PLACEMENT FORMATS

We have seen methods for reproduction of sound that can place sources as being fixed in space. The listener is now free to move and turn without sweet spot restriction.

The ability to accurately place multiple reproduced sound sources at points that remain fixed in space when observed from anywhere in a defined listening region raises the issue of possible format restrictions.

Each array needs to cover a target listening area with rendered sound based on the listening area requirements. Three formats arise. In all of the three cases, the listener has a defined listening region but cannot stray from this region without destroying the perception of sound objects fixed in space. In particular, the listener cannot pass the line of the first loudspeakers of the arrays or the wavefront creation technique collapses.

Voyeur format

The distance and direction information remains correct in a region in space provided the listener is in a target listening area in front of the arrays. This allows for render of sound objects from well in front of the array, back to the vanishing point or acoustic horizon behind the array. This would suit 2D and 3D screen-based cinema for example.

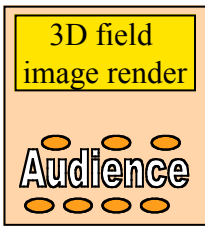

Figure 1
Voyeur format

Bubble format

The listeners can be seated or walk completely around the region of space where the arrays are located, but cannot enter the region of the arrays. The listeners will perceive sound objects from well forward of the array “bubble”, back to the vanishing point well behind the bubble, and for each listener location. This requires the use of multiple or sectored array structures to present the different perspectives as the listeners position themselves in different locations or move around the arrays. This format would suit conference call systems, “concerts in the round” and point of sale apparatus for example.

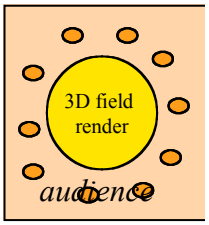

Figure 2
Bubble format

Immersive or Virtual Reality format

This is the complement to the bubble format. The listener is now inside a region surrounded by the arrays and perceives the correct sound source distance, direction and horizon or vanishing point, but cannot leave the region. This would suit “cinema in the sphere” and immersive virtual reality applications, for example.

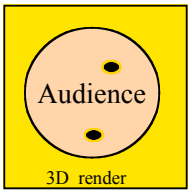

Figure 3
Immersive VR
format

The use of these separate formats will assist in balancing array design requirements against scope of audience placement in the intended application. But it does not allow for the situation where a person wants to be able to walk around, up to, through and away from each or any sound source created in space.

We will now consider how this could be done. The first obvious requirement is that the loudspeaker sources creating the sound fields will need to be truly omni-directional in nature as total room coverage will be required. One easy method of achieving this is to use half sources and take advantage of the boundary image to complete the spherical source.

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