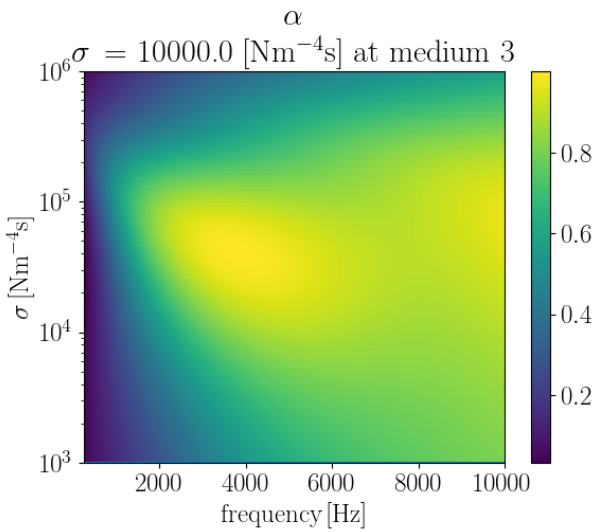
To obtain of a new kind of mono and multilayer materials for the automotive industry, which will be used to improve the comfort conditions inside the vehicle cabins.

CHALLENGES AND GOALS

- ✓ Development and verification of different specific mathematical and numerical tools to analyze vibro-acoustic and thermal problems involving a new range of polymeric multilayer materials.
- ✓ Optimization of the physical characteristics of mono and multilayer materials for the thermal and acoustic protection at low frequency range.

MATHEMATICAL AND COMPUTATIONAL METHODS

- ✓ Acoustic problem: vibro-acoustic coupled models in one-dimensional structures.
- ✓ Thermal problem: numerical simulation tool that allows, in a one-dimensional way, the thermal analysis of structures, and the post-processing of thermal variables of interest.
- ✓ Finite element methods to solve the coupled three-dimensional vibro-acoustic problems in 3D alpha cabins.



Absorption coefficient for a range of materials with different flow resistivity, where the frequency response is analyzed.

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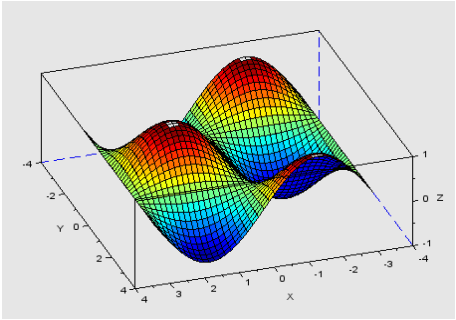
RESULTS AND BENEFITS

- ✓ The numerical simulation is used as an innovation tool in the design process of multilayer materials.
- ✓ Support to verify process parameters and to predict potential problems setting novel multilayer materials.
- ✓ Cost reduction by avoiding unexpected coupled phenomena, which could arise during the process of integrating layers of different materials.
- ✓ Optimization of use of materials, energy consumption, and costs related to manufacture novel multilayer materials



Graph generated by the developed OPERPER thermal tool

The numerical simulation allows to have a specific and complete range of fully qualified and quantified materials, so can offer specific solutions in terms of thermal and acoustic protection adjusted to different technical requirements.

Digital Twin

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

UNIVERSIDADE DA CORUÑA

ADHEX TECHNOLOGIES The adhesive technology company

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