

Application of CAE techniques in solving tweeter installation issues.

High frequency study focused on the effect of grills, cavities and nearby reflecting surfaces on tweeter performance in cars.

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Abstract

Nowadays the automotive industry is faced with new features that customers demand, which were not a priority a few years ago. Audio performance is one of them and it is quite challenging. To be able to detect, before any physical prototyping if the speaker mounting or installation is acceptable will allow the teams to perform faster design iterations to achieve better audio performance.

This paper tackles how different installation details of a tweeter will affect its directivity radiation. Installation details within the automotive industry are usually interfaces, grills or nearby reflecting surfaces. The investigation is made through numerical modeling, specifically Finite Element Method in this thesis and it is then validated with experimental measurements. As this study is done at high frequencies, some of the issues faced during modeling and measurement will also be discussed.

Keywords: Tweeter, Thiele and Small Parameters, Finite Element Method, Loudspeaker Directivity, Acoustic impedance, Resonance, Frequency response function