



Monday, 28 March 2011 (TUM, Garching near Munich, Germany)

## NONLINEAR THERMO-ACOUSTICS

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- 1. Introduction to nonlinear thermo-acoustics** - *M. Heckl, Keele Univ.*  
When does acoustics become nonlinear?  
Elementary nonlinear processes in thermo acoustics  
Higher harmonics in spectra – are they due to nonlinear effects or higher modes that are unstable?  
Exercise
- 2. Nonlinear identification of heat source dynamics** -  
*W. Polifke, Tech. Univ. Munich*  
Nonlinear filters NFIR or NIIR  
Neural networks  
Proper orthogonal decomposition
- 3. A frequency-domain model of thermo acoustic limit cycles with modal coupling** - *W. Polifke, Tech. Univ. Munich*  
Nonlinear system model
- 4. Using Flame Describing Functions to analyze nonlinear features of combustion instabilities** - *N. Noiray, Alstom*
- 5. Influence of nonlinear flame response on modal dynamics in annular combustion chambers** - *N. Noiray, Alstom*
- 6. Analytical tools to model nonlinear behaviour** - *M. Heckl, Keele Univ.*  
G-equation  
Nonlinear dynamics (lin./nonlinear stability, bifurcation, hysteresis, ...)  
Green's function methods in the time domain

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## ACTIVE INSTABILITY CONTROL

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- 1. Introduction to AIC** - *J. Hermann, IfTA GmbH*  
Open and close loop control  
Interference point (Loudspeaker, Valve)
- 2. Modeling of combustion instabilities for active control** -  
*O. Paschereit, Tech. Univ. Berlin*  
Control strategies
- 3. Active control applications** - *O. Paschereit, Tech. Univ. Berlin*  
Single burner, open and closed loop  
Multi burner  
Impedance tuning
- 4. Gas turbine application** - *J. Hermann, IfTA GmbH*  
Sensor and valve implementation  
Controller set-up  
Results
- 5. Viewing of the Limousine test rig at IfTA** - *J. Hermann, IfTA GmbH*  
Demonstration of active instability control

Wednesday, 30 March 2011

## GUIDED TOURS

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- 1. Siemens NGF at power plant Irsching 4 and EON Visitor Centre**
- 2. Production units at MTU Aero Engines GmbH, Munich**

Updated info will be posted @ [www.ifta.com/ntaaic](http://www.ifta.com/ntaaic)

Organised by IfTA GmbH in the framework of, and sponsored by  
the FP7 project LIMOUSINE, a Marie Curie initiative





**N'taaic** 3 day Workshop on  
Nonlinear Thermo Acoustics  
and Active Instability Control  
**Second Announcement**



## REGISTRATION

**A fee applies to non-Limousine, non-TUM participants (excl. VAT):**

(PhD) Students: € 360,-  
Other: € 540,-

Registration includes:

Workshop Days 1 and 2: lectures, lecture notes, refreshments, lunches  
Workshop Day 3: guided tours, refreshments, lunches, evening  
program incl. dinner (<http://www.nockherberg.com/starkbierfest.html>)

Please note that the number of participants for the guided tours is limited due to preset group size.

Registration form and instructions are available at:  
**[www.ifta.com/ntaaic](http://www.ifta.com/ntaaic)**

Updated information will be sent by e-mail when available. If you require further assistance, please send an e-mail to [ntaaic@ifta.com](mailto:ntaaic@ifta.com) or [workshop@ifta.com](mailto:workshop@ifta.com), including your interest and affiliation.

## ACCOMODATION

We recommend

**Hotel König Ludwig II** ([http://www.hkl.de/index\\_e.html](http://www.hkl.de/index_e.html))  
Reservations: e-mail to [hotel@hkl.de](mailto:hotel@hkl.de), indicating the ref. LIMOUSINE.  
For reservations and other questions you can also contact Ms. Andrea Glatzel (Hotel König Ludwig II), Phone +49 (0) 89 329 310

**Hotel am Park** (<http://www.hotel-am-park.com>)  
Reservations: e-mail to [info@hotel-am-park.com](mailto:info@hotel-am-park.com), indicating the ref. LIMOUSINE. For reservations and other questions you can also contact Ms. Sabrina Eibl (Hotel am Park), Phone +49 (0) 89 320 40 84

## VENUE

The workshops will be held at the campus of the Technical University of Munich, Boltzmannstraße 15 in D-85748 Garching.

Faculty of Mechanical Engineering (Maschinenwesen)  
Thermodynamics Research Group  
Room MW 1701 on the first floor (2<sup>nd</sup> floor American numbering)

## TRAVELING TO THE UNIVERSITY CAMPUS

From Munich International Airport Franz Josef Strauss:

Please take 1) suburban train S8 in the direction of Munich Central Station (Hauptbahnhof) till Ismaning (3rd stop), then bus 230 until stop MI-Building on the Garching Campus or 2) suburban train S1 till Neufahrn, then bus 690 to Garching Forschungszentrum (Boltzmannstrasse)

## CONTACT

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