ACOUSTICS2008/813
Effects of hardware on optimal filter segmentations for the segmented convolution

Frank Wefers
Institute of Technical Acoustics, RWTH Aachen University, Neustrasse 50, 52066 Aachen, Germany

The segmented convolution is a commonly used method for the auralisation in interactive virtual acoustic environments. Typically the auralisation of a virtual scene is done by convolution of the scenes' sound sources signals with impulse responses, that describe the sound transmission paths. The segmented convolution algorithm allows an efficient computation of the convolution in real-time, by segmentation of the impulse response into several parts. In order to allow the realistic simulation of complex acoustical scenes, the convolutions' computational effort must be minimised.
It is a fact that the segmentation of the impulse response is a key parameter to the algorithm and has great effects on its computational load, stability and even realisability in real-time. Considerations on optimal filter segmentations mainly founded on a theoretical point, like the runtime complexity of operations or the number of required floating point operations. However, practical systems behave differently: Calculations on real hardware suffer cache losses and memory bandwidth.
In this contribution, the influence of real hardware on optimal filter segmentations is examined. An optimisation algorithm is presented, that allows to gain optimal filter segmentations for a dedicated target system. The consequences of efficiency losses to the structure of optimal filter segmentations are discussed.