FKFS
Forschungsinstitut für Kraftfahrwesen und Fahrzeugmotoren Stuttgart

Registration:
Stuttgart International Summer School

Please fax or email until 1 June 2017 to:
Franziska Liedecke Fax: +49 711 685-65710 franziska.liedecke@fkfs.de

Family and first name

Company / Institute

Department

Function

Street / P.O. box

Postal code / City

Country

Phone, Fax

E-mail

Invoice address (if different from above address)

VAT ID no.

Date, Signature

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Logistics:
Stuttgart International Summer School

Format and Delivery Method:
Each course is a non-credit graduate level seminar consisting of lectures and exercises or lab sessions.

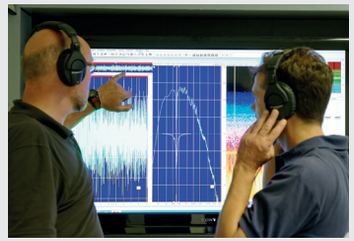
Materials:
A comprehensive set of notes will be provided on the first course day.

Location:
FKFS, Pfaffenwaldring 12, 70569 Stuttgart, Germany

Accomodation:
Commundo Tagungshotel, Universitätsstraße 34, 70569 Stuttgart, Germany
www.commundo-tagungshotel.de
Please make your own reservations. Room allotment available until 18 June 2017.

Catering:
Coffee breaks, lunch on every full course day and dinner on a social evening are included.

Social Evening:
On the first or second evening of the course there will be a social get together during which the participants of the Stuttgart International Summer School will have the chance to network in a relaxed and comfortable atmosphere. Taking part in the social evening is optional and included in the course fee.

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Stuttgart International Summer School Mobility
03.07. – 12.07.2017

System Competence in Powertrains, Aerodynamics and Aeroacoustics

Course 1 & 1a: **System Integration, Simulation and Energy Management of Hybrid Electric Vehicles**

Course 2: **Vehicle Aerodynamics and Aeroacoustics**

- Educational program for working engineers from the automotive field
- Attendants: Engineers from R&D departments of automotive companies
- Small groups, at most 20 participants per course
- Modular course participation possible

In cooperation: Universität Stuttgart

Research in motion

Course 1 & 1a: System Integration, Simulation and Energy Management of Hybrid Electric Vehicles

Learn HEV System Simulation Methods for SIL and HIL Development of HEV Energy Management Strategies

Course Objectives:

The objective of this course is to introduce the participants to HEV system integration and energy management concepts using modern simulation methods based on Matlab/Simulink tools. The participants will use a modular simulator compatible with software- and hardware-in-the-loop control development systems, describing the energy flows in conventional and hybrid vehicles and analyzing energy management strategies in a series of computer laboratory exercises that culminates with the participants developing their own energy management strategy based on the simulator developed during the course. Participants receive a copy of the modular Matlab/Simulink simulator used in the exercises.
The course is available in two formats (three-day, Course 1, and one-day, Course 1a). The broad objectives apply to both versions, but the specifics can be found below:

Ohio State's EcoCAR 3 national championship team

Objective 1 (Courses 1 + 1a):
Evaluate energy consumption in road vehicles. Relate energy demand of driving cycles to fuel economy and CO2 emissions. Understand basic energy models of IC Engines, electric drives and energy storage systems. Understand the concept and potential benefits of drivetrain hybridization strategies. Explore these concepts in simulation using a PHEV simulator.

Objective 2 (Course 1):
Develop more detailed mathematical models of energy use in combustion engine and mechanical transmission subsystems and use these models in a conventional power-train vehicle simulator to learn how to develop energy management algorithms using StateFlow.

Objective 3 (Course 1):
Develop more detailed mathematical models of electric traction drives and energy storage systems, used in hybrid vehicles. Use these models in electric and hybrid vehicle simulators to predict energy use and CO_2 emissions.

Objective 4 (Course 1):
Learn principles of energy management for hybrid electric vehicles, including mathematical methods such as Dynamic Programming, as well as real-time implementable strategies such as ECMS. Explore and improve HEV supervisory control design and energy management using a hybrid-electric vehicle simulator.

For a more detailed description of the course please go to www.fkfs-conferences.de

Goals:

Upon completion of the course the participants will be familiar energy analysis and modeling of hybrid-electric powertrains, with some principles of optimal control, and with Matlab/Simulink™ tools for vehicle energy analysis and supervisory control, and with the design of energy management strategies using StateFlow™.

Lecturer:

Prof. Giorgio Rizzoni, The Ohio State University
Giorgio Rizzoni, the Ford Motor Company Chair in ElectroMechanical Systems, is a Professor of Mechanical and Aerospace Engineering and of Electrical and Computer Engineering at The Ohio State University (OSU). He received his B.S. (ECE) in 1980, his M.S. (ECE) in 1982, his Ph.D. (ECE) in 1986, all from the University of Michigan. Since 1999 he has been the director of the Ohio State University Center for Automotive Research (CAR), an interdisciplinary research center in the OSU College of Engineering. He is author or co-author in over 400 journal and conference papers, and three books. He is a Fellow of SAE (2005), a Fellow of IEEE (2004), a recipient of the 1991 National Science Foundation Presidential Young Investigator Award.

Course 2: Vehicle Aerodynamics and Aeroacoustics

Know-how in Theory, Measuring Technique and Testing

Course Objectives:

The course is designed to provide a deeper understanding of vehicle aerodynamics and vehicle aeroacoustics. The participants will be trained to be able to carry out respective development work at car manufacturers and suppliers under consideration of the various interfaces to other disciplines.

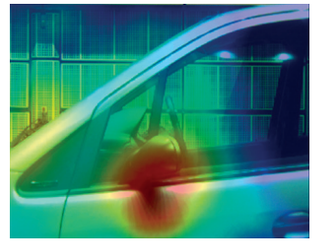
Objective 1: Understand basic aerodynamic physics and relationships; apply fundamental aerodynamic equations on standard flow situations; assess aerodynamic coefficients and aerodynamic results; influences on vehicle drag and lift as well as vehicle dynamics.

Objective 2: Understand the principal acoustic and aeroacoustic physics; choose the adequate measurement instrumentation and setup; acquire expertise to assess aeroacoustic analyses and results.

Objective 3: Understand the approaches when implementing computational methods in aerodynamics and aeroacoustics; being able to assess the possible field of application and the advantages and disadvantages concerning the various numerical methods realistically.

Objective 4: Learn to plan and conduct aerodynamic and aeroacoustic investigations under experimental conditions in our modern wind tunnel facilities (full-scale aero-acoustic and scale-model wind tunnel as well as briefly thermal wind tunnel) and to evaluate the measured data.

Experimental and numerical investigation of the flow through a rotating wheel



Measurement by array-based acoustic mirror in full-scale wind tunnel

For a more detailed description of the course please go to www.fkfs-conferences.de

Goals:

After having completed this course, the participants will have a fundamental knowledge of vehicle aerodynamics and aeroacoustics. They will be able to use high-tech aerodynamic and aeroacoustic measurement technique and will be able to carry out wind tunnel tests, both in order to effectively perform aerodynamic and aeroacoustic development work at cars under consideration of the interfaces to other disciplines.

Lecturer:

Prof. Dr.-Ing. Jochen Wiedemann, University of Stuttgart
In 1977 Professor Wiedemann received his Diploma Degree in mechanical engineering from Ruhr-Universität, Bochum, Germany. After carrying out aerodynamic research at the von Karmàn Insitute for Fluid Dynamics in Belgium and Ruhr-University Bochum he received the doctoral degree (Dr.-Ing.) in 1983 for his work on aerodynamic drag reduction. In 1984 Professor Wiedemann joined Audi AG where he held several managing positions. In 1998 Jochen Wiedemann was appointed Chair Professor of Auto-motive Engineering at the Institute for Internal Combustion Engines and Automotive Engineering, (IVK) at the Stuttgart University, Germany and he also became a Member of the Board of Managing Directors of FKFS. His research work is largely associated with aerodynamics/aeroacoustics, road load and vehicle dynamics.

Co-lecturers: Dr. Reinhard Blumrich, FKFS, Head of NVH Department, Nils Widdecke, IVK/FKFS, Head of Aerodynamics and Thermal Management, Dr. Timo Kuthada, FKFS, Head of High Performance Computing.

SIS

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Schedule: Stuttgart International Summer School

Course 1 (Day 1,2 & 3)	**System Integration, Simulation and Energy Management of Hybrid Electric Vehicles**	3 Days	☐ 03. – 05.07.2017[1]
Course 1a (Day 1)	**Overview of System Integration, Simulation and Energy Management of Hybrid Electric Vehicles**	1 Day	☐ 03.07.2017[2]
Course 2	**Vehicle Aerodynamics and Aeroacoustics**	3 Days	☐ 10. – 12.07.2017[1]

[1] Day 1 & 2: 8:30 – 17:30, Day 3: 8:30 – 16:00
[2] Day 1: 8:30 – 17:30

Registration Fee

Course 1: (Day 1, 2 & 3) € 1900 + VAT

Course 1a: (Day 1) € 800 + VAT

Course 2: (Full course only) € 1900 + VAT

Group Discounts:
2 participants of the same organization registering at the same time: 10% off registration.
3 participants of the same organization registering at the same time: 15% off registration.

Cancellation charge 50 € for cancellations until 1 May 2017. In case of cancellation after this date full participation fee will be charged.

Registrations until 1 June 2017 (thereafter upon availability).

Mode of Payment:
By bank transfer upon invoice or by credit card.

Organizer:
FKFS
Pfaffenwaldring 12
70569 Stuttgart
Germany
www.fkfs.de

For any questions please contact:
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