Tuesday, June 4th

08:30 - 08:50 Registration
08:50 - 09:00 Welcome

09:00 - 09:45 Dr. Andrew Grace – The MathWorks Inc.
"Directions for Model-Based Design of Automotive Control Systems"
This talk provides an overview of how Model-Based Design is being used to reduce costs, design iterations, and to improve quality. Directions for The MathWorks Simulink family of products will be presented including a demonstration of new capabilities in the upcoming MathWorks Releases 13.

09:45 - 10:15 Jacob Eelkema – TNO Automotive, Powertrains
"ADVANCE - a modular vehicle simulation environment in MATLAB/Simulink"
This presentation discusses ADVANCE, a modular vehicle simulation environment in MATLAB/Simulink. The background and philosophy of this simulation tool are explained. Its library contains chassis and powertrain modules that communicate via an intuitive and transparent interface. The use of ADVANCE is demonstrated by a practical example, where a hybrid vehicle is designed. ADVANCE is used in the configuration selection process and in the controller design stage.

10:15 - 10:45 Dr. Christian Robl – CR Redline-Systems
Martin Orehek – Lehrstuhl für Realzeit-Computersysteme
"Model-Based Design of an ECU with Data and Event-Driven Parts Using Auto Code Generation"
The design flow for nowadays for embedded systems is quite inert and contains many gaps and inhomogeneities. This fact causes additional errors and makes the realization of new projects, with increasing time and cost constraints, even more difficult. We present a full model-based approach for the development of embedded systems with data and event-driven parts and we illustrate its advantages over the classical design flow. Using a model, from the early stages of the development, a simulation makes it possible to verify the correctness of the design. The validated model is an executable specification of the desired system. The implementation is then made automatically by means of auto code generators. The presented model-based approach is evaluated in a case study on a real world example, an ECU for a hydraulic front wheel drive of a truck.

10:45 - 11:15 Exhibition / Break

11:15 - 11:45 Manji Suzuki – DENSO Corporation
"Extensive usage of the Model-Based Calibration Toolbox in the development process of automotive powertrain systems"
MATLAB based tool chain in DENSO
DENSO’s activities to reduce calibration efforts drastically
Solution by front loading calibration and using HIL
Solution by introducing Model-Based Calibration toolbox
Extensive usage of Model Based Calibration toolbox with practical examples

11:45 - 12:15 Marco Pengov, Jean Christophe Hanin – PSA Peugeot Citroën
"Evaluation of non-linear control laws for tracking control systems"
PSA Peugeot Citroën evaluates different kinds of non-linear control laws. One of the tests is the yaw moment tracking control while cornering and braking. We consider vehicles equipped with a system producing independent braking torques on the four wheels.
The aim is to implement the different control law on a prototype. We first present an easy to use simulation tool called SimuLinkCar. Our tool is developed in order to reduce prototyping tasks. In the second part, the control method, which is based on non-linear constrained optimisation combined with singular perturbation theory, is presented. To compute the control law, non-linear multi-input multi-output observers have been developed from the existing measurements. In the last part simulation results of the non-linear control law, which is computed with the estimated states, are shown and discussed.

12:15 - 12:45 Stefano Nerbolino – Magneti Marelli Sistemi Elettronici
"A complete simulation environment for modeling and prototyping climate control ECUs, with automatic production-quality code generation"
This paper presents a simulation environment for modeling, testing and prototyping climate control ECUs. All the principal components of a closed loop climate control system have been considered. The thermodynamic of the vehicle cabin has been obtained through a lumped parameters model. A HVC unit has been identified through measurements. Sensor and actuators have been modeled along with their possible states of fault. The loop has been closed with the ECU itself, modeled as a finite state machine using an advanced graphic formalism (Stateflow).

12:45 - 14:15 Exhibition / Break

14:15 - 15:00 William Allärich – The MathWorks Inc.
"Model-Based Testing with Simulink and Stateflow"
How do you qualify and test your designs during the important early development stages? Do you all too often find unexpected and unanticipated design problems at the latest stages of development?
This talk will introduce important new features that facilitate natural, systematic ways to develop and test your designs. We will show how the simulation capabilities of Simulink, of critical importance to testing, are enhanced with Model Based Coverage to provide a quantitative measure of testing. We will demonstrate how to graphically produce test input and augment block diagram designs with internal verification checks.

15:00 - 15:30 Jean Michel Fiard, Sandra Schmied – Renault
"MATLAB/Simulink based programs in vehicle and powertrain development"
This paper deals with Renault in-house programs based on MATLAB and Simulink products.
We describe the activity of the computing development department through the presentation of several simulation codes dedicated to Research and Design engineers in Vehicle and Powertrain Departments. The goal here is to focus on our main technical precaution: producing reliable, industrial and efficient scientific software.

15:30 - 16:00 Andreas Rau – DaimlerChrysler AG
"Integrated Specification and Documentation of Simulink Models"
A concept for the integrated requirement specification and documentation of Simulink models is presented and its implementation in MATLAB is shown. It consists of new (green) blocks to extend an existing model, a custom report generator and additional browsing tools.
The concept was developed and implemented in-house at DaimlerChrysler and is part of their Central System Design (CSD) environment that makes use of the power and extensibility of the MATLAB tool family.

16:00 - 16:30 Exhibition / Break

16:30 - 17:00 Gerd Baumann, Prof. Dr.-Ing. Jochen Wiedemann – FKFS Stuttgart
"Real Time and HIL Simulation of heavy trucks using Simulink"
FKFS has developed a new method for the creation of complex, real-time capable simulation models for motor vehicles, based on Simulink and the integration of additional code from other software tools.
The paper discusses modelling aspects for vehicle dynamics, power trains and electronics of heavy trucks. Examples for the setup of Hardware-in-the-Loop test stands and interactive driving simulators are presented.

17:00 - 17:45 Jay Sharp – The MathWorks Inc.
"Modeling of Physical Systems with SimMechanics and SimPowerSystems"
Automotive engineers today are implementing technologies such as active suspensions, anti-lock brakes, complex engine controllers, side curtain air-bags, and sophisticated climate control systems. These technologies depend on tightly integrating control systems with mechanical and electrical power systems. Modeling and simulating the physical system accurately to design sophisticated controllers is a primary concern of automotive engineers in both OEM and supplier organizations. The MathWorks provides simulation tools that allow engineers to easily model their control designs with mechanical and power electronic systems. SimMechanics and SimPowerSystems will be used to show how complex physical systems can be modeled, controlled and visualized within the Simulink environment.

International Automotive Conference 2002
Pioneering Design Methods in the Automotive Industry
"Model-Based Design and Code Generation at Ford Powertrain"
Ford has successfully achieved higher quality and productivity, and a reduction of development time, by employing a model-based design process in their powertrain controller development. Ford has progressed from a manual process to an automated process utilizing model-based design and automatic code generation tools from The MathWorks.

"Embedded code generation and targets"
Automatic code generation is rapidly becoming an alternative to hard coding. This talk is an overview of some of the latest features in the Simulink environment and the Real-Time Workshop. In particular, we will discuss specific features in support of automotive applications and automatic production code generation for embedded fixed- and floating-point microcontrollers.

"Modeling Safety-Critical Applications based on xCom Blocksets in the SETTA Project"
At January 31st, 2002 ended the EC-funded project SETTA - Systems Engineering for Time-triggered Architectures. In the SETTA Project, DECOMSYS acted as a technology supplier where xCom, the MATLAB/Simulink Toolbox for communication protocols, played a major part in the development of virtual prototypes of by-wire validators which were bill up by DaimlerChrysler, Renault and Siemens VDO. Different partners provided MATLAB/Simulink models of their ECUs. The modeling of each ECU was hidden in executable models to protect IP rights. The virtual communication system was then interconnected to these different ECU models so that the simulation of the entire distributed system became possible. Using these technologies a virtual prototype of a brake-by-wire system was developed and several fault injection experiments were performed which uncovered various design flaws. To verify the results acquired by the virtual prototype, a hardware prototype was developed afterwards.

"System-on-Chip Design in Automotive Applications"
This talk lines out a new approach to concurrent Hardware/Software design for systems on chip. Co-Simulation in a combined development environment with xControl and Simulink is used to achieve a much more efficient design process. With this approach processor core and peripheral functionality are available for the evaluation and tests of the whole system including controller and plant before the final silicon is available.

"TTP-Matlink as Design and Simulation Tool for TTP/C"
The presentation will demonstrate the capabilities of TTP-Matlink as design tool and simulation tool for TTP/C. The demonstration is part of a complex real-world automotive project. The project is conducted within a large European consortium. The consortium consists of 15 partners from 8 European countries. The project is led by the University of Michigan, USA. The project aims to develop a set of tools and methods for the design and simulation of complex automotive systems on chip. TTP-Matlink is one of the tools developed in the project.