

Report on the ALMA winter meeting in Las Vegas (Ne, U.S.A.) on 4 and 5 januari 2014

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At the end of November, Hans received an invitation to present the paper, he presented at the conference of the Audio Engineering Society (AES) in Helsinki, Finland, August 2013, again at the winter meeting of the ALMA (Association of Loudspeaker Manufacturers and Acoustics) in Las Vegas (Nevada, U.S.A.). With some shuffling, Hans was able to fit this meeting in his agenda and departed for Las Vegas.

The ALMA is more specifically focused on loudspeakers than the AES and thus there is more attention for the specific problems of loudspeakers. So there is more room for in-depth analysis than is common with the AES. In that respect, the organisations are complementary. As an example: during the exhibition, there were also manufacturers of loudspeaker parts like voice coils and cones.

Really revolutionary developments cannot be reported, most developments are more gradual. The constant improvement of software is helpful as this facilitates the tracing of all kinds of problems and more optimal designs can be achieved. There are also interesting developments at the materials side: possibly is Beryllium a good material for tweeters also this combines a low density with a high stiffness and thus might enable an improvement of the impulse response. "Temporal Coherence" will closely follow these developments and has contacts with the developers of Beryllium in loudspeakers.

Ferrofluids have been used for several tens of years in loudspeakers to improve the coupling between the voice coil and the magnetic field and to improve the heat transfer from the voice coil to the outside world. But these ferrofluids also have their limitations (viscosity, visco-elastic properties, temperature dependence). The developments are mainly focused on the reduction of these disadvantages, but there will always be a trade-off between conflicting requirements.

An interesting contribution concerned the annoyance of harmonic distortion. The presenter showed that the annoyance of harmonics increases with the ratio to the fundamental: the third is more annoying than the second, etc. He showed a fragment of a publication from 1952 (!) in which it was suggested to "weigh" the harmonics in order to get a more reliable, more related to perception, distortion figure. It is interesting to know that the computer simulations, run by "Temporal Coherence" are focused on the reduction of higher harmonics, because it is known to "Temporal Coherence" that the higher harmonics are rather annoying.

Very interesting was the "keynote lecture", given by Siegfried Linkwitz. Siegfried Linkwitz has, as an independent expert, contributed a lot by critically following the developments in the field of loudspeakers and is world-wide known as an expert. Not only was his lecture amusing because it was sprinkled with anecdotes, but it certainly had depth. What is of great importance for these developments, I would like to describe as the three criteria of Linkwitz:

1. Loudspeakers should preferably be 360 degree radiators or, as a second best, have a cardioid radiation characteristic, equal for all frequencies (which is hard to realise).
2. Loudspeakers should not have ports and the like as these distort the temporal response at low frequencies because both the ports and the loudspeaker(unit)s resonate and thus introduce large time delays.
3. There should "sit" nothing in between the amplifier output and the loudspeaker units (coils, capacitors and resistors) in order to give the amplifier maximum control over the loudspeaker units.

It is clear that the large majority of the loudspeakers do not fulfil criterion 1. Siegfried Linkwitz explained clearly that the increasing concentration towards the "sweet spot" with increasing frequency (which happens with most loudspeakers) results in a difference between the direct and indirect sound

and thus generates an unnatural effect. It was exactly the same problem that Hans brought forward in Veldhoven (Netherlands) in September 2013..... Also, most loudspeakers have ports in the woofer compartment to generate more low frequencies, but that is slow, literally. On top of that, ports can generate noise because the air velocities become too high. Siegfried Linkwitz is therefore a great proponent of dipole radiators (both electro- and magnetostatics as well as those, build up with electro-dynamic loudspeaker units), but these suffer from acoustic shortcut. This can electronically be compensated, but it requires a lot of power and leads to large cone excursions. The choice by "Temporal Coherence" to use a closed box with electronic compensation is therefore an attractive alternative.

Criterion 3 actually only allows active systems, in which "Temporal Coherence" has an additional "plus": the impedance compensation makes the life for the amplifiers a lot easier as voltage and current remain in phase, which audibly reduces the distortions. Added to that has "Temporal Coherence" another "plus": the whole system is time-optimised, which prevents a lot of annoying deviations.

Because Hans gave his presentation the day after the "keynote lecture", he was not only able to press the necessity to strive for (a lot) better impulse response, but could also reference to the "Linkwitz" criteria and report that the experiments, which Siegfried Linkwitz proposed at the end of his lecture, had already been done and that these indeed resulted in the improvements he expected from these. It is a nice result to see that Siegfried Linkwitz and "Temporal Coherence" have come, independently from each other, to more or less the same conclusions on what is required for natural sounding reproduction, just differ in the way to achieve this goal. Hans' presentation led to interesting discussions because his views go a lot further than what the common opinion is about the requirements for good sound reproduction. His statement that we need to take the non-linear properties of our hearing into account when the requirements are determined was an "eye opener" to many. But one which has far-reaching consequences which always uniquely can be found in the systems of "Temporal Coherence".

Manufacturers of polymers were also present at the "winter meeting". Of course for the cone materials, but also for loudspeaker cabinets. It is probably interesting to see whether "sandwich" materials with e.g. sand fillings could be used to create "dead" cabinets. Nowadays, the materials are stiff enough, but the damping needs improvement, which could be possible with "sandwich" constructions, so the best of both worlds could be combined. "Temporal Coherence" will closely follow these developments and, where possible, give directions to it.