Acoustic Impulse Response Measurement Methods for Small Rooms

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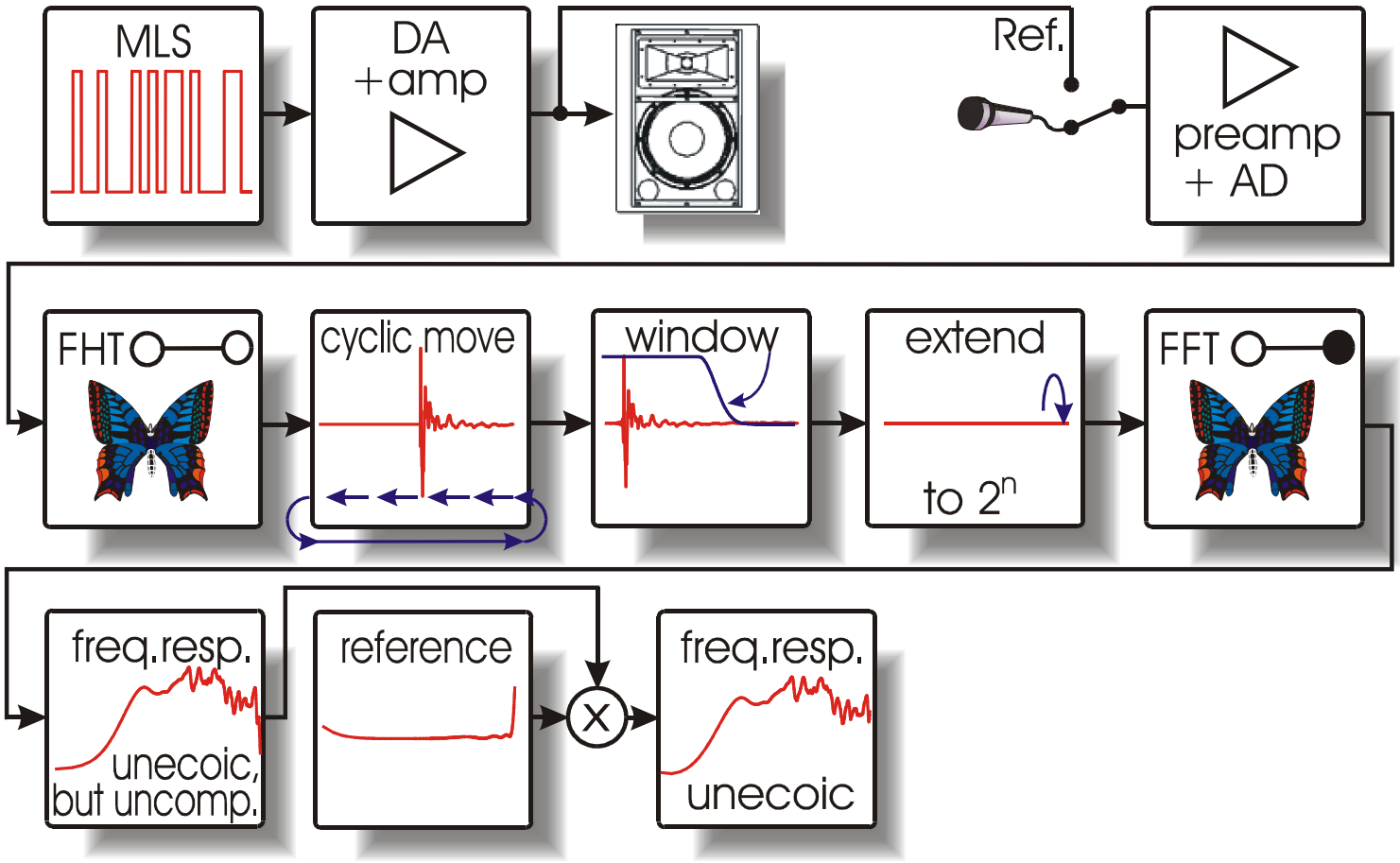
Contents

1. MEASURING THE ACOUSTIC IR
2. MEASURING THE ACOUSTIC PARAMETERS (ISO 3382)
3. MEASUREMENT SYSTEM
4. CONCLUSIONS

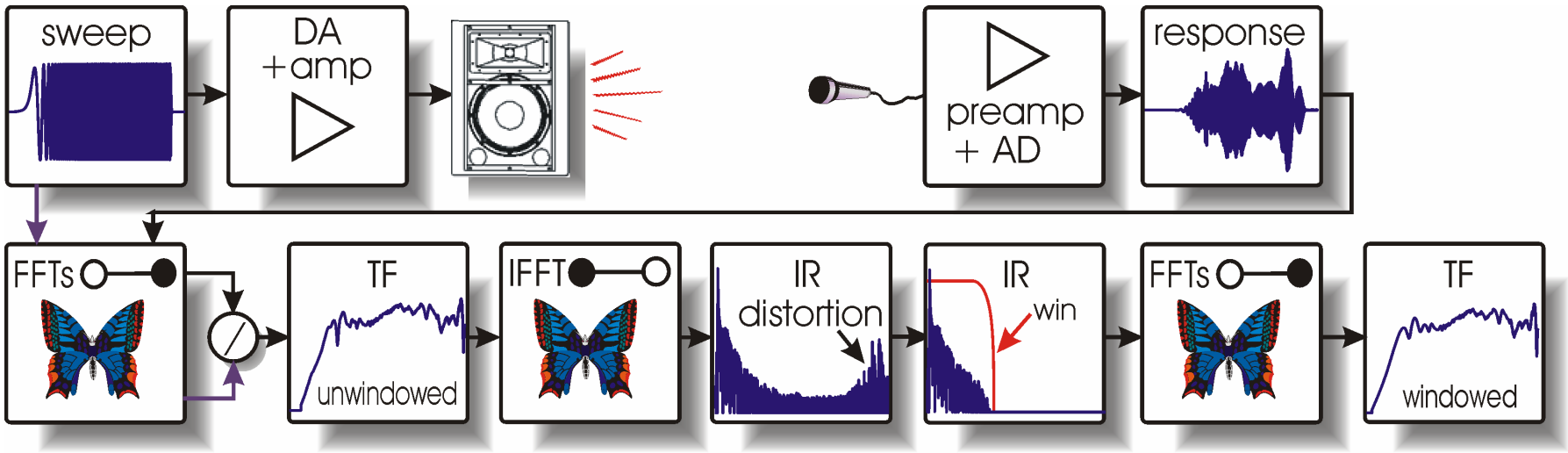
Measuring the Acoustic IR

- Maximum Length Sequences (MLS)



Measuring the Acoustic IR

- FFT analysis with Log Sweep excitation



- Proposed name: "*Log-sweep FFT method*" or simply ***LSF***

Comparison between methods

- MLS
  - ✓ Fast, high resolution/trustworthiness and easy excitation signal generation.
  - × High vulnerability to time variance and non-linearity.
- LSF
  - ✓ Fast, high resolution/trustworthiness.
  - ✓ Insensitive to time variance.
  - ✓ Immune against harmonic distortion.
  - ✓ Crest Factor smaller than of a colored noise.

Measuring the Acoustic Parameters

1. Real IR presents sound arrival delay.
2. Decay can be composed of different parts with different decay rates.
3. The measured IR presents background noise, that limits the decay to a given level.

- *The underestimation of these effects can cause systematic errors in the measurement of acoustic parameters.*

Measurement System

- The system architecture consists of two modules:
  - Signal generation, measurement of IR and processing of the acoustic parameters: Implemented with a computer.
  - Audio signal acquisition and reproduction: Implemented with a soundboard and a transductors set.

Conclusions

- Nowadays, the LSF method seems much more interesting than the MLS method for acoustic measurements. This was the method chosen to our product.

- The measured IR will always have a non-ideal behavior. Techniques should be employed to reduce the influence of these phenomena in the measurement of the acoustic parameters.