

Multiple Exponential Sweep Method for Fast Measurement of Head Related Transfer Functions

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Presenting sounds in virtual environments requires filtering of free field signals with head related transfer functions (HRTF). The HRTFs describe the filtering effects of pinna, head, and torso measured in the ear canal of a subject. The measurement of HRTFs for many positions in space is a time-consuming procedure. To speed up the HRTF measurement the multiple exponential sweep method (MESM) was developed. MESM speeds up the measurement by interleaving and overlapping sweeps in an optimized way and retrieves the impulse responses of the measured systems. In this paper the MESM and its parameter optimization is described. As an example of an application of MESM, the measurement duration of an HRTF set with 1550 positions is compared to the unoptimized method. Using MESM, the measurement duration could be reduced by a factor of four without a reduction of the signal-to-noise ratio.