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IDENTIFICATION OF ADMITTANCE COEFFICIENTS FROM IN-SITU MEASUREMENTS IN ACOUSTIC CAVITIES

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Abstract. In recent decades, sound intensity and quality is taking an increasingly important place in the design process of products like cars or aircrafts. Different types of absorbing materials have therefore been developed and used in such products to achieve this purpose. Acoustical calculations are quite heavy and industries generally have to use numerical tools to predict the influence of absorbing materials on the sound propagation inside cavities. In these ones, the acoustical properties of absorbing materials are described by the admittance (or impedance) coefficient, which is a simplification of the physical model. However, the limits of applicability of this model are not well known and the conditions in which its parameters are measured can differ significantly from the ones in which the materials are really used.
In this paper, a model updating technique process is used to identify the parameters required to describe admittance coefficients from sound pressure measurements inside a closed cavity. Updating techniques have been used for many years to improve numerical models, and consist in minimizing an error between the numerical solutions and a set of experimental results. The technique based on the Constitutive Relation Error (CRE), initially proposed by Ladevèze [1] for structural dynamics problems, is an indirect method in which the cost function, called the CRE, is based on an energy norm. The main advantages of this method are that the updated parameters keep a physical meaning, that it allows taking into account the measurement error and that it allows locally evaluating the modeling and measurement errors [2].
In this paper the CRE-based updating technique is applied to the acoustical problem ([3], [4]) in order to identify the admittance coefficients and the local estimators are developed. The method is applied on real 2D (Kundt's tube) and 3D (concrete box) experimental data.

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