Prediction of the Loudspeaker Total Harmonics Distortion Using Comsol Multiphysics
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Introduction: For automotive applications, simulation methods are used to optimize the position and orientation of speakers. Since a loudspeaker is a non linear device, the sound pressure includes harmonics. Engineers at Harman are optimizing the audio performance by predicting and minimizing the amplitude of the harmonics.

Computational Methods: The harmonics are mainly created by 3 non linear speaker components (force factor, suspension stiffness and voice coil inductance).

Results: Simulation results were compared with measurement data delivered by a professional loudspeaker measurement system. Total Harmonic Distortion (THD) was predicted based on Comsol and measurement system datasets. Predicted THD was compared with a measurement.

Conclusion: The optimization of the non linear behavior of a loudspeaker can be realized in the virtual domain.

References: