



SAUSALITO AUDIO

An Overview of Conic Section Array™ Waveguides

By Manny LaCarrubba





Conic Section Array waveguides grew out of inventor and company co-founder Manny LaCarrubba's interest in applying ultra-wide dispersion waveguides to high SPL sound reinforcement loudspeakers. CSA waveguides trade off some performance in pattern control in the vertical plane to achieve spectacular performance in the horizontal plane. For many sound reinforcement applications this type of dispersion characteristic is highly desirable. For instance, many "speaker on a stick" applications such as street festivals, coffee houses, foreground music for bars/clubs, under balconies or even the school principal, standing mid court, addressing students sitting on bleachers that run the length of the gym.



Here we see the CSA in a sound reinforcement application. There were about 60 people on a hillside looking down on the deck with many of them seated far outside the right frame of the picture.

The CSA is scalable however. Sausalito Audio has built prototypes demonstrating the suitability of the CSA in a relatively small consumer loudspeaker or professional near field monitor. In this application, coverage of a large audience seating area is not the issue rather, the highest fidelity playback for a single person or small



group is most important. The CSA allows for the construction of a playback speaker that has a very flat power response as well as flat axial response. So, in addition to the extraordinary stability of the high frequency response seat to seat, the room reflections, especially the important side wall reflections, have full frequency content – the spectrum of the room ambience is much flatter. (There is an assumption here regarding proper room acoustics, of course.) This turns out to be quite important and leads to a much greater sense of realism and envelopment in the playback environment. Other things being equal, listeners prefer the sound of loudspeakers that have this characteristic. This all comes with no degradation of phantom images which are life-like and stable. People describe CSA speakers as “transparent” and “open.” The sound stage is huge. Recording engineers have commented that it’s easier to pick out details in the recordings – things like reverb tails.



This 6" two-way concept prototype would make an outstanding consumer speaker or professional studio monitor with the right industrial design and electronics compliment.



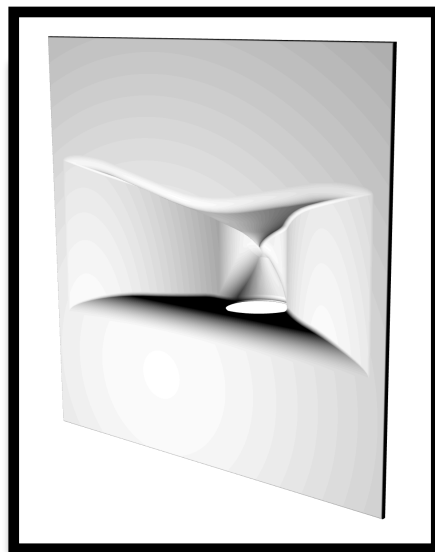
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In multi-channel cinema applications, the performance is equally stunning. In a theater environment, even high frequency coverage of the seating area is obviously desirable, as is the enhanced sense of envelopment. However, there is a particular challenge that the new Atmos and Aura 3D formats have regarding surround speaker performance. Historically, the side and back channels in a cinema system were a single channel of audio sent to arrays of speakers on the side and back walls of the theater. With the newer formats, each channel is individually addressable. Consider the following scenario of a sound effect panned to the right rear of the sound field. In a traditional theater loudspeaker setup, that effect would appear in the right surround speaker array and also in the back speakers. Depending on where you were sitting in the theater, you would hear the effect on the right, behind you, or perhaps for a lucky few (very few) at the right rear of the theater. In modern systems, with each loudspeaker individually addressable, everyone in the theater can hear the effect coming from the same spot -- the speaker in the right rear of the theater. The problem now is that the timbre of that effect will vary wildly with seat position. People sitting on the right front quadrant of the theater will be so far off axis that high frequencies can be on the order of 20dB down! If that effect is a bird chirp or breaking glass, they may miss it entirely. A CSA loudspeaker fixes the problem.



This Grima Systems Beta loudspeaker delivers the highest level of performance in high-end private cinemas.

Sausalito Audio is currently working on an embodiment of the CSA for in-wall loudspeakers and outdoor landscape speakers. In all of these applications, the CSA can provide an obvious competitive advantage over more conventionally designed product.



Coming soon...