Advanced Loudspeaker Calculator - an Example of Comsol Apps Utilization

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Abstract

Developing a new loudspeaker design requires not only knowledge and experience in the field, but also an access to verified and efficient tools. HARMAN's Virtual Product Development (VPD) team has developed a Comsol Application to serve at the early stages of the design process. The app, simply called "HARMAN LPM/THD Speaker Simulator" has been created in a close collaboration with the end users, i.e. transducer engineers.

The LPM calculator is based on the Vanderkooy's method[1], which considers Thiele Small parameters as inputs. This method has been implemented to simulate and compare two speakers in different configurations such as free field, closed, vented, etc. Additionally, a user can calculate Total Harmonic Distortion (THD) in the sound pressure, as well as corresponding speaker DC shift. Required inputs, such as force factor Bl, stiffness Kms and voice coil inductance Le, may come either from a measurements or simulation[2].

Application is currently hosted on the HARMAN's COMSOL Application Server and is accessible globally to all HARMAN transducer engineers.

References:
1. J. Vanderkooy, P.M.Boers, M.Aarts, "Direct-Radiator Loudspeaker System with High Bl", Paper presented at AES 114th Convention, 22-25 March 2003, Amsterdam, Netherlands
2. F. Malbos, M. Bogdanski, M. Strauss, „Prediction of the Loudspeaker Total Harmonic Distortion using Comsol Multiphysics", Paper presented Comsol Conference 2016, Munich, Germany