

Full title:

Sound Field Control for Outdoor Concerts

Abstract in English:

The aim of sound field control methods is to manipulate and synthesize extended sound fields with an array of loudspeakers. Currently, these methods have mainly been used indoors, for example to reproduce sound fields accurately over space or to deliver different audio content to different areas of the same space simultaneously. This PhD study investigates the use of sound field control methods outdoors for the reduction of low frequency noise created by outdoor concerts. Specifically, the following three contributions are made: (i) The control of sound fields is experimentally studied outdoors and it is shown that, in favorable conditions such as a flat ground topography, sound pressure levels can be reduced significantly (~ 15 dB) over large areas (~ 320 m²) and long distances (70–130 m). (ii) The tuning of such a control system requires accurate estimates of the concert and control sound fields in the control area. A modeling approach is proposed to simplify the estimation of these sound fields and thereby enable the deployment of large-scale control systems. (iii) Wind and temperature variations in the atmosphere impact the sound propagation and thus the performance of outdoor sound field control systems. The performance variations induced by changing atmospheric conditions are experimentally studied and a simple compensation scheme is proposed.