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# Experimental Verification of Similarity Criteria for Sound Absorption of Perforated Panels

**Authors :** Aleksandra Majchrzak, Katarzyna Baruch, Monika Sobolewska, Bartlomiej Chojnacki, Adam Pilch

**Abstract :** Scaled modeling is very common in the areas of science such as aerodynamics or fluid mechanics, since defining characteristic numbers enables to determine relations between objects under test and their models. In acoustics, scaled modeling is aimed mainly at investigation of room acoustics, sound insulation and sound absorption phenomena. Despite such a range of application, there is no method developed that would enable scaling acoustical perforated panels freely, maintaining their sound absorption coefficient in a desired frequency range. However, conducted theoretical and numerical analyses have proven that it is not physically possible to obtain given sound absorption coefficient in a desired frequency range by directly scaling only all of the physical dimensions of a perforated panel, according to a defined characteristic number. This paper is a continuation of the research mentioned above and presents practical evaluation of theoretical and numerical analyses. The measurements of sound absorption coefficient of perforated panels were performed in order to verify previous analyses and as a result find the relations between full-scale perforated panels and their models which will enable to scale them properly. The measurements were conducted in a one-to-eight model of a reverberation chamber of Technical Acoustics Laboratory, AGH. Obtained results verify theses proposed after theoretical and numerical analyses. Finding the relations between full-scale and modeled perforated panels will allow to produce measurement samples equivalent to the original ones. As a consequence, it will make the process of designing acoustical perforated panels easier and will also lower the costs of prototypes production. Having this knowledge, it will be possible to emulate in a constructed model panels used, or to be used, in a full-scale room more precisely and as a result imitate or predict the acoustics of a modeled space more accurately.

**Keywords :** characteristic numbers, dimensional analysis, model study, scaled modeling, sound absorption coefficient
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