Generic Speaker Grille Apps

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Abstract

For automotive applications, HARMAN is using simulation and equalization methods to optimize audio systems. The fidelity of an audio system depends on many characteristics like the number of loudspeakers, the speaker packaging as well as the position and orientation of the speakers in the vehicle. To optimize the speaker packaging, our engineering team has developed a COMSOL Multiphysics® Application to evaluate the influence of adding a speaker grille assembly to a loudspeaker. A parametric approach is used to design the 3D speaker grille. The assembly is mounted on an infinite baffle and is radiating into a semi anechoic room. A comparison with Sound Pressure measurements in an anechoic room shows that the acoustic predictions include the main characteristics of the speaker packaging. After performing the speaker packaging optimization, the user can build an automatic simulation report including the geometry description and the simulation results. The application was created in close collaboration with the engineering end users. It was uploaded to an internal COMSOL Server™ and is accessible to all audio system engineers at HARMAN.

Figures used in the abstract

Figure 1 : Speaker Grille Geometry

Figure 2 : 3D Sound Pressure Level

Figure 3 : Polar Directivity Plot (Sound Pressure Level)

Figure 4 : Directivity Map (Sound Pressure Level)