KoMSO

KoMSO – Committee for Mathematical Modeling, Simulation and Optimization (KoMSO)
unites the triad of mathematical modeling, simulation and optimization (MSO) as new field of technology in research and development to reinforce the innovational strength of Germany as high-tech location. As a strategic alliance it is KoMSO's purpose to determine current and future demand areas in MSO, to make them visible, and to support respective projects. KoMSO is currently funded by the German Federal Ministry of Education and Research (BMBF) as part of the "Mathematics for Innovations in Industry and Services" program.

acatech – The National Academy of Science and Engineering
is the exponent of German science and technology around the world. As a working academy, acatech provides support for policy makers and society through technical reviews and recommendations or policy options. The academy works to promote sustainable growth through innovation.

The Heidelberg Academy of Sciences and Humanities
has been constituted in 1909 and since that time has always been committed to its founding idea of assembling the land's eminent scientists for the purpose of interdisciplinary discussion and independent research. Until today it is a scholarly society and a modern non-university research institution in one. At present it is running 20 research projects, which are covering a broad range of disciplines. It organizes scientific conferences and public lectures und promotes young scientists, e.g. through programes (WIN-Kolleg) and by awarding of research-prices.

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IWR Interdisciplinary Center for Scientific Computing
HEIDELBERGER AKADEMIE DER WISSENSCHAFTEN
KoMSO

7th KoMSO CHALLENGE WORKSHOP · **PROGRAM**

Mathematical Modeling, Simulation and Optimization for Energy Conservation

OCTOBER 8–9, 2015
Heidelberg Academy of Sciences and Humanities
Karlstraße 4, 69117 Heidelberg

7th KoMSO CHALLENGE WORKSHOP

Mathematical Modeling, Simulation and Optimization for Energy Conservation

Energy efficiency remains the second pillar of the Energiewende. In keeping with its energy concept, it is the German government's long-term objective to reduce energy consumption by 50 percent until 2050 compared to the respective figures in 2008.

It is the goal of this workshop to evaluate the potential of mathematical modeling, simulation and optimization (MSO) for energy conservation in industrial systems and processes and to identify new relevant MSO methods in this respect.

Practical aim of this workshop is to lay the content-related groundwork for a call for proposals, e.g. with the Federal Ministry of Education and Research (BMBF) or the Federal Ministry of Economics and Technology (BMWi).

Furthermore, this event serves as platform for industrial and academic exchange regarding the complex issue of mathematical MSO for energy conservation.

THURSDAY – OCTOBER 8, 2015

8:00 Registration

9:00 **Address of Welcome**
Hans Georg Bock (IWR, Heidelberg University)
Hans-Georg Kräusslich (Secretary Mathematics and Natural Sciences, Heidelberg Academy of Sciences and Humanities)

9:30 **Challenging Optimal Control Problems in Air and Subway Traffic: Opportunities for Energy Conservation**
Hans Georg Bock (IWR, Heidelberg University)
Ekaterina A. Kostina
(Applied Mathematics, Heidelberg University)

10:00 **Energy Conservation by Scheduling: A Systems View, Applications and Open Questions**
Reinhard Bauer (ABB AG)

10:30 Coffee Break

11:00 **MSO for EnergyLab 2.0**
Veit Hagenmeyer
(Karlsruhe Institute of Technology, KIT)

11:30 **Demands on Optimization Tools from an Engineer's Perspective**
Manuel Gräber
(TLK-Thermo GmbH Braunschweig)

12:00 **Reduction of Energy Consumption in Aerodynamic and Fermentation Applications – Optimization Challenges**
Volker Schulz (Trier University)

12:30 Group Photo / Lunch

14:00 **Mathematical Challenges from the Design of Heavy Duty Gas Turbines**
Hanno Gottschalk (University of Wuppertal)

14:30 **Mathematical Optimization of Chemical Energy Conversion Systems**
Kai Sundmacher (Max Planck Institute for Dynamics of Complex Systems Magdeburg)

15:00 **Accurate Mathematical and Numerical Modeling of Electrochemical Systems**
Jürgen Fuhrmann (Weierstrass Institute for Applied Analysis and Stochastics, Berlin)

15:30 Coffee Break

16:00 **Energy Conservation in Rail Services**
Hanno Schülldorf (DB Mobility Logistics AG)

16:30 **Energieeffizienz durch Flugtrajektorienoptimierung in der Verkehrsluftfahrt**
Swen Schlobach (Lufthansa Systems GmbH & Co.KG)

17:00 **Fuel-Efficient Free-Flight Trajectory Planning**
Liana Amaya Moreno
(Helmut Schmidt University Hamburg)

17:30 **Discussion**

19:30 Dinner at Haus Buhl
Hauptstraße 234, 69117 Heidelberg

FRIDAY – OCTOBER 9, 2015

9:15 **Discussion Summary of Previous Day**
Hans Georg Bock

9:30 **Enabling Fuel Efficiency Improvements for Heavy Duty Trucks Using Applied Optimal Control**
Ottmar Gehring (Daimler AG)

10:00 **Mathematical Methods for NMPC-Based Operation of Hybrid Electric Vehicles**
Christian Kirches
(HGS MathComp, Heidelberg University)

10:30 **Optimal Energy Control of Hybrid Vehicles**
Angie Burtchen (Brandenburg University of Technology Cottbus-Senftenberg)

11:00 Coffee Break

11:30 **How Simulation Can Help Buildings to Perform Better**
Sven Moosberger (EQUA Solutions AG)

12:00 **Towards Parallel Solvers for Optimal Power Flow Problems**
Philipp Gerstner (Engineering Mathematics and Computing Lab, Heidelberg)

12:30 Lunch

13:30 **Black-Box Co-Simulation for Novel Energy System Solutions**
Sebastian Lehnhoff (OFFIS – Institute for Information Technology, Oldenburg)

14:00 **Energy Efficiency in Industry: Analysing the Potential by using an Agent-Based Simulation**
Thomas Ketelaer (Jülich Research Center)

14:30 **Future Data Centers for Energy-Efficient Large-Scale Numerical Simulations**
Markus Geveler (Technical University Dortmund)

15:00 Closing Discussion & Farewell