

stiftung



Technische Universität München

Program

TÜV-Süd Stiftung Student-Workshop

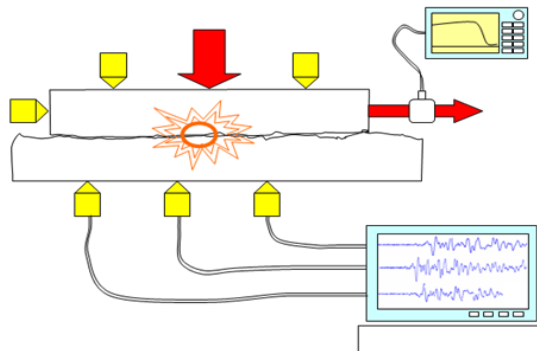
From Earthquakes to Acoustic Emissions:

Non-destructive Testing in Engineering

July 19 – 23, 2010

Oskar von Miller Forum

München



Organizers:

Prof. Dr. Steven D. Glaser: University of California Berkeley
TUV Guest Professor, TUM

Prof. Dr. Christian U. Große: TUM, Non-destructive Testing Lab

Monday July 19

**18.30 – 20.30: Reception at the
Oskar von Miller Forum (7th floor)**

Tuesday July 20

9.00 Workshop opening (rules)

9.15 Seismology as Nondestructive Evaluation

- Earthquakes big and small
- Seismic site response
- Nanoseismic experiments as model of earthquakes rupture

10.30 Coffee

10.45 Workshop: NDE – what it is and is not

- History
- Concept of Damage
- Examples of effectiveness
- Tools – signal processing, data acquisition, electronics, etc
- Sensors

12.30 Lunch

13.30 Wave propagation and damage sources

- Concept of Green's functions
- Physics behind signals
- Damage sources
- Effect of different media

15:00 Coffee

15.15 From seismograms and sensors

- Play with "Seismic waves" and velocity sensors (LE-3Dlite and 1D-velocity sensor)

16.20 Summary and Plans

17.00 End Day 1

Wednesday July 21

8.30 Acoustic emission - theory (part I)

- Physics behind signals
- AE techniques (difference of parameter- and signal-based techniques)
- Setup (equipment; sensors; coupling; infrastructure)
- Recording AE, triggered or continuous
- Data processing
- Summary of good and bad

10.00 Coffee

10.15 Acoustic Emission – feature-based theory

- Applications and examples of parameter-based techniques
- Analysis methods and standards
- AE activity, Kaiser- and Felicity-Effect
- Extraction of "features"

11.00 Acoustic Emission - exercises (part I)

12.30 Lunch

13.30 Acoustic emission – physics-based theory (part II)

- Physics behind signals
- Applications and examples of signal-based techniques
- Analysis methods
- Summary of good and bad

15.00 Coffee

15.30 Acoustic Emission - exercises (part II)

- Recording AE triggered or continuous
- Data processing / Filtering
- Localization techniques
- Fracture mechanical interpretations (moment tensors)

17.00 End Day 2

Thursday July 22

8.30 Ultrasonics (part I)

- Basics / Measurement techniques
 - Sensors and sensing
 - Through-transmission / reflection
 - A-, B-, C-, D-Scan
 - Phased-array
 - Tomography

10.00 Coffee

10.15 Ultrasonics (part II)

- Selected Applications
 - Ultrasound for material characterization
 - US for fresh concrete
 - Evaluation of welded joints
 - Rotor blades

11.30 Ultrasonics Hands-on demonstrations

12.30 Lunch

**13.45 NDE for corrosion detection – theory (part i)
(Prof. Dr. Christoph Gehlen)**

- Basics / Measurement technique
 - Fundamentals of steel corrosion
 - Potential field techniques
 - Factors affecting the measurement
 - Case studies from the practice

15.15 Coffee

15.30 NDE for corrosion detection - exercises (part ii)

- Applications
 - Measurement of corrosion indicators
 - Measurement of potential mapping in concrete
 - Measurement of electrokinetical effects

17.00 End Day 3

Friday July 23

8.30 Wireless sensor networks (WSN) I

- The Berkeley mote concept
- What they are
- What they can do
- Hardware
- Software

10.00 Coffee

10.15 Play with motes as network elements

- Computer interface
- Network programming
- Sensor interfacing
- Experimenting with a self-assembling WSN

12.30 Lunch

13.30 Wireless sensor networks II

- Sensing
 - MEMS sensors
 - non-MEMS
- Examples
- Seismic response of wood-frame buildings
- Structural response of the Golden Gate Bridge
- Large-scale WSN for forest hydrology and ecology
- WSN tool for diagnosis of early-stage Parkinson's disease
- Historic structures I
- Historic structures II

15.00 Coffee

15.15 Play with wireless sensing

- Vibration monitoring
- Environmental monitoring

17.00 General discussion at Biergarten, open bar

How to find the conference venue (*Oskar von Miller Forum*):

Address:

Oskar-von-Miller-Ring 25

80333 München

Phone: +49 89 1588338-0



Take Metro U3, U4, U5 and U6 to Station Odeonsplatz.

Follow Ludwigstraße (the big avenue) for 200 m, then turn left into Oskar-von-Miller-Ring. Follow for another 200 m, the Forum is located on the right-hand side in the corner of Amalienstraße.

Registration:

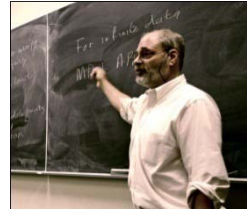
Registration by phone or email is required. Participation for students is free and will include lunch and refreshments during the breaks.

Phone: 089-289-27221; email: grosse@cbm.bv.tum.de

Workshop organizers

Prof. Steven D. Glaser

Professor, Dept. of Civil and Environmental Engineering, University of California, Berkeley; TUV Guest Professor, TUM; faculty scientist at the Lawrence Berkeley National Laboratory; researcher, Intel Laboratory at Berkeley; Intelligent Infrastructure leader for CITRIS, the Center for Information Technology Research in Service to Society.



Prof. Christian U. Große

Diploma in Geophysics at the University of Karlsruhe followed by a PhD in Civil Engineering and a Habilitation in Materials Testing at the University of Stuttgart. He has more than 20 years experience in non-destructive testing.

Assistant organizers

Greg McLaskey

Greg is a PhD candidate in Civil and Environmental Engineering, University of California Berkeley. His current research involves the study of acoustic emission as it relates to friction and earthquakes. Previous projects include acoustic emission monitoring of concrete, beamforming analysis techniques, and modal analysis.

Bronco Kerkez

Branko is a third year PhD student in Civil Systems at UC Berkeley. He is interested in the deployment of large-scale wireless sensor networks, and the applications of control and machine learning theory to civil infrastructure problems. Website: <http://systems.berkeley.edu/branko>

Local organizers' contacts

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