

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

OPERPER

H2020 SOCIETAL CHALLENGES: Climate action, environment, resource efficiency and raw materials

PRODUCTIVE SECTOR: Materials

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.

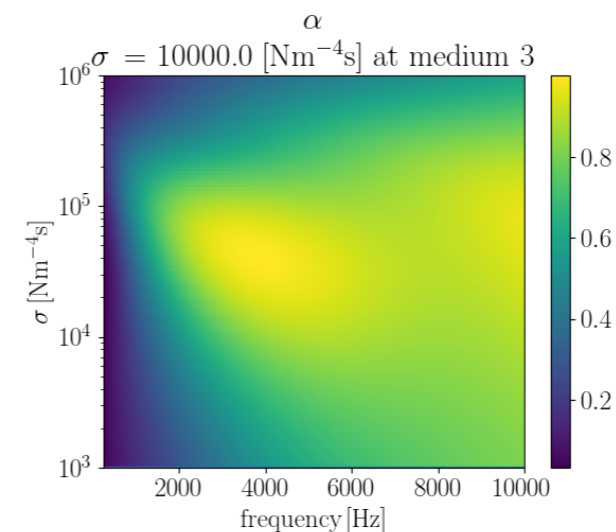
Optimization of the physical characteristics of mono and multilayer materials for the thermal and acoustic protection at low frequency range.

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 alpha cabins.



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

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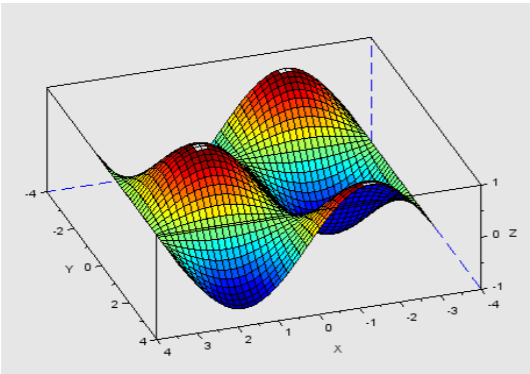
Results and Benefits

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.



Spanish Network for Mathematics & Industry (math-in)

