AES Technical Committee on Loudspeakers and Headphones

Meeting Notes:

AES 143rd New York

Chair: Steve Hutt

Vice-chair: Juha Backman

Trends:

- DSP to correct for transducer non-linearities,
    - Continuing development.
- *Micro speakers:*
    - Mobile devices continue to press demands for micro speakers.
    - Fraunhofer have a piezo mems & the group pondered if the application may be a challenge, 10k Fs, useful to ~3kHz.
- 3D sound
    - some consumer products reflect sound off ceiling.
    - specification continues development.
- Headphones
    - Continue to grow with numerous variants.
    - VR is expanding the potential headphone market.
- Hi Resolution Audio
    - The trend of Hi Res Audio is of interest and impact on loudspeakers and headphones.
- Smart Speakers:
    - Huge trend.
    - Are or can they be self calibrating?

Workshops:

Report on 142nd Time domain measurement and analysis workshop.

- Hans van Maanen. Mike Turner & David Griesinger presented an excellent workshop.

Time response and temporal resolution are controversial topics in sound reproduction. In this workshop a theoretical analysis will be accompanied by the results of listening experiences on the lower end of the audio range and at the higher end. The background is that the temporal

relation between the different tones, which make up complex sounds like attacks, need to be conserved to create a viable reproduction of the original sound. Many systems do not preserve a correct time relation (e.g., cross-over filters in loudspeakers, base-reflex systems, and reconstruction filters in digital audio). The aim is to identify the audibility of such timing errors.

Workshop Proposals:

- ***Workshop: Amplifier & Loudspeaker Power Ratings:***

  The topic of a workshop on power ratings of amplifiers & loudspeakers was raised.
  - Loudspeakers - A single figure of merit for power rating has been a point of contention with respect to AES2-2012 vs. 1984. Calculating V^2/R leaves room for interpretation & argument around Rated Z vs. minimum Z. Specsmanship pressed by marketing numbers is not not be relative to AES standards where instead, AES should focus on science & engineering.
  - A workshop at the 143rd looked at power efficiency of systems from amp mains power to acoustic power out & included analysis of loudspeaker driver complex impedance.
  - The target is to find a power rating, maybe frequency dependent true efficiency related.
    - Charlie Hughes reminded us that you need complex phase data of current to know true power, consequently clarifying that "power" frequency dependent.
  - Crest Factor for life testing:
    - The AES2-2012 specified 12dB CF with power calculated as V^2/Rated Z was motivated by detailed signal analysis of various music and referenced in the addendum. Note, at the time of publishing AES2 1984 & the 2003R revision assumed that 6dB CF was relative to music…….
    - Regarding thermal vs. mechanical stress related to CF, some "users" use a 6dB voltage set to pass 100hrs, find the maximum voice-coil temperature, then 1.5 x that power for an AES2 type 2 hour test. So, consideration must be made for crest factor, possibly suggesting that thermal vs. mechanical testing should utilize different test methodologies.
    - More discussion is required.
  - Amplifiers: Some consideration is that testing with 12dB CF requires a test amplifier capable of 16 x the average power, & that 6dB CF makes access to large amplifiers more available. However, if attempting to emulate dynamics of music a 6dB CF is inadequate as a substitute for music with Crest Factors typically between 7-8dB towards 15-16dB. Additionally, amplifiers with a steady state output of a given arbitrary capacity are capable of delivering considerably higher burst output with ability to achieve undistorted high CF.
  - A separate workshop on CF and life testing could be very engaging.
  - Watch for announcements

- ***Workshop: Audibility of distortion.***
  Mark Ziemba has offered to organize a workshop for Milan.
    - This workshop would be 'co-sponsored' by TCAA
    - Will be a live demo of listen & measure loudspeaker samples, then filter to listen only to the distortion components.
    - Analyze excursion vs. distortion,
    - Will discuss impact on vehicle panels such as rear deck.
- **Note, if you have an idea for a workshop you can submit a proposal directly on line.**

Standards Liaison:

- SC04-03 – Loudspeaker modeling & measurement:
    - IEC
        - Engagement between IEC & AES is being formalized, more info to come.
        - IEC 60268-21 is progressing with development of Part B, systems (to be 60268-22.
    - AES-X168 Characterization of loudspeaker systems
        - David Murphy is leading the task:
            - to make the standard - output based.
            - will include mechanical characteristics – weight, size etc should include specified tolerances.
    - AES2-2012, was re-affirmed Oct/2017. Discussions of recommended edits & updates for a revised version with target 2018 has begun.
    - X241 End-of-Line Component testing - sub-committee chair Richard Stroud has formed a first draft. Angelo Farina is processing data from a survey to attain perspectives of importance for eol testing.
    - AES-1ID: David Murphy has developed an annex with review of absorption material and shape that will be added to the AES1-ID Plane Wave Tubes.
    - AES-X223 Loudspeaker driver correlation chambers.
        - This ID is near ready for publication. A few edits still required.

New Topics:

- None

Next Meeting:

- Milano, May 2018