

## PHD THESIS SUMMARY

# “CONTRIBUTIONS TO THE ANALYSIS OF ACOUSTIC PHENOMENA IN THE PROXIMITY OF MILITARY AIRPORTS”

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The main objective of this thesis is the study of the propagation of acoustic waves with numerical and experimental methods, in order to know and adopt the most appropriate measures regarding the acoustic protection of personnel and the environment in general. The objective adopted is a very important one from a theoretical point of view and, above all, practically, because the noise level in the proximity of military airports can have negative effects on the health and comfort of the people in the area.

Designing a new sound-absorbing structure to reduce noise levels is a complex task that requires a solid theoretical and experimental foundation. In this sense, the main objective is represented by the development of a solid theoretical basis that allows understanding the mechanisms by which noise attenuation occurs in sound-absorbing structures.

Furthermore, the paper aims to carry out a rigorous experimental analysis of existing sound-absorbing solutions. These research efforts can have a significant impact on reducing the negative effects of noise on the health and quality of life of people living near military airports, as well as improving the performance of sound-absorbing systems used in other fields, such as building acoustics or the automotive industry.

In addition to the main objective, the following specific objectives can be listed within the thesis:

- ✓ systematization of theoretical knowledge in order to substantiate and apply modern numerical methods of calculation regarding the propagation of acoustic waves and the effect of sound-absorbing panels;
- ✓ the creation of models, methods and methodologies regarding the use of the finite element method for the numerical simulation of the propagation of acoustic waves and the behavior of sound-absorbing panels;
- ✓ the use of an experimental investigation regarding the determination of the acoustic pressure level in an open space, under the conditions of the use of sound-absorbing panels;
- ✓ the numerical study regarding the propagation of acoustic waves through holes, since the numerically and experimentally investigated sound-absorbing panel was one with holes.
- ✓ numerical and experimental simulation of the behavior of a sound-absorbing metal panel with holes;
- ✓ the use and interpretation of a professional software product for the creation of sound pressure maps in the proximity of the airport and the interpretation of its results.

The main objective as well as the specific ones have been successfully accomplished and are presented over nine chapters. The arrangement of the chapters was carried out in a logical order, treating, one by one, the objectives of the work to develop elements of novelty and scientific research.

The role of this thesis is to contribute to the development of noise reduction technologies in the proximity of military airports, through a theoretical and experimental substantiation, which will allow the design of a new sound-absorbing structure.