

INVITATION to the lecture on

Sound Quality of Audio Systems

presented by Prof. Dr. Wolfgang Klippel, Institute of Acoustics and Speech Communication,
Dresden University of Technology, Germany

Date:	The university course will be presented as a block seminar from March 26 th to March 28 th , 2012 (Monday to Wednesday).
Time:	9:00 a.m. – 5:00 p.m.
Location:	Dresden University of Technology Barkhausenbau Helmholtzstraße 18 01069 Dresden Germany
Language:	Presentation and handout in English
Fee:	300 € (plus 19% VAT) per Person (Students free of charge)
Participants:	Students of Dresden University of Technology and from other universities, Engineers of the audio industry active in research & development, manufacturing and quality control
Registration:	Please complete and return the registration form enclosed to +49-(0)351- 2513431 or email Stefanie at s.weichelt@klippel.de .

Abstract:

The lecture addresses the evaluation of sound reproduction systems using objective measurement techniques. This is the basis for designing small, light and cost-effective loudspeakers reproducing the sound at high efficiency and sufficient sound quality.

The generation of signal distortion is modeled by linear, nonlinear and time-variant systems with lumped and distributed parameters. New measurement techniques based on those models are presented which assess electro-acoustical systems while reproducing test signals and music as well.

The course establishes a relation between symptoms and physical causes of the distortion more transparently and discusses the impact on the perceived sound quality. This knowledge is important for describing loudspeaker drive units and complete systems by a comprehensive set of data based on a minimal number of measurements.

The new methods and diagnostic tools are illustrated on loudspeakers used in telecommunication, automotive, multi-media and professional applications. The lecture is supplemented by practical sections giving each participant further opportunities for learning by doing.

New topics addressed this year:

Defining target performance and minimal sound quality requirements for the particular application by combining listening tests, auralization techniques and objective testing, transfer of R&D specifications into production limits used by end-of-line testing, advanced modeling of micro speakers and parameter identification, assessing fatigue and load-induced aging of loudspeaker suspension.

Content:

Electroacoustical Modeling and Design

- Fundamentals - transduction, vibration, radiation
- Abstraction - models with lumped and distributed parameters
- Small Signal Performance - linear approximation and transfer function
- Large Signal Performance - thermal dynamics and nonlinearities
- Time-varying properties - influence of climate and aging

Measurements and Analysis

- Persistent excitation - artificial and natural stimuli
- Monitored signals - electrical, mechanical and acoustical sensors
- Complex structures - digital and analogue components
- Sound field - measurements in the near and far field
- Interaction with the room - direct and diffuse sound part
- Measurement time - ultra-fast and long-term (power) testing
- Distortion analysis - linear and nonlinear components
- System identification - optimal fitting and parameter estimation
- Transformations - Fourier, wavelet and perceptual modeling
- Data compression - separation of unique and redundant information

Interpretation and Diagnostics

- Interpretation - measured symptoms and physical causes
- Perception - audibility and impact on perceived sound quality
- Evaluation - selection of optimal drive units for system design
- Specification - minimal but comprehensive set of data
- Tolerances - variation of parameters and influences

Selection of issues addressed in the practical workshop:

- How to get maximal power handling and acoustical output?
- Which loudspeaker nonlinearities are good and which are bad?
- How to interpret the results of distortion measurements?
- How to perform proper acoustical measurements without anechoic room?
- How to get valid material parameters as input for FEA?
- How to find the optimal geometry of the cone?
- How to design loudspeaker enclosures with BEA?
- How to detect air leaks in enclosures?
- How to reduce the rejection rate in manufacturing?
- How to cope with ambient noise corrupting the measurement?

REGISTRATION FORM

Sound Quality of Audio Systems

March 26th – 28th, 2012

At the Technical University Dresden, Barkhausenbau, Helmholtzstraße 18, 01069, Dresden

Registration Fee:

300 € (plus 19% German VAT) per Person
Students* and University staff free of charge

* Please submit certificate of matriculation together with your registration.

Number of participants (Please circle):

1 2 3 4 5 6 7 8 9 10

Name(s):

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Company Name / Address:

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Email(s):

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Phone(s):

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Comments:

(Requests, suggestions)

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Please complete and return the form to our fax no. +49-(0)351-2513431 or email it to Stefanie at s.weichelt@klippel.de.

Thank you!