A Future without Feedback?

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Workshop 15: July 17th 2015 4:00 pm – 5:00 pm
Topic: Electroacoustic Enhancement
Presenter: Ben Kok, Wieslaw Woszczyk, (McGill University), Ikeda Masahiro (Yamaha Japan), Doyuen Ko, (Belmont University)
Venue: MMR
Yamaha AFC System

Active Field Control
Various Acoustics for Various Performances

Speakers
Microphones

Arkas SASEBO
We need to struggle with Feedback
We need to struggle with Feedback

Fig. 4. Comparison of $|G_c(\omega)|$ with SP (speaker) aimed at; (a) microphone and (b) room boundary.
Reduce the Acoustic Feedback or...

- Electric Gain
- Acoustic Feedback

- More Flexibility for More Gain or FIR/IR
- Closer Mic/SP
- Directional Mic/SP
Reduce the Acoustic Feedback or...

Electric Gain

More Flexibility for More Gain or FIR/IR

Acoustic Feedback

Closer Mic/SP

Directional Mic/SP

Multiple Systems

More Energy with Same Loop Gain
Reduce the Acoustic Feedback or...

- **Electric Gain**
  - More Flexibility for More Gain or FIR/IR
  - Closer Mic/SP
  - Directional Mic/SP

- **Acoustic Feedback**
  - More Energy with Same Loop Gain

- **Multiple Systems**
Reduce the Acoustic Feedback or...

- Electric Gain
- Acoustic Feedback
- More Flexibility for More Gain or FIR/IR
- Closer Mic/SP
- Directional Mic/SP

- Multiple Systems
- More Energy with Same Loop Gain
Electronic Microphone Rotator
Application 1: La Folle Journée au Japon

Tokyo International Forum: Hall A
Application 1: La Folle Journée au Japon
Application Map

Stage Configuration

Purpose of the system

Enhancement

Fixed

Variable

Opera

Orchestra

Musical/Cirque

Various

Synthesis
Application Map

Stage Configuration

- Fixed
- Various

Purpose of the system

- Enhancement
- Synthesis

Operas: Opera

Other applications:
- Musical / Cirque
- Orchestra
- Various
Application Map

Stage Configuration

Fixed

Musical / Cirque

Various

Synthesis

Purpose of the system

Enhancement

Reverberation

Early Reflection

Orchestra

Opera

Various

Purpose of the system
Application Map

Purpose of the system:
- Enhancement
- Reverberation
- Early Reflection
- Virtual Acoustic

Stage Configuration:
- Fixed
- Variable

Musical/Cirque
- Various
- Various

Opera

Purpose of the system:
- Synthesis

Yamaha
Application 2: Renaissance

Venetian Fantasy  
Looking for an acoustic of Basilica di San Marco

Tenku Theater, Tokyo  
500 seats

Basilica di San Marco  
Venezia  
RT60=5s
Convolution with Measured Impulse Response

“Active field control using sound field generation techniques”,
ICA 2013 Montreal, T. Watanabe et.al
Tenku Theater with 500 seats

Absorption Panel on the Stage

I.R. Modification

Target Data Based on Convolution Data
(Original Data * Reproduced Speaker Characteristics)

Applied Data in the Reproduction Field

Original Data Measured in the Target Field

Orchestra on Stage

“Active field control using sound field generation techniques”,
ICA 2013 Montreal, T. Watanabe et.al
“Active field control using sound field generation techniques”, ICA 2013 Montreal, Watanabe et.al

Application 2: Renaissance - Results

ASW

Clarity

LEV

Sound Source

6ch Microphone System

YAMAHA
Solutions for Applications

- **Fixed**
  - Stage Configuration
  - Various

- **Variable**
  - Stage Configuration
  - Various

- **Virtual Acoustic**
  - Early Reflection
    - Enhancement
      - Emmanuel
      - Off Mic & SP
      - FIR
    - IR
  - Closer Mic & SP
  - Various

- **Orchestra**
  - Fixed
  - Various

- **Musical / Cirque**
  - Fixed
  - Various

- **Opéra**
  - Fixed
  - Various
Future Works to do

- How to Control FIR/IR
  - More ER for Performers, when more RT for Audiences
  - Room Impression, Visual Cue

- More Tools
  - Auto Tuning
  - Singing Detection

- Voice Lift
  - Turn on and Enhanced
  - Like Lighting or Air Conditioning
  - Could be more effective with Dynamic Processing
Demo Systems

Yamaha Artist Services Inc.
New York Piano Salon

Frank Sinatra School of the Art
– Tony Bennett Concert Hall

Both in

Tony Bennett Concert Hall

139th International Convention
Jacob Javits Center
New York, NY
Oct 29 - Nov 1, 2015

If It’s about AUDIO, It’s at AES!