

Introduction

One of the aims of the EU project **FACE** (Friendly Aircraft Cabin Environment) is to reduce **aircraft interior noise**. For this purpose, **sound absorbing trim panels** with acoustic resonators have been designed. By applying tube resonators with different lengths and radii, the absorption characteristics can be optimised for various frequency ranges.

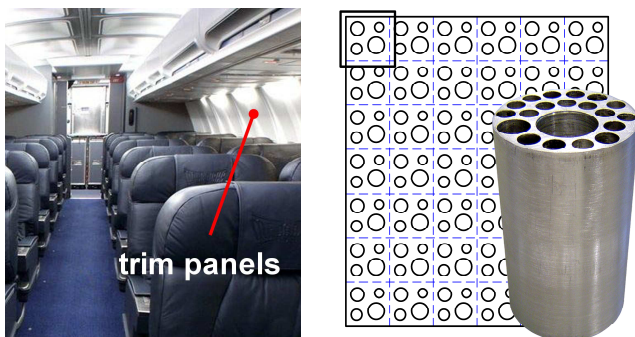


Figure 1 : Aircraft cabin with trim panels (left) and sample for experimental validation (right)

Objective

The objective of the present study is the experimental **validation** of the **optimised resonator configurations** on a small scale.

Methods

The trim panel can be subdivided into a number of identical characteristic areas (see Figure 1). A **sample** of such a characteristic area is placed at one end of an **impedance tube** (see Figure 2). At the other end a broadband sound field is generated by a speaker. The **absorption coefficient** for each frequency can be calculated from the dimensions of the impedance tube and the measured transfer function between two pressures.

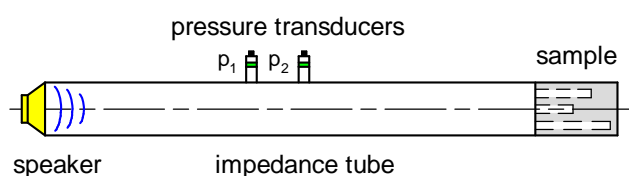


Figure 2 : Experimental setup, 2p method

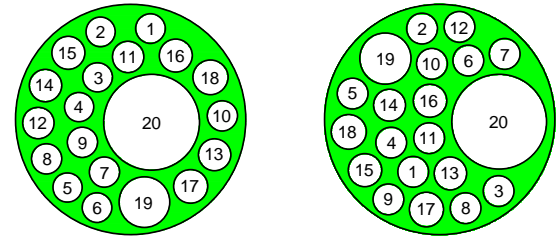


Figure 3 : Sample 1 (left) and sample 2 (right)

Results

Figure 4 shows the measured absorption curves of **two samples** with the same, but differently distributed, resonators (see Figure 3). The resonator dimensions have been optimised for maximum sound absorption in a frequency range of 1000-2000 Hz¹.

Very high absorption levels are obtained and the **agreement** between theory and experiment is **fairly good**. The fact that the measured absorption curves of the two samples are different, indicates that the absorption characteristics are influenced by the position of the resonators in the surface.

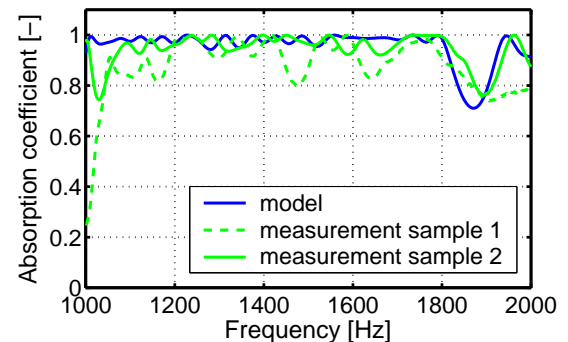


Figure 4 : Measurement results

Discussion

The predicted and measured absorption curves match fairly well. The influence of the **position of the resonators** needs to be examined further.

Reference

1. Hannink, M.H.C. et al. (2004) Optimised sound absorbing trim panels for the reduction of aircraft cabin noise, ICSV11, St. Petersburg, Russia.