On the Directional Response of Multi-Driver Column Loudspeaker Configurations Using FEA and BEM

R. Balistreri[1]

[1]Klipsch Group, Inc, Indianapolis, IN, USA

Abstract

Column Loudspeakers employ multiple drivers to get close to a radiating line source. A line source gives several acoustic advantages versus a point source, especially in highly reverberant environments. This property particularly has made column loudspeakers the preferred solution in houses of worship, airports and large environments, yet, being a Public Address (PA) application, often sound quality of existing products is inadequate to outstanding music reproduction. On this thought the exploration of a design suitable for home theater sound, but for bigger and untreated environments arise.
This paper will discuss a comparative study between a basic column design and a computer optimized configuration of transducer drivers' quantity, geometry and distance among them, also, crossovers considerations, network delay in the system, etc., all to control directivity further retaining music reproduction quality as per Klipsch intent. An illustration of the model within COMSOL Multiphysics® is given. The use of Modules is reviewed for the electrical, magnetics, and moving parts components of the drivers. Moreover, for the acoustics in the cabinet and far field, the use of both, Finite Element Analysis (FEA) and Boundary Element Analysis BEM is detailed.

Figures used in the abstract

Figure 1: Inspiration