

# 5<sup>th</sup> International Modelica Conference



September 4-5, 2006  
Vienna, Austria

## Final Program

Organizers



Modelica Association

Giefinggasse 2,

1210 Vienna, Austria

[www.modelica.org](http://www.modelica.org)

[www.arsenal.ac.at](http://www.arsenal.ac.at)



# 5<sup>th</sup> International Modelica Conference

## Welcome to the Modelica Conference 2006!

The 1<sup>st</sup> International Modelica Conference took place October 2000, in Lund, Sweden. Since then, Modelica has increasingly become the preferred modeling language for complex multi-domain systems. During this time, the community of Modelica users has grown continuously. This is also reflected in the great response to the Call for Papers of the 5<sup>th</sup> Intern. Modelica Conference. This year's conference will be held on September 4<sup>th</sup>-5<sup>th</sup>, 2006 in Vienna. From the excellent papers submitted to the program committee, it was finally decided to include 66 oral and 15 poster presentations in the technical program. The technical papers cover thermodynamic and automotive applications, mechanical and electrical systems and the latest developments in modelling and simulation products. Before the conference, there will be 5 parallel tutorials. These tutorials include an introduction to Modelica, mathematical aspects of modeling, as well as the modeling of electric drives, vehicle and thermodynamic systems.

Due to the special features of the Modelica language, such as object-oriented modeling and the ability to reuse and exchange models, Modelica strongly supports an integrated engineering design process. This fact is emphasized by the keynote of Dominique Florack, Executive Vice President R&D of Dassault Systemes, "About the strategic decision of Dassault Systemes to select Modelica to be at the core of Dassault Systemes' open strategy for CATIA Systems". In various fields Modelica is being used as a standard platform for model exchange between suppliers and OEMs.

A key issue for the success of Modelica is the continuous development of the Modelica language as well as the Modelica Standard Library by the Modelica Association under strict observance of backward compatibility with previous versions. The broad base of private and institutional members of the Modelica Association as a non-profit organization ensures language stability and security in software investments.

The 5<sup>th</sup> International Modelica Conference was organized by the Modelica Association and arsenal research, Vienna, Austria. We would like to thank the local organizing committee, the technical program committee and the reviewers for offering their time and expertise throughout the organization of the conference. We would also like to wish all participants an excellent and interesting conference and hope you will have a memorable experience in Vienna.

Vienna, September 1<sup>st</sup>, 2006

Dr. Christian Kral  
Conference Chair

Anton Haumer  
Program Chair

## Program Committee



**Conference Chair:**

Dr. Christian Kral  
arsenal research  
Vienna, Austria



**Program Chair:**

Anton Haumer  
arsenal research  
Vienna, Austria

## Program Board:

- Prof. Martin Otter | DLR, Oberpfaffenhofen, Germany
- Prof. Peter Fritzson | Linköping University, Sweden
- Dr. Hilding Elmqvist | Dynasim AB, Lund, Sweden
- Dr. Michael Tiller | Emmeskay Inc., Michigan, USA
  
- Prof. Bernhard Bachmann | University of Applied Sciences Bielefeld, Germany
- Dr. Ingrid Bausch-Gall | Bausch-Gall GmbH, Munich, Germany
- Daniel Bouskela | Electricite de France, Chatou Cedex, France
- Prof. Felix Breiteneker | Technical University Vienna, Austria
- Dr. Francesco Casella | Politecnico di Milano, Cremona, Italy
- Thomas Christ / Marco Bross | BMW, Munich, Germany
- Dr. Ruediger Franke | ABB, Heidelberg, Germany
- Dirk Limperich | DaimlerChrysler AG, Sindelfingen, Germany
- Prof. Karin Lunde | University of Applied Sciences Ulm, Germany
- Ludwig Marvan | DRIVEScom, Vienna, Austria
- Dr. Jakob Mauss | DaimlerChrysler AG, Berlin, Germany
- Gert Pascoli | arsenal research, Vienna, Austria
- Franz Pirker | arsenal research, Vienna, Austria
- Markus Plainer | arsenal research, Vienna, Austria
- Prof. Gerhard Schmitz | Technical University Hamburg-Harburg, Germany
- Dr. Hubertus Tummescheit | Modelon AB, Lund, Sweden

## Local Organizing Committee

- arsenal research:  
Anton Haumer, Dr. Christian Kral, Franz Pirker, Veronika Roscher, Silke Schrödl
- WEBSTRACTS on-line Conference Management
- procon Conference, Incentive & Event Management GmbH



# 5<sup>th</sup> International Modelica Conference

## Location

The 5<sup>th</sup> International Modelica Conference will be held at arsenal research in Vienna, Austria on September 4<sup>th</sup> - 5<sup>th</sup>, 2006, at TECHbase Vienna, which is located in a district north of the city of Vienna. Vienna railway stations (Westbahnhof and Südbahnhof) can be reached by public transport in about 30 minutes as well as the airport Vienna in about 1 hour:

### **By means of public transport to TECHbase Vienna:**

#### At the U6 terminal Floridsdorf:

Take the Schnellbahn S1 or S2 heading north and leave at "Siemensstraße" station. There you take the bus 31A towards "Kagran" and leave at "Giefinggasse".

#### At the U1 terminal Kagran:

Take the bus 31A towards "Jochen-Bergengasse" and leave at "Heinrich-von-Buol-Gasse".

### **From Vienna International Airport to TECHbase Vienna:**

Take the City Airport Train (CAT) or a S2, which will take you from the Airport directly to "Wien Mitte-Landstraße". From there, lines S1, S2 or S8 head for station "Siemensstraße".

### **From TECHbase Vienna to the airport (Vienna/Schwechat):**

Take the train (S-Bahn/Schnellbahn) from "Siemensstraße" to the airport (direct trains every 30 minutes, other trains you'll have to change at "Wien Mitte").

### **From TECHbase Vienna to the railway station (Wien Westbahnhof):**

Take the train (S-Bahn/Schnellbahn) from "Siemensstraße" direction "Floridsdorf", getting off at "Handelskai", changing to underground U6, direction "Siebenhirten" to "Westbahnhof".

-> Please pay attention to the map of the TECHbase and its surrounding on the penultimate page of this program.

## Vienna

Vienna is the capital of Austria, located in the east of the country, having approximately 1.6 million inhabitants. Vienna's history can be tracked back to the 5<sup>th</sup> century before Christ. Vienna is also known worldwide as a city of cultural life: music, theater and fine arts. There's definitely a lot for **sightseeing**: St. Stephen's Cathedral, the Imperial Palace, the Spanish Riding School, the Vienna State Opera, the National Theater Burgtheater, a lot of museums, the palace of Schönbrunn, the Vienna Prater, and many more ...

## Accommodation

Three hotels are near the conference site:

- Austria Trend Hotel Donauzentrum
- Austria Trend Hotel Lasalle
- Austria Trend Hotel Messe Wien

You can book your hotel room at [www.proconference.at/modelica/modelica.htm](http://www.proconference.at/modelica/modelica.htm) during registration, we have arranged special prices for the conference.

Between the hotels and the conference site there will be a bus shuttle for participants.

### Getting from the airport (Vienna/Schwechat) to the hotels:

take the train (S-Bahn/Schnellbahn) direction "Floridsdorf", get off at "Wien Nord".

- > Hotel Messe Wien: Take the tram 21 towards "Praterkai" and leave at "Messeplatz".
- > Hotel Lasalle: Take the underground U1 direction "Kagran", get off at "Vorgartenstraße", take the bus 11A towards "Heiligenstadt" and leave at "Walcherstraße"
- > Hotel Donauzentrum: Take the underground U1 direction "Kagran", get off at "Kagran".

### Getting from the railway station (Wien Westbahnhof) to the hotels:

take the underground U3 direction "Simmering", get off at "Stephansplatz", changing to underground U1, direction "Kagran".

- > Hotel Messe Wien get off at "Wien Nord", take the tram 21 towards "Praterkai" and leave at "Messeplatz".
- > Hotel Lasalle get off at "Vorgartenstraße", take the bus 11A towards "Heiligenstadt" and leave at "Walcherstraße"
- > Hotel Donauzentrum get off at "Kagran".

## Climate

The Viennese **climate** is a Pannonian climate with a continental influence; during September there's normally a stable warm weather situation without much rain.



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## Internet Access

Wireless LAN internet access is provided in each meeting room on the third and fourth floor. In these rooms you can access the internet (via HTTP and HTTPS) with your own notebook computer.

Room W302 on the third floor is exclusively designated as internet room. Please note, that public computers for accessing the internet are not provided.

When accessing the wireless LAN with your internet browser you are prompted to type in the following information:

username: wl\_guest

password: meetingroom

## Guidelines for Oral Presentations

The authors are requested to prepare a Power Point presentation. Please be aware that the computer equipment only supports standard Windows fonts, and that video clips often cause trouble in a presentation. The presentation has to be transferred to a notebook computer which will be available in each of the session rooms. Do not bring your own computer. No slide projector or other presentation equipment will be available.

The presenting authors are expected to upload their Power Point presentations at [www.webstracts.com](http://www.webstracts.com) latest one week before the conference (August 28<sup>th</sup>, 2006).

For backup reasons we recommend additionally bringing your presentation on a CD-Rom or a memory stick. Floppy disk and ZIP drives are not supported. However, your presentation will be erased from the session computer right after the session, so we do not keep your presentation.

You are also requested to submit a short biography for introduction by the session chair.

The oral presentations are scheduled to last not longer than 20 minutes. There is an additional 5 minutes for discussion. The session chairs are requested to maintain the session schedule, so that a total duration of 25 minutes is not exceeded.

## Guidelines for Session Chairs

The session chairs should be present in the session room 10 minutes before the session starts so that they can meet the authors. Author biographies will be provided to the chairs before the session starts. Authors who did not submit their biographies should be asked to fill out a biography form, so that the chairs can introduce them. Biography forms will be available in the session rooms.

The oral presentations are scheduled to last not longer than 20 minutes. There is an additional 5 minutes for discussion. The session chairs are requested to maintain the session schedule, so that a total duration of 25 minutes per paper is not exceeded. If an author is absent and a paper cannot be presented, the session chairs are asked to have a 25 minute break and proceed with the next paper according to the schedule.

## Guidelines for Poster Presentations

The poster displays will support up to a 96 cm wide by 124 cm tall poster, slightly larger than A0 (84.1 x 118.9 cm). Therefore you may use up to 16 A4 (29.7 x 21.0 cm) pages. The poster session will be organized into topic areas and so it will be important that you mount your poster on the proper poster display, timely before the poster session starts. Please refer to the Program. To facilitate this process each poster display will have a label indicating the paper that should be posted on that display. Material for mounting the poster(s) will be available.

Posters are a nearly ideal method for communicating scientific and technical ideas. Posters promote personal contact and individual exchange of ideas. Such individual contact is not so easy during an oral presentation, but it comes naturally in a good poster session.

The most successful posters:

- attract attention
- provide a brief overview of the work
- initiate discussion

The title of your paper and the author names should be printed in large characters at the top of the poster presentation. The remaining text in the poster presentation should be easily visible from a distance of about one meter. Please do not use less than a 16pt font for any text you mount.

At last: Please do not be absent during the poster session!



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## Ancillary Events

### Sunday, September 3<sup>rd</sup>

17.00 - 20.00      Registration and Reception  
at the Austria Trend Hotel Donauzentrum  
Wagramer Straße 83-85  
1220 Vienna, Austria

### Monday, September 4<sup>th</sup>

20.00 - 23.00      Conference Dinner  
at the Vienna City Hall  
Entrance Liechtenfelsgasse  
1010 Vienna, Austria

### Tuesday, September 5<sup>th</sup>

16.15 - 18.00      Technical Tour through arsenal research's laboratories  
at the TECHbase Vienna  
Giefinggasse 2  
1210 Vienna, Austria

There will be a bus shuttle for conference participants.



## Technical Program

Sun 09-05	17:00-20:00	Registration & Reception	
	08:15-11:00	Tutorial 1	Introduction to Object-Oriented Modelling and Simulation with ...
	08:15-11:00	Tutorial 2	Mathematical Aspects of Modeling and Simulation with Modelica
	08:15-11:00	Tutorial 3	Simulation of Electric Machines and Drives using the ...
	08:15-11:00	Tutorial 4	Vehicle system modelling using the new, free Vehicle ...
	08:15-11:00	Tutorial 5	Modeling of Thermodynamic Systems using Modelica_Fluid ...
	11:00-11:30	Break	
	11:30-11:35	pr	Welcome & Opening of the Conference
	11:35-12:05	Anton Plimon	The Importance of Modelling and Simulation in different ...
	12:05-12:35	Dominique Florack	About the strategic decision of Dassault Systemes to select ...
	12:35-12:50	Martin Otter	Future directions of Modelica and of the Modelica Association
	12:50-13:50	Lunch	
Mon 09-04	13:50-15:05	Session 1a pr	Thermodynamic Systems for Power Plant Applications 1
	13:50-15:05	Session 1b W301	Automotive Applications 1
	13:50-15:05	Session 1c W401	Language, Tools and Algorithms 1
	13:50-15:05	Session 1d W404	Mechanical Systems and Applications 1
	15:05-15:35	Break	
	15:35-16:50	Session 2a pr	Thermodynamic Systems for Power Plant Applications 2
	15:35-16:50	Session 2b W301	Automotive Applications 2
	15:35-16:50	Session 2c W401	Language, Tools and Algorithms 2
	15:35-16:50	Session 2d W404	Mechanical Systems and Applications 2
	16:50-17:00	Break	
	17:00-18:00	pr	Dymola Users Group Meeting
	17:00-18:00	W301	Free Modelica environments
	17:00-18:00	W401	Modelica tool vendor session 1
	17:00-18:00	W404	Modelica tool vendor session 2
	18:00-20:00	Bus Transfer to hotels, then to Townhall	
	20:00-23:00	Conference Dinner	
	08:30-09:45	Session 3a pr	Thermodynamic Systems for Energy Storage and Conversion
	08:30-09:45	Session 3b W301	Hardware in the Loop
	08:30-09:45	Session 3c W401	Language, Tools and Algorithms 3
	08:30-09:45	Session 3d W404	Electric Systems and Applications 1
	09:45-09:55	Break	
	09:55-10:55	Session 4 W402	Poster Session
	10:55-11:25	Break	
	11:25-13:05	Session 5a pr	Language, Tools and Algorithms 4
	11:25-13:05	Session 5b W301	Thermodynamic Systems for Cooling Applications
Tue 09-05	11:25-13:05	Session 5c W401	Free and Commercial Libraries 1
	11:25-13:05	Session 5d W404	Electric Systems and Applications 2
	13:05-14:05	Lunch	
	14:05-15:45	Session 6a pr	Language, Tools and Algorithms 5
	14:05-15:45	Session 6b W301	Thermodynamic Systems and Applications
	14:05-15:45	Session 6c W401	Free and Commercial Libraries 2
	14:05-15:45	Session 6d W404	Multidomain Systems
	15:45-15:55	Break	
	15:55-16:10	pr	Modelica Library Award & Closing the Conference
	16:10-16:15	Break	
	16:15-18:00	Technical Tour through arsenal's laboratories	



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## Tutorial 1

### Introduction to Object-Oriented Modelling and Simulation with OpenModelica

**Time & Location** Monday, 8.15 - 11.00

**Tutors** Peter Fritzson, Peter Bonus | University of Linköping, Sweden

**Prerequisites** Knowledge of basic programming concepts

#### Description

The tutorial presents an object-oriented component-based approach to computer supported mathematical modeling and simulation through the powerful Modelica language and its associated technology. Modelica can be viewed as an almost universal approach to high level computational modeling and simulation, by being able to represent a range of application areas and providing general notation as well as powerful abstractions and efficient implementations. The tutorial gives an introduction to the Modelica language to people who are familiar with basic programming concepts. It gives a basic introduction to the concepts of modeling and simulation, as well as the basics of object-oriented component-based modeling for the novice, and a an overview of modeling and simulation in a number of application areas.

## Tutorial 2

### Mathematical Aspects of Modeling and Simulation with Modelica

**Time & Location** Monday, 8.15 - 11.00

**Tutors** Bernhard Bachmann | University of Applied Sciences Bielefeld, Germany

**Prerequisites** Basic knowledge of the language, some experience in using Dymola

#### Description

The investigation of dynamical systems in mechanical, electrical or chemical engineering usually requires mathematical modeling of the system behavior. The object-oriented modeling language Modelica provides powerful features which make it possible to build up very complex even hybrid systems quite easily. But, what happens if a Modelica tool is not capable to compile and/or correctly simulate the system of interest? Reasons can be i.e. modeling errors, wrong parameter values and/or numerical instabilities. Automatic problem detection is usually not possible and only understanding of symbolical and numerical techniques behind the scene can help in resolving this issue. This tutorial provides a basic understanding on the mathematical aspects of object-oriented modeling and simulation. Different phenomena are explained in detail using simple examples which can be thoroughly analyzed during hand-out exercises.

## Tutorial 3

# Simulation of Electric Machines and Drives Using the Machines and the SmartElectricDrives Libraries

**Time & Location** Monday, 8.15 - 11.00

**Tutors** Johannes Gragger, Harald Giuliani, Hansjoerg Kapeller, Thomas Baeuml | arsenal research, Vienna, Austria

**Prerequisites** Basic knowledge of the Modelica language and some experience in using Dymola

### Description

The tutorial starts with an introduction to electric machines. This includes DC machines, asynchronous machines and permanent magnet synchronous machines. Simple applications of starting and operating the machines will be presented using the Machines package of the Modelica Standard Library. The limits of operation of open loop and mains supplied machines will be discussed. For operating electric machines at variable speed (or torque) usually closed loop drives are used.

The basic principle of a closed loop drive system will be explained. For the examples presented in this tutorial the SmartElectricDrives (SED) library will be used. An overview of the structure of the basic components (source, converter, machine, control unit, sensor and load) of the SED library will be given. The basics of controlling DC machines are outlined, followed by an introduction to space phasors (as the reference frames get explained the transformation blocks in the SED library get pointed out).

The torque controlled drive models of a DC machine, an asynchronous induction machine and a permanent magnet synchronous machine are presented. For these drive types the differences between TransientDrives and QuasiStationaryDrives will be compared. Then the Sources models will be explained and their parameterization will be discussed.

After this two examples using an asynchronous induction machine and a permanent magnet induction machine are shown. These examples will demonstrate the correct use of the bus connectors and the supplementary functions for estimating the control and machine parameters. nomena are explained in detail using simple examples which can be thoroughly analyzed during hand-out exercises.



## Tutorial 4

### Vehicle System Modelling Using the New, Free Vehicle Interfaces Package

**Time & Location** Monday, 8.15 - 11.00

**Tutors** Mike Dempsey et al | Claytex, UK

**Prerequisites** Basic knowledge of the Modelica language and some experience in using Dymola

#### Description

Learn how the interface definitions provided in the VehicleInterfaces package simplify modelling the whole vehicle system. See how these interface definitions are utilised in commercial automotive libraries such as PowerTrain 2.0 (from DLR), SmartElectricDrives (from arsenal research), Transmission (from Ricardo), VehicleDynamics (from Modelon).

## Tutorial 5

### Modeling of Thermodynamic Systems Using Modelica\_Fluid and Modelica.Media

**Time & Location** Monday, 8.15 - 11.00

**Tutors** Hubertus Tummescheit, Jonas Eborn | Modelon AB, Lund, Sweden

**Prerequisites** Basic knowledge of the Modelica language, some experience in using Dymola

#### Description

The goal of the tutorial is to get an overview over Modelica libraries for thermodynamic system modeling and show how to make use of Modelica's unique features in thermodynamics modeling. Compared to traditional, specialized flow sheeting tools, Modelica offers increased flexibility. The new Media and Fluid libraries make this flexibility accessible without the drawback of laborious model implementation. We will explain the design ideas behind the libraries and, through a series of hands-on exercises, learn to use the libraries for simple examples.

Using these examples, we will investigate typical modeling trade-offs in thermodynamics between models intended for component design use and models intended for system design use. The same examples will be used to demonstrate typical numerical pitfalls in thermo-fluid systems.

## Welcome Opening of the Conference

**Time & Location** Monday, 11.30 - 12.50, ground floor, plenary room

11.30 - 11.35      **Opening of the Conference**

11.35 - 12.05      **The Importance of Modelling and Simulation  
in different stages of Engineering processes**

Keynote Anton Plimon

CEO arsenal research

12.05 - 12.35      **About the strategic decisions of Dassault Systemes to select Modelica to be  
at the core of Dassault Systemes' open strategy for CATIA Systems**

Keynote Dominique Florack

Executive Vice President R&D of Dassault Systems

12.35 - 12.50      **Future Directions of Modelica and of the Modelica Association**

Keynote Martin Otter

Chairman of the Modelica Association



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## Session 1a

### Thermodynamic Systems for Power Plant Applications 1

**Time & Location** Monday, 13.50 - 15.05, ground floor, plenary room

**Session Chair** Katrin Proelss | Technical University Hamburg-Harburg, Germany

10091 **Fast Start-up of a Combined-Cycle Power Plant: A Simulation Study**

1a1 F. Casella | Politecnico di Milano, Italy

F. Pretolani | CESI S.p.A., Italy

10019 **Modelling of a Water/Steam Cycle of the Combined**

1a2 **Cycle Power Plant “Rio Bravo 2” with Modelica**

B. El Hefni, D. Bouskela | EDF R&D, France

10129 **Modeling and Dynamic Analysis of CO<sub>2</sub>-Emission Free**

1a3 **Power Processes in Modelica using the CombiPlant Library**

J. Eborn | Modelon AB, Sweden

F. Selimovic, B. Sundén | Lund Institute of Technology, Sweden

## Session 1b **Automotive Applications 1**

**Time & Location** Monday, 13.50 - 15.05, 3<sup>rd</sup> floor, room W301

**Session Chair** Dirk Limperich | DaimlerChrysler AG, Sindelfingen, Germany

10100 **Simulation of Hybrid Electric Vehicles**

1b1 D. Simic, H. Giuliani, C. Kral, J.V. Gragger | arsenal research, Austria

10081 **Coordinated Automotive Libraries for Vehicle System Modelling**

1b2 M. Dempsey | Claytex Services Ltd., UK

M. Gäfvert | Modelon AB, Sweden

P. Harman | Ricardo UK Ltd., UK,

C. Kral | arsenal research, Austria

M. Otter | DLR Oberpfaffenhofen, Germany

P. Treffinger | DLR Stuttgart, Germany

10143 **The VehicleDynamics Library - Overview and Applications**

1b3 J. Andreasson, M. Gäfvert | MODELON AB, Sweden

## Session 1c Language, Tools and Algorithms 1

**Time & Location** Monday, 13.50 - 15.05, 4<sup>th</sup> floor, room W401

**Session Chair** Prof. Peter Fritzson | Linköping University, Sweden

10034 **Modelica CVD - A Tool for Visualizing the Structure of Modelica Libraries**  
1c1 M. Loeffler, M. Huhn, C.C. Richter | TU Braunschweig, Germany  
R. Kossel | TLK-Thermo GmbH, Germany

10112 **Advanced Modeling and Simulation Techniques**  
1c2 **in MOSILAB: A System Development Case Study**  
C. Nytsch-Geusen, T. Ernst, A. Nordwig | Fraunhofer FIRST, Germany  
P. Schwarz, P. Schneider | Fraunhofer IIS/EAS, Germany, M. Vetter,  
C. Wittwer | Fraunhofer ISE, Germany, A. Holm, T. Noudui | Fraunhofer  
IBP, Germany, J. Leopold, G. Schmidt | Fraunhofer IWU, Germany  
A. Mattes | Fraunhofer IPK, Germany

10049 **Quant. State System Simulation in Dymola/Modelica Using the DEVS Formalism**  
1c3 T. Beltrame | VTT, FINLAND, F.E. Cellier | ETH Zurich, Switzerland

## Session 1d Mechanical Systems and Applications 1

**Time & Location** Monday, 13.50 - 15.05, 4<sup>th</sup> floor, room W404

**Session Chair** Markus Plainer | arsenal research, Vienna, Austria

10051 **The DLR FlexibleBodies Library to Model Large Motions of Beams**  
1d1 **and of Flexible Bodies Exported from Finite Element Programs**  
A. Heckmann, M. Otter | German Aerospace Center (DLR), Germany  
S. Dietz | INTEC GmbH, Germany, J.D. Lopez | Dynasim AB, Sweden

10080 **3D Flexible Multibody Thin Beams Simulation**  
1d2 **in Modelica with the Finite Element Method**  
X. Murua, F. Martinez, A. Pujana, J. Basurko, J.M. Pagalday |  
IKERLAN Research Centre, Spain

10111 **A Modelica Library for Space Flight Dynamics**  
1d3 T. Pulecchi, F. Casella, M. Lovera | Politecnico di Milano, Italy



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## Session 2a

### Thermodynamic Systems for Power Plant Applications 2

**Time & Location** Monday, 15.35 - 16.50, ground floor, plenary room

**Session Chair** Dr. Francesco Casella | Politecnico di Milano, Cremona, Italy

10083 **Simulation of Components of a Thermal Power Plant**

2a1 R. Schimon, D. Simic, A. Haumer, C. Kral, M. Plainer | arsenal research, Austria

10075 **Pressurized Water Reactor Modelling with Modelica**

2a2 A. Souyri, D. Bouskela | Electricité de France EDF/R&D, France  
B. Pentori, N. Kerkar | Electricité de France EDF/SEPTEN, France

10029 **Simulation of the Start-Up Procedure of a Parabolic**

2a3 **Trough Collector Field with Direct Solar Steam Generation**  
T. Hirsch, M. Eck | German Aerospace Center, Institute of Technical Thermodynamics, Germany

## Session 2b **Automotive Applications 2**

**Time & Location** Monday, 15.35 - 16.50, 3<sup>rd</sup> floor, room W301

**Session Chair** Jonas Eborn | Modelon AB, Lund, Sweden

10061 **Modeling the Dynamics of Vehicle Fuel Systems**

2b1 J.J. Batteh, P.J. Kenny | Ford Motor Company, USA

10056 **Motorcycle Dynamics Library in Modelica**

2b2 F. Donida, G. Ferretti, S.M. Savaresi, F. Schiavo, M. Tanelli | Politecnico di Milano, Italy

10036 **Development and Verification of a Series Car Modelica/Dymola Multi-body Model to Investigate Vehicle Dynamics Systems**

2b3 C. Knobel | BMW Group Research and Technology, Germany  
G. Janin | École Nationale Supérieure de Techniques Avancées, France  
A. Woodruff | Modelon AB, Sweden



## Session 2c Language, Tools and Algorithms 2

**Time & Location** Monday, 15.35 - 16.50, 4<sup>th</sup> floor, room W401

**Session Chair** Dr. Hilding Elmqvist | Dynasim AB, Lund, Sweden

10031 **Modeling and Simulation of Differential Equations in Scicos**  
2c1 M. Najafi, R. Nikoukhah | INRIA-Rocquencourt, France

10097 **How to Dissolve Complex Dynamic Systems for**  
2c2 **Wanted Unknowns with Dymola / Modelica**  
J. Koehler | ZF Friedrichshafen AG, Germany

10105 **Using Modelica Models for Complex Virtual**  
2c3 **Experimentation with the Tornado Kernel**  
F.H.A. Claeys | BIOMATH, Ghent University, Belgium  
P. Fritzson | PELAB, Linköping University, Sweden  
P.A. Vanrolleghem | modelEAU, Université Laval, Canada

## Session 2d Mechanical Systems and Applications 2

**Time & Location** Monday, 15.35 - 16.50, 4<sup>th</sup> floor, room W404

**Session Chair** Prof. Martin Otter | DLR, Oberpfaffenhofen, Germany

10088 **Leaf Spring Modeling**  
2d1 N. Philipson | Modelon, Sweden

10024 **Multibody Systems Dynamics:**  
2d2 **Modelica Implementation and Bond Graph Representation**  
I.I. Kosenko, M.S. Stavrovskaya | Moscow State University of Service,  
Russian Federation,  
M.S. Loginova, YA.P. Obraztsov | Moscow State Academy of Instrument  
Making and Computer Science, Russian Federation

10149 **NowaitTransit Concept Assessment. Modeling**  
2d3 **of Trains on Complex Track Geometry**  
J. Tuszynski | Nowaittransit AB, Sweden  
N. Philipson, J. Andreasson, M. Gäfvert | Modelon AB, Sweden



# 5<sup>th</sup> International Modelica Conference

## Users Group Meeting

### Dymola Users Group Meeting [www.dynasim.se](http://www.dynasim.se)

**Time & Location** Monday, 17.00 - 18.00, ground floor, plenary room

- Perspectives of the aquisition of Dynasim by Dassault Systemes
- New and coming features of Dymola
- Dynasim library partner presentations:
  - Modelon
  - arsenal research
  - DLR

## Users Group Meeting

### Free Modelica Environments

**Time & Location** Monday, 17.00 - 18.00, 3<sup>rd</sup> floor, room W301

- OpenModelica ([www.ida.liu.se/~pelab/modelica/OpenModelica.html](http://www.ida.liu.se/~pelab/modelica/OpenModelica.html))
  - Status and coming features
- MathModelica Lite ([www.mathcore.com](http://www.mathcore.com))
- Simpa2 project ([www.rntl.org/projet/resume2005/simpa2.htm](http://www.rntl.org/projet/resume2005/simpa2.htm))
  - Objectives and status

## Vendor Sessions

### Modelica Tool Vendor Session 1

**Time & Location** Monday, 17.00 - 18.00, 4<sup>th</sup> floor, room W401

- MathCore Engineering AB ([www.mathcore.com](http://www.mathcore.com)):
  - MathModelica
- Equa Simulation AB ([www.equa.se](http://www.equa.se)):
  - IDA Simulation Environment
- Modelon AB ([www.modelon.se](http://www.modelon.se)):
  - Modelon consulting services and library products
- Schlegel Simulation
  - Consulting for mechatronic systems

## Vendor Sessions

### Modelica Tool Vendor Session 2

**Time & Location** Monday, 17.00 - 18.00, 4<sup>th</sup> floor, room W404

- ITI GmbH ([www.simulationx.com](http://www.simulationx.com)):
  - SimulationX
  - Tool demonstration and typical applications
  - New features in release 2.0
  - Forthcoming development
- Maplesoft ([www.maplesoft.com](http://www.maplesoft.com)):
  - BlockBuilder for Modelica



# 5<sup>th</sup> International Modelica Conference

## Session 3a

### Thermodynamic Systems for Energy Storage and Conversion

**Time & Location** Tuesday, 8.30 - 9.45, ground floor, plenary room

**Session Chair** Dr. Hubertus Tummescheit | Modelon AB, Lund, Sweden

10043 **Analysis of Steam Storage Systems using Modelica**

3a1 J. Buschle, W.D. Steinmann, R. Tamme |

German Aerospace Center (DLR), Germany

10048 **An Enhanced Discretisation Method for**

3a2 **Storage Tank Models within Energy Systems**

S. Wischhusen | XRG Simulation GmbH, Germany

10089 **HydroPlant – a Modelica Library for Dynamic**

3a3 **Simulation of Hydro Power Plants**

K. Tuszynski | Modelon AB, Sweden

J. Tuszynski | Datavoice HB, Sweden

K. Slättorp | Tactel AB, Sweden

## Session 3b **Hardware in the Loop**

**Time & Location** Tuesday, 8.30 - 9.45, 3<sup>rd</sup> floor, room W301

**Session Chair** Franz Pirker | arsenal research, Vienna, Austria

10121 **Interacting Modelica using a Named Pipe for**

3b1 **Hardware-in-the-loop Simulation**

A. Ebner, A. Haumer, D. Simic, F. Pirker | arsenal research, Austria

10150 **Parameterisation of Modelica Models on PC and Real Time Platforms**

3b2 M. Kellner, M. Neumann, A. Banerjee | ZF Friedrichshafen AG, Germany

P. Doshi | Universität Duiburg-Essen, Germany

10063 **Synchronising a Modelica Real-Time Simulation Model**

3b3 **with a Highly Dynamic Engine Test-Bench System**

D. Winkler, C. Gühmann | Technische Universität Berlin, Germany

## Session 3c Language, Tools and Algorithms 3

**Time & Location** Tuesday, 8.30 - 9.45, 4<sup>th</sup> floor, room W401

**Session Chair** Dr. Jakob Mauss | DaimlerChrysler AG Research and Technology, Berlin

10136                    **A Numeric Library for Use in Modelica Simulations**  
3c1                        **with Lapack, SuperLU, Interpolation, and MatrixIO**  
A. Sandholm | Linköping University and Kalmar University, Sweden  
P. Bunus, P. Fritzson | Linköping University, Sweden

10094                    **Online Application of Modelica Models in the Industrial**  
3c2                        **IT Extended Automation System 800xA**  
R. Franke | ABB AG, Power Technology Systems, Germany  
J. Doppelhamer | ABB Corporate Research, Germany

10137                    **Types in the Modelica Language**  
3c3                        D. Broman, P. Fritzson | Linköping University, Sweden  
S. Furic | Imagine, France

## Session 3d Electric Systems and Applications 1

**Time & Location** Tuesday, 8.30 - 9.45, 4<sup>th</sup> floor, room W404

**Session Chair** Gert Pascoli | arsenal research, Vienna, Austria

10099                    **Modeling and Simulation of Generator**  
3d1                        **Circuit Breaker Performance**  
O. Fritz | ABB Switzerland Ltd., Corporate Research, Switzerland  
M. Lakner | ABB Switzerland Ltd., High-Current Systems, Switzerland

10102                    **Parallel Simulation with Transmission Lines in Modelica**  
3d2                        K. Nyström, P. Fritzson | Linköping University, Sweden



# 5<sup>th</sup> International Modelica Conference

## Session 4 Poster Session

**Time & Location** Tuesday, 9.55 - 10.55, 4<sup>th</sup> floor, room W402 + W403

- 10072  
401 **GAPILib - A Modelica Library for Model Parameter Identification Using Genetic Algorithms**  
M.A. Rubio, L. González, D. Guinéa | Instituto de Automática Industrial (IAI), CSIC, Spain  
A. Urquía, S. Dormido | ETS de Ingeniería Informática, UNED, Spain
- 10073  
402 **Ascola: A Tool for Importing Dymola Code into Ascet**  
C. Schlegel | Schlegel Simulation GmbH, Germany  
R. Finsterwalder | University of the Federal Armed Forces Munich, Germany
- 10095  
403 **An Analyzer for Declarative Equation Based Models**  
J.-W. Ding, L.-P. Chen, F.L. Zhou, Y.Z. Wu | Huazhong University of Science and Technology, China,  
G.B. Wang | National Natural Science Foundation of China, China
- 10145  
404 **Engineering Design Tool Standards and Interfacing Possibilities to Modelica Simulation Tools**  
O. Johansson, A. Pop, P. Fritzson | Linköping University, Sweden
- 10020  
405 **On the Noise Modelling and Simulation**  
D. Aiordachioaie, V. Nicolau, M. Munteanu, G. Sirbu | Dunarea de Jos Galati University, Romania
- 10045  
406 **Acausal Modelling of Helicopter Dynamics for Automatic Flight Control Applications**  
L. Viganò, G. Magnani | Politecnico di Milano, Italy
- 10064  
407 **Dynamic Modeling and Control of a 6 DOF Parallel Kinematics**  
M. Krabbes, Ch. Meissner | Leipzig University of Applied Sciences, Germany

- 10116      **Modelling of Alternative Propulsion Concepts of Railway Vehicles**  
408      H. Dittus, J. Ungethüm | German Aerospace Center, Institute of Vehicle Concepts, Germany
- 10039      **Modelling Automotive Hydraulic Systems using the Modelica**  
409      **ActuationHydraulics Library**  
P.A. Harman | Ricardo UK Ltd., UK
- 10098      **Vehicle Model for Transient Simulation of a Waste-Heat-Utilisation-Unit**  
410      **Containing Extended PowerTrain and Fluid Library Components**  
M. Eschenbach, J. Ungethüm, P. Treffinger | German Aerospace Center, Germany
- 10054      **Modeling, Calibration and Control of a Paper Machine Dryer Section**  
411      J. Åkesson | Lund University, Sweden  
O. Slättke | ABB Ltd., Ireland
- 10126      **System and Component Design of Directly Driven Reciprocating**  
412      **Compressors with Modelica**  
T. Bödrich | Dresden University of Technology, Germany
- 10066      **Multizone Airflow Model in Modelica**  
413      M. Wetter | United Technologies Research Center, USA
- 10032      **Modelling of a Solar Thermal Reactor for Hydrogen Generation**  
414      J. Dersch, A. Mathijssen, M. Roeb, C. Sattler | Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
- 10124      **Object Oriented Modelling of DISS Solar Thermal Power Plant**  
415      L.J. Yebra, E. Zarza | C.I.E.M.A.T., Spain  
M. Berenguel | Universidad de Almería, Spain  
S. Dormido | U.N.E.D., Spain



# 5<sup>th</sup> International Modelica Conference

## Session 5a Language, Tools and Algorithms 4

**Time & Location** Tuesday, 11:25 - 13.05, ground floor, plenary room

**Session Chair** Prof. Bernhard Bachmann | Univ. of Applied Sciences Bielefeld, Germany

10138  
5a1 **OpenModelica Development Environment with Eclipse Integration for Browsing, Modeling, and Debugging**

A. Pop, P. Fritzson, A. Remar, E. Jagudin, D. Akhvlediani | Linköping University, Sweden

10125  
5a2 **A Modelica Based Format for Flexible Modelica Code Generation and Causal Model Transformations**

J. Larsson, P. Fritzson | Linköping University, Sweden

10132  
5a3 **Dymola interface to Java - A Case Study: Distributed Simulations**

J. Díaz López, H. Olsson | Dynasim AB, Sweden

10038  
5a4 **Simulation of Complex Systems using Modelica and Tool Coupling**

R. Kossel, W. Tegethoff, M. Bodmann, N. Lemke | TLK-Thermo GmbH, Germany

## Session 5b Thermodynamic Systems for Cooling Applications

**Time & Location** Tuesday, 11:25 - 13.05, 3<sup>rd</sup> floor, room W301

**Session Chair** Dr. Ruediger Franke | ABB, Mannheim, Germany

10076  
5b1 **Optimization of a Cooling Circuit with a Parameterized Water Pump Model**

D. Simic, C. Kral, H. Lacher | arsenal research, Austria

10035  
5b2 **Using Modelica as a Design Tool for an Ejector Test Bench**

C.C. Richter, C. Tischendorf, R. Fiorenzano, P. Cavalcante, W. Tegethoff, J. Köhler | TU Braunschweig, Germany

10128  
5b3 **Modeling of Frost Growth on Heat Exchanger Surfaces**

K. Proelss, G. Schmitz | Hamburg University of Technology, Germany

10065  
5b4 **Multizone Building Model for Thermal Building Simulation in Modelica**

M. Wetter | United Technologies Research Center, USA



## Session 5c Free and Commercial Libraries 1

**Time & Location** Tuesday, 11:25 - 13.05, 4<sup>th</sup> floor, room W401

**Session Chair** Dr. Michael Tiller | Emmeskay Inc., Michigan, USA

10151            **The LinearSystems Library for Continuous and Discrete Control Systems**  
5c1                M. Otter | German Aerospace Center (DLR), Germany

10079            **ARENALib: A Modelica Library for Discrete-Event System Simulation**  
5c2                V.S. Prat, A. Urquia, S. Dormido | ETS de Ingeniería Informática, UNED, Spain

10092            **Neural Network Library in Modelica**  
5c3                F. Codecà, F. Casella | Politecnico di Milano, Italy

10025            **The Modelica Multi-bond Graph Library**  
5c4                D. Zimmer, F.E. Cellier | ETH Zürich, Switzerland

## Session 5d Electric Systems and Applications 2

**Time & Location** Tuesday, 11.25 - 13.05, 4<sup>th</sup> floor, room W404

**Session Chair** Ludwig Marvan | DRIVEScom, Vienna, Austria

10069            **The SmartElectricDrives Library - Powerful Models**  
5d1                **for Fast Simulations of Electric Drives**  
J.V. Gragger, H. Giuliani, C. Kral, T. Bäuml, H. Kapeller, F. Pirker |  
arsenal research, Austria

10037            **Quasi-stationary AC Analysis Using Phasor Description With Modelica**  
5d2                O. Enge, C. Clauß, P. Schneider, P. Schwarz | Fraunhofer Institute  
Integrated Circuits, Germany  
M. Vetter, S. Schwunk | Fraunhofer Institute Solar Energy Systems, Germany

10107            **Identification and Controls of Electrically Excited Synchronous Machines**  
5d3                H. Kapeller, A. Haumer, C. Kral, F. Pirker, G. Pascoli | arsenal research,  
Austria



# 5<sup>th</sup> International Modelica Conference

## Session 6a

### Language, Tools and Algorithms 5

**Time & Location** Tuesday, 14.05 - 15.45, groundfloor

**Session Chair** Dr. Ingrid Bausch-Gall | Bausch-Gall GmbH, Munich, Germany

10148                    **Dynamic Optimization of Energy Supply Systems with Modelica Models**  
6a1                      C. Hoffmann, H. Puta | Technische Universitaet Ilmenau, Germany

10152                    **Robust Initialization of Differential Algebraic Equations**  
6a2                      B. Bachmann | University of Applied Sciences, Germany  
P. Aronsson, P. Fritzson | Linköping University, Sweden

10118                    **Calibration of Static Models using Dymola**  
6a3                      H. Olsson, S.E. Mattsson, H. Elmqvist | Dynasim, Sweden  
J. Eborn | Modelon, Sweden

10133                    **Automatic Fixed-point Code Generation for Modelica using Dymola**  
6a4                      U. Nordström | Dynasim AB and Lund Institute of Technology, Sweden  
J. Díaz López, H. Elmqvist | Dynasim AB, Sweden

## Session 6b

### Thermodynamic Systems and Applications

**Time & Location** Tuesday, 14.05 - 15.45, 3<sup>rd</sup> floor, room W301

**Session Chair** Prof. Gerhard Schmitz | Technical University Hamburg-Harburg, Germany

10154                    **The Modelica Fluid and Media Library for Modeling of**  
6b1                      **Incompressible and Compressible Thermo-Fluid Pipe Networks**  
F. Casella | Politecnico di Milano, Italy  
M. Otter | German Aerospace Center (DLR), Germany  
K. Proelss | Technical University Hamburg-Harburg, Germany  
C. Richter | Technical University Braunschweig, Germany  
H. Tummescheit | Modelon AB, Sweden

- 10131  
6b2      **Shock Wave Modeling for Modelica.Fluid Library using Oscillation-free Logarithmic Reconstruction**  
J. Díaz López | Dynasim AB, Sweden
- 10082  
6b3      **Modelling of an Experimental Batch Plant with Modelica**  
K. Poschlad, M.A.P. Remelhe | University of Dortmund, Germany  
M. Otter | German Aerospace Center (DLR), Germany
- 10130  
6b4      **Integral Analysis for Thermo-Fluid Applications with Modelica**  
J.J. Batteh | Ford Motor Company, Research & Advanced Engineering, USA

## **Session 6c** **Free and Commercial Libraries 2**

**Time & Location** Tuesday, 14.05 - 15.45, 4<sup>th</sup> floor, room W401

**Session Chair** Daniel Bouskela | Electricite de France, Chatou Cedex, France

- 10023  
6c1      **Integration of CATIA with Modelica**  
P. Bhattacharya, R. Makanaboyina, A. Chimalakonda | DaimlerChrysler Research and Technology, INDIA  
N. Suyam Welakwe | DaimlerChrysler Research and Technology, Germany
- 10044  
6c2      **A Modelica Library for Simulation of Household Refrigeration Appliances Features and Experiences**  
C. Heinrich, K. Berthold | Institute for Air Conditioning and Refrigeration, Germany
- 10106  
6c3      **A New Energy Building Simulation Library**  
J.I. Videla, B. Lie | Telemark University College, Norway
- 10123  
6c4      **UnitTesting: A Library for Modelica Unit Testing**  
M.M. Tiller, B. Kittirungsi | Emmeskay, Inc., USA



# 5<sup>th</sup> International Modelica Conference

## Session 6d **Multidomain Systems**

**Time & Location** Tuesday, 14.05 - 15.45, 4<sup>th</sup> floor, room W404

**Session Chair** Marco Bross | BMW, Munich, Germany

- 10077 **If We Only had Used XML...**  
6d1 U. Reisenbichler, H. Kapeller, A. Haumer, C. Kral, F. Pirker, G. Pascoli | arsenal research, Austria
- 10050 **Coupled Simulation of Building Structure and Building Services Installations with Modelica**  
6d2 P. Matthes, T. Haase, A. Hoh, T. Tschirner, D. Müller | TU Berlin, Germany
- 10093 **MWorks: a Modern IDE for Modeling and Simulation of Multi-domain Physical Systems Based on Modelica**  
6d3 F.-L. Zhou, L.-P. Chen, Y.-Z. Wu, J.-W. Ding, J.-J. Zhao, Y.-Q. Zhang | Huazhong University of Science and Technology, China
- 10103 **Domain Library Preprocessing in MWorks - A Platform for Modeling and Simulation of Multi-domain Physical Systems Based on Modelica**  
6d1 Y.-Z. Wu, F.-L. Zhou, L.-P. Chen, J.-W. Ding, J.-J. Zhao | Huazhong University of Science and Technology, China

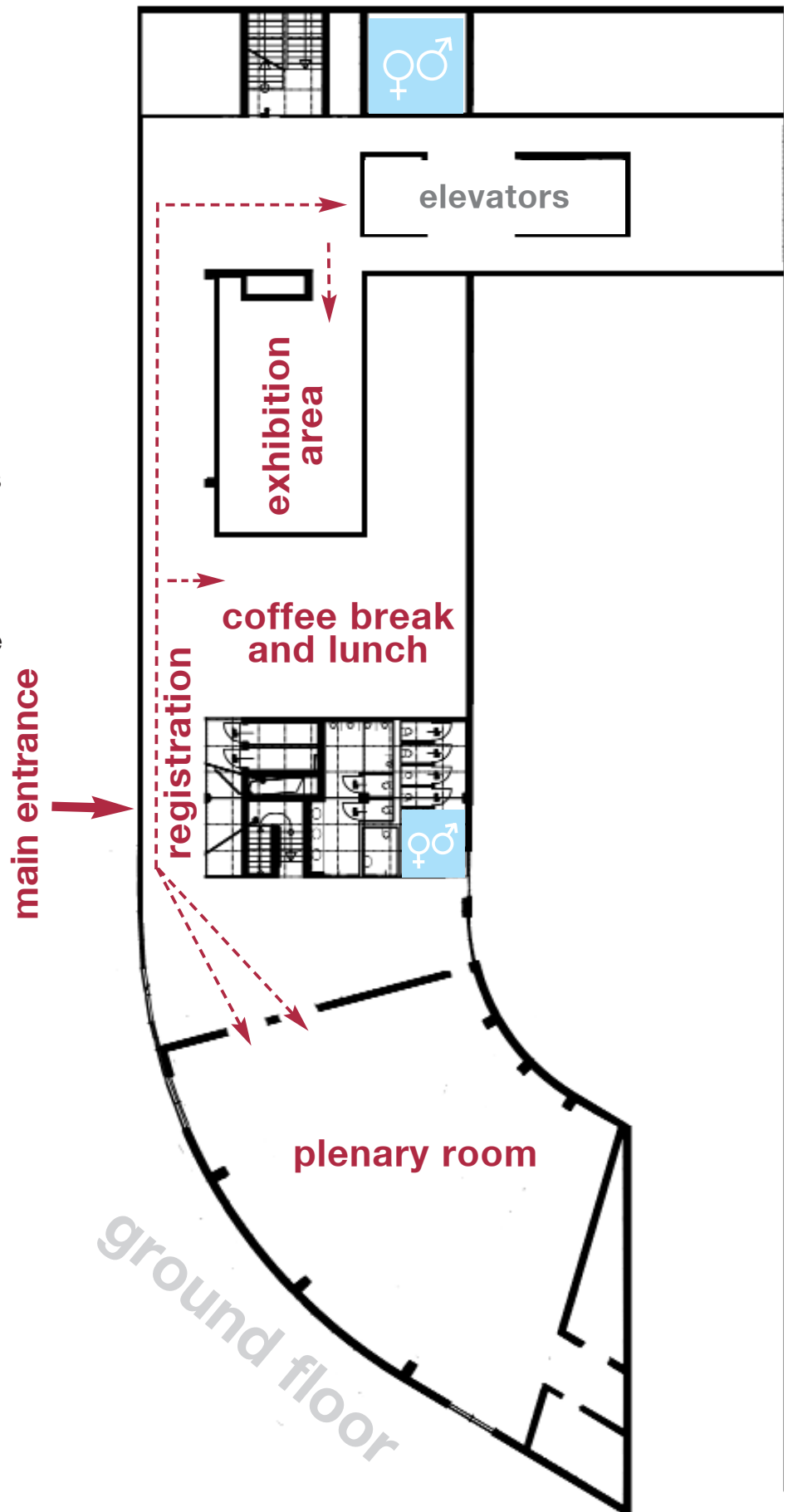
## Orientation

Besides the ground floor, the TECHbase building consists of four floors.

The Modelica Conference takes place on the ground floor (registration, plenary room, exhibition, lunch), on the third floor (W301 and internet room W302) as well as on the fourth floor (W401 - W404).

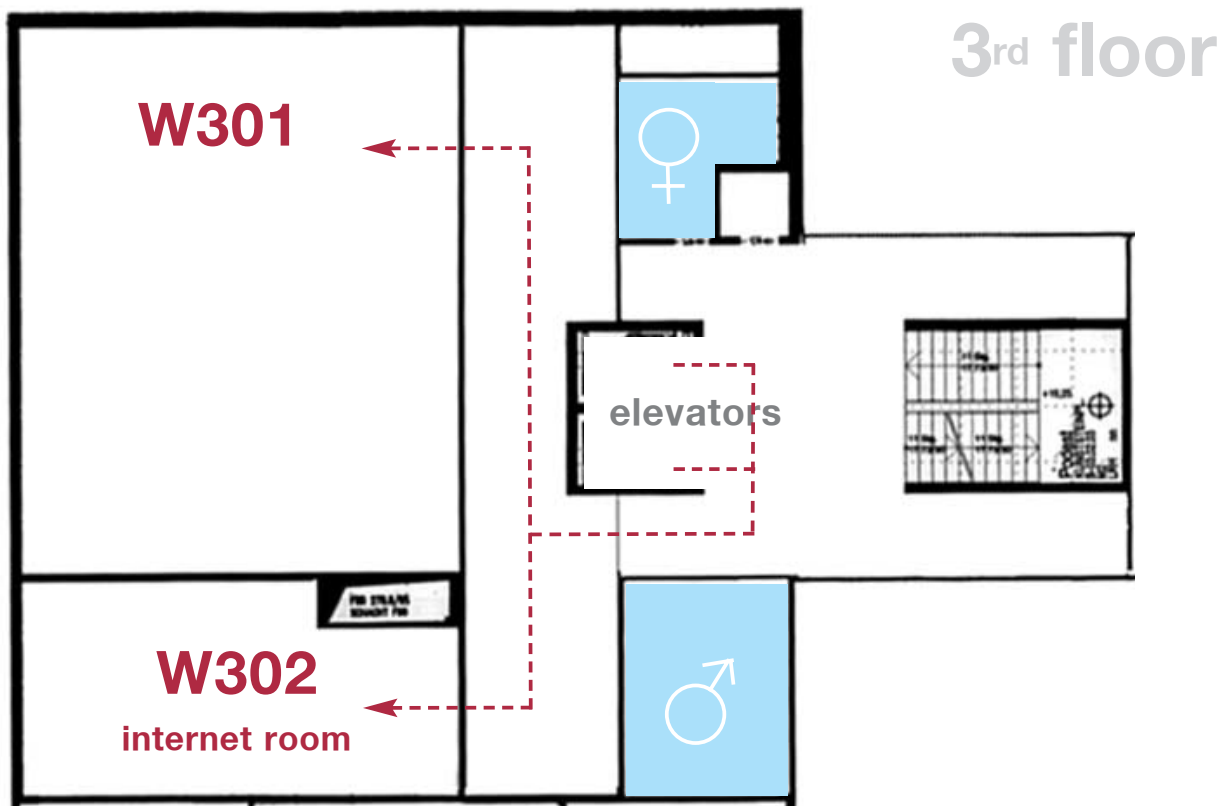
Lavatories are located near the plenary room as well as near the elevators.

Please pay attention to the local signposts.

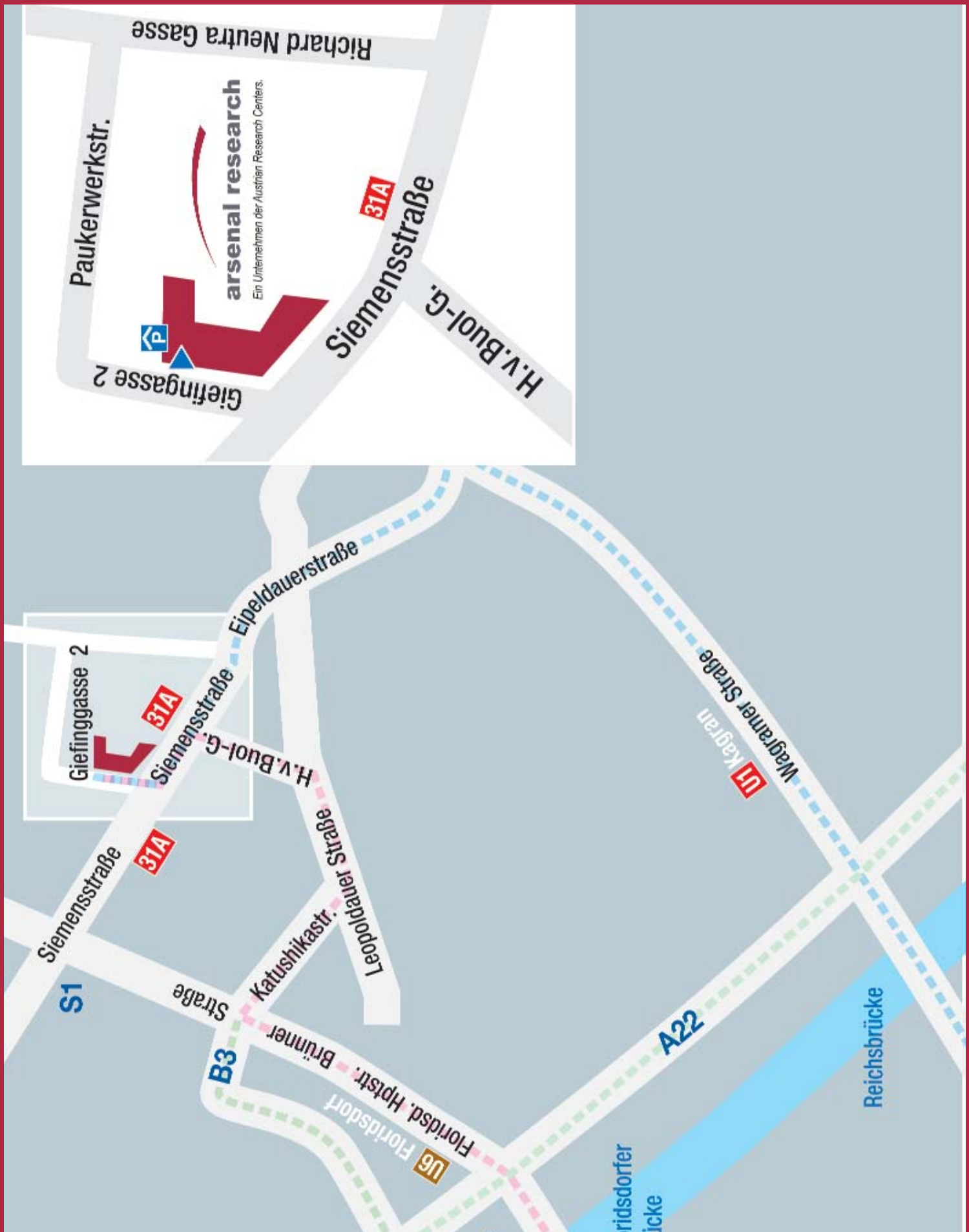




# 5<sup>th</sup> International Modelica Conference



# Orientation



[www.modelica.org](http://www.modelica.org) | [www.arsenal.ac.at](http://www.arsenal.ac.at)

## Organizers

The logo for Modelica Association, featuring a stylized lowercase 'm' in a light grey color above the word 'MODELICA' in a bold, black, sans-serif font. A small red dot is positioned above the letter 'i' in 'MODELICA'.

**MODELICA**

Modelica Association

The logo for Arsenal Research, featuring a red curved line above the text 'arsenal research' in a bold, black, sans-serif font. Below this, the text 'An Enterprise of the Austrian Research Centers.' is written in a smaller, italicized font.

**arsenal research**  
*An Enterprise of the Austrian Research Centers.*

Giefinggasse 2,  
1210 Vienna, Austria