THE PROPAGATION OF LOW FREQUENCY SOUND THROUGH AN AUDIENCE

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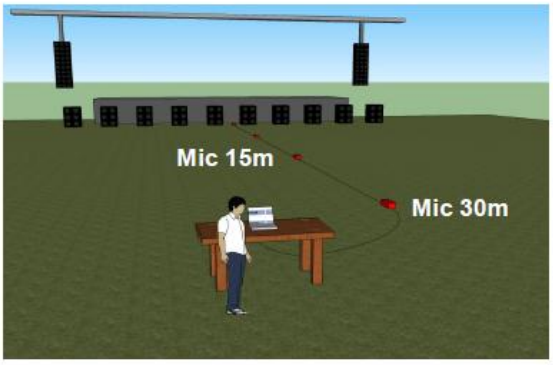
1. INTRODUCTION

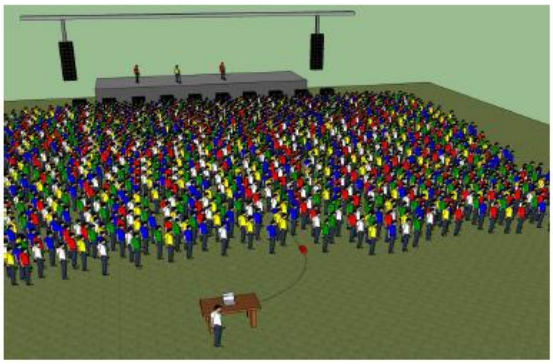
At open-air festivals and large scale concerts subwoofers are often placed in a row in front of the stage as an evenly spaced, delayed array. This arrangement provides even sound pressure level distribution over the audience area and eliminates the well-known “Power Alley” of low frequency, but the audience itself often stands tightly packed in front of the array. The sound waves from the subwoofers therefore propagate partly through the crowd and the propagation is strongly influenced by its density.

An interesting effect that can be seen in the graphs at the top of page two is that the level at certain positions is higher with the audience present than it is in free field, the reasons for this constitute further research.

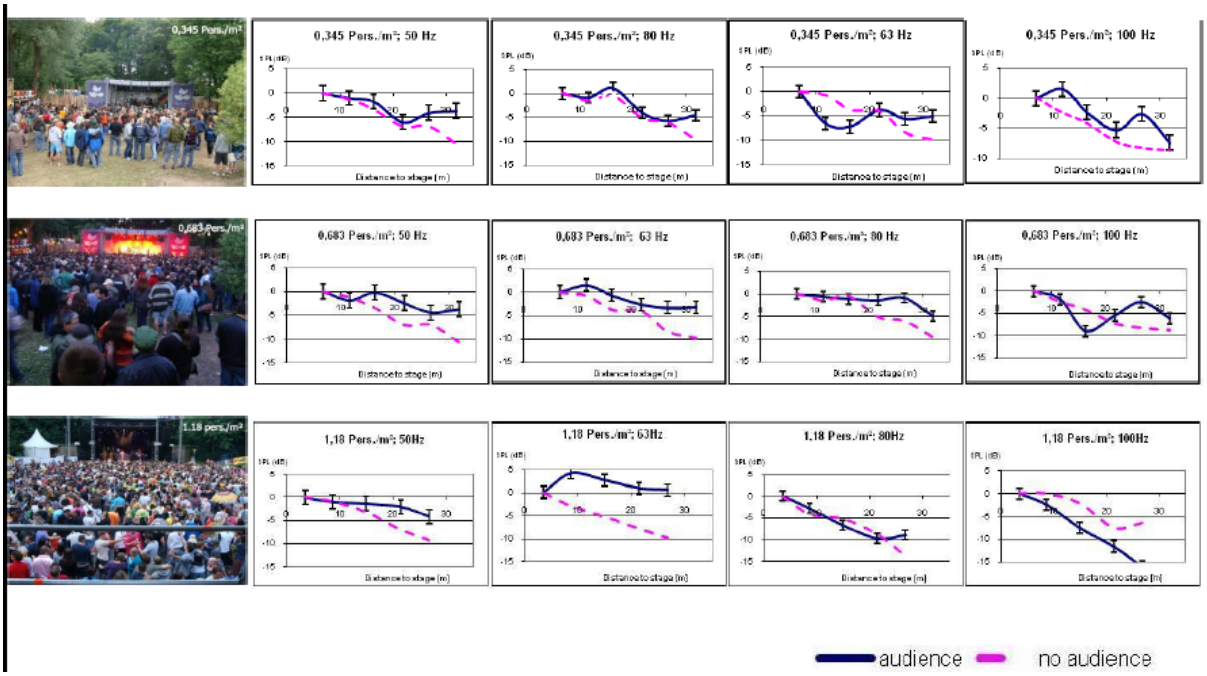
As far as we know, these effects are so far undocumented and research to date is presented including live concert measurements, measurements of the absorption of humans (well students actually!) in a reverberation chamber, laboratory scale measurements and boundary element method simulations.

Live measurement method:





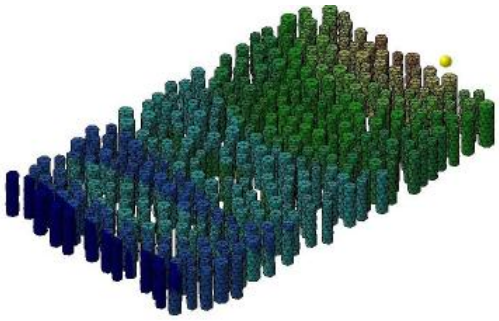
Results of live measurements

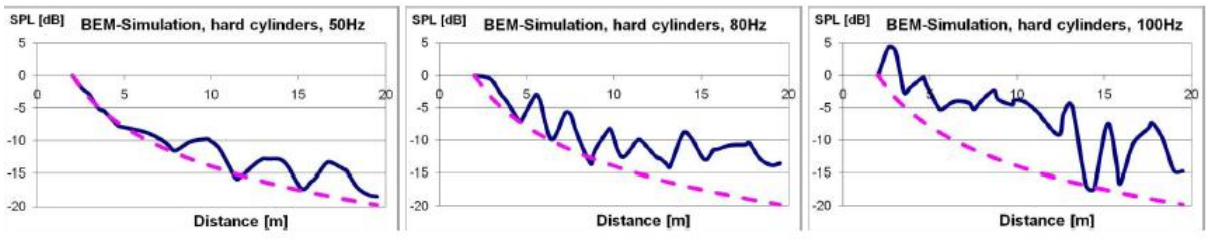


Measurements of absorption of people in a reverberation chamber

Scale measurements

BEM-simulation:





10 x 17m, 2 person / m²

audience no audience