HSLU Lucerne University of Applied Sciences and Arts

Engineering and Architecture

16th Modelica & FMI Conference

September 8 – 10, 2025

Lucerne University of Applied Sciences and Arts (HSLU)

Modelica Association

Content

Modelica & FMI News

Dear Participants of the 16th International Modelica & FMI Conference

Our biannual conference represents the main event where our community exchanges on the newest developments on the standards of the Modelica Association. Given all the highlights since the last conference, there is indeed a lot to exchange. Here are the most important milestones that have been reached:

- FMI has surpassed support from over 250 different simulation tools, further solidifying its position as world-leading standard for model-exchange and co-simulation.
- The first version of new layered standards has been released, most importantly FMI-LS-BUS for network communication. The concept of layered standards will enable a more decentralized development of standards.
- SSP 2.0 has been released, making the former standard more valuable in industrial practice. Join the corresponding industrial user presentations and the tutorials to learn more about it.

→ **Dirk Zimmer**
Chairman of the Modelica Association

→ **Ulf Christian Müller**
Chairman of the 16th Modelica & FMI Conference

– The Modelica Standard Library (MSL) v4.1 has been released. This important release contains vital backward compatible improvements w.r.t version 4.0 and from now on, the development of the MSL is planned to transform into a mode of continuous integration.

I want to thank all our members and especially the Modelica Association project leaders for their hard work and persistence that make this progress possible.

This uptick in activity is also reflected in the program of this conference. With significantly over 100 scientific papers submitted, we had to carefully select the papers for presentation. It is great to see so many domains covered and even new application fields such as pharmacology and marine applications added to the conference program. Since our standards increasingly permeate industry, we have decided create a dedicated track for industrial user presentations and welcome contributors of different background: from waste water treatment to aerospace applications.

Whereas the Modelica Association has started on one particular modeling language, the association meanwhile hosts a whole set of standards for modeling and simulation. This is best reflected by the record number of 15 tutorials that we offer at this conference, that cover these new standards and their relevant use cases.

Having reached our past milestones, it is important to set new development targets for the Modelica Association. There are 3 main topics where we have already started.

Further International Development
The biannual rhythm of our conference enables Modelica events in America and Asia that take place in between. We are glad to have a strong team with the North-American Modelica Users Group (NAMUG) in the United States that have established a healthy community. The next American Conference will be in Atlanta, Georgia in the autumn of 2026.

With conferences in Japan and Korea, a local team will now form for Asia as well and that especially includes China where Modelica has gained popularity and found many users. The Modelica Association however is underrepresented in China and it is worth a dedicated effort to strengthen their local community. As one of the actions, we are proud to announce the next Asian Modelica conference 2026 in Hangzhou, China. The Modelica board also aims to give our members in Asia and their activities sufficient representation.

Cross layered standards
Layered standards represent a concept that has been developed around FMI but that proves to be of generic value. Primarily, layered standards enable the organic and decentralized development of sub-standards for particular applications or domains without having to interfere with the main standard. Many of these layered standards thus care about enhanced meta-information. Often this meta-information is also relevant for other standards such as SSP and especially the Modelica language itself. The MA will therefore take action to harmonize the development of layered standards so that they can be created as cross-layered standards, for instance applicable to both FMI and Modelica.

Education initiative
Equation-based modeling is a craft and requires training and education. We are fortunate that many professors at universities and professional consultants undertake this effort. Yet, the teaching material that is directly available through the association requires a significant update. We therefore invite teachers to join the Modelica association and collectively organize their teaching material.

Furthermore, another option is to develop some simpler libraries that are easier to understand and more robust to apply. This shall help to lower the barrier of entrance. The barrier of entrance is also currently lowered by many tool developers who provide web-based services with easily accessible interfaces.

The Modelica Association welcomes these recent developments and we thereby want to contribute to the education in modeling and simulation world-wide.

Concluding Remarks
The recent developments within the field of artificial intelligence (AI) have strong disruptive potential for all processes of information technology with modeling and simulation being a part of it. The use of agentic AI in co-pilots or similar tools already impacts the way we program, work and interact with our software tools, and sub-components built using NN are integrated seamlessly.

It is currently impossible to predict exactly how Modelica and its associated standards will interplay with these developments. However, what is fundamentally useful for humans, will also be useful for AI:

– Having open-source libraries based on open-standards is a very useful source of information for both humans and AI.

– Having widely applicable standards for model-exchange and co-simulation is highly useful for both humans and AI.

– Having standardized formats for parameterizations of models and results is highly useful for both humans and AI.

Even in these exciting (and probably transitioning) times, it is therefore good advice to remind ourselves about the fundamental basis of our work: creating useful mathematical descriptions of our world and make them available, executable and shareable via open-standards.

Regarding this, I am sure the 16th International Modelica & FMI Conference will be full of excellent examples and I wish you all much inspiration and fruitful exchange!

Dirk Zimmer
Chairman of the Modelica Association

Ulf Christian Müller
Chairman of the 16th Modelica & FMI Conference

Keynotes

Tuesday, September 9th,
09:00 – 09:45, Audi Max

Physics-Informed AI

→ **Mishra Siddhartha**, Professor and Deputy Head of the Seminar for Applied Mathematics at ETH Zürich

AI is increasingly being used in the fast and accurate simulation of physical systems. In this keynote, we will discuss how knowledge of the underlying physics can be explicitly incorporated into AI systems for physical simulations. Key examples will highlight the potential gains as well as the involved challenges.

Wednesday, September 10th,
08:30 – 09:15, Audi Max

Opportunities and Challenges in Design and Operation of Integrated Energy Systems

→ **Johan R Åkesson**, Associate Director for Computational Engineering at Carrier, Former CTO Modelon AB

The complexity of modern integrated energy systems demands the systematic use of systems engineering methods and tools to address key challenges across product lifecycle. This keynote will explore three related and critical areas: 1) the demand for diverse model fidelities and analysis, 2) maintaining consistency across design layers, and 3) the importance of seamless tooling and integration. Real-world, HVAC-specific examples will highlight how these challenges are being tackled in practice and the opportunities they present. For over two decades, Carrier has relied on Modelica as a cornerstone technology for model-based product design. The journey began with the development of control systems for transportation refrigeration, where transient simulations allowed for rapid control function development and verification. Today, while controls development remains a vital application, Carrier has expanded Modelica's use across the entire product lifecycle – from conceptual design, through testing and verification, to business sales tools, and into operation with monitoring and diagnostics. Design and operation of highly integrated energy systems such as data centers and district heating systems also calls for new methods and tools. Differentiated applications has driven diversified analysis with Modelica models. Modelica-based steady-state simulation has emerged as a back-bone in product design, sales tools, as well as in field diagnostics. Steady-state and transient optimization is also a necessary element across the product life cycle. The need for diversified analysis and computation is further amplified by application of systems engineering methods where requirements, design space exploration, and validation and verification are key elements.

Panel Discussion

Tuesday, September 9th,
16:00 – 17:00, Audi Max

For the first time at the International Modelica & FMI Conference, we will have a Panel Discussion. The topic is: **Open Standards vs. Open source, Collaboration or Conflict?**.

We choose panelists from a braod range of companies and organizations using Modelica for their product design and research. Our distinguished panelists are:

→ **Adam Moravanszky**, Senior Director Simulation Technology, NVIDIA.

At NVIDIA, Adam leads teams advancing open source simulation projects such as PhysX and Newton, and chairs the Physics Working Group of the Alliance for OpenUSD (AOUSD) open standard.

→ **Clément Coïc**, Technology Cluster Lead – Digital Mechatronics, Siemens Healthineers.

Clément leads innovation projects that investigate the value and interconnection of new digital technologies for Siemens Healthineers purposes. A specific focus is carried into leveraging system simulation for better control or path planning of robotic systems, enhancing Machine Learning models with Physics, and modeling the physical behavior of PhysicalAI developments. His works heavily relies on open standards, like Modelica and FMI, and open source modules – like Julia's SciML ecosystem, ROS or OpenCV and Yolo, to name a few.

→ **Dirk Zimmer**, Chairman of the Modelica Association. Expert for equation-based modeling and simulation at the Institute of Robotics and Mechatronics, German Aerospace Center (DLR).

The open Modelica standards provide a real technical, economical as well as societal benefit. Promoting them in Dirk's role as Chairman is hence an honor. Also DLR profits from them: in the field of robotics the multi-domain simulation and control aspects play a crucial role for further advancement.

→ **Marius Dupuis**, CEO, ASAM e.V.

The CEO's role at ASAM is to manage a team that keeps things running, kicks off new endeavors, and makes sure we are seen and heard. Marius' role is right in the midst of system simulation and (open) standards. It comprises getting members on board, motivating them to initiate and conduct standardization projects, providing a roadmap and legal framework that fit the market, and keeping the association in a good shape.

→ **Michael Wetter**, Computational Senior Scientist, Lawrence Berkeley National Laboratory (LBNL).

Leading the development of modular modeling, design and controls based on Modelica and FMI for building and district energy and control systems. Michael Wetter has been leading the Modelica Buildings Library which is used in industry and academia for the design of HVAC equipment, building and district energy systems, and data center cooling systems. He also spearheaded the development of digitalization of building control design-installation-commissioning, leading to the proposed ASHRAE Standard 231P, expected to be approved within the next few months, which uses a subset of Modelica to standardize control logic formulation in a vendor-independent format.

→ **Hans-Martin Heinkel**, Project Leader prostep SmartSE, and Bosch expert in MBSE and simulation-based engineering.

Hans-Martin has more than 35 years of experience in systems engineering, system simulation, Hardware-in-the-Loop, and the integration of simulation into development processes. His main focus, both within Bosch and in the prostep project, is on collaboration based on simulation-supported engineering.

→ **Hubertus Tummescheit**, Board member Modelica Association, President Model Based Innovation LLC.

We are looking forward to a lively and informative discussion with our panelists. The panel discussion will evolve around a few prepared questions, and questions from the audience. It will be moderated by our board member Hubertus.

General schedule

Monday, 8th September

Start

11:30 Arrival / Reception in Rotkreuz with Welcome Coffee

Main-Entrance

13:00 Welcome Speech

Audi Max

13:30 Tutorials: all in parallel

Introduction to Modeling and Simulation, Debugging with Modelica and OpenModelica	FMI Beginners Tutorial	Introduction to System Structure and Parameterization (SSP)	eFMI: A beginner's overview and hands-on	Beyond Simulation: Building Workflows and Web Interfaces with Modelica and Python
531	**202**	**322**	**221**	**321**
Modeling complex thermal architectures using the DLR ThermoFluid Stream Library	3DS: Exporting and importing an FMU using C code	Using SMArtInt+: Machine-learning and easy integration of AI in Modelica	M&S of Robotic Arm Dynamics and Control in Modelica with MWORKS.	From Uncertainty-Aware Simulation to Learning-Based Control using FMI and Python
320	**203**	**330/331**	**201**	**Audi Midi**
Regression Testing with Dymola and the Testing Library	CasADi tutorial on dynamic optimization with FMI 3.0 Model Exchange	Modeling and Simulation of profitableness in Modelica industrial energy systems…	FMI3 co-simulation with UniFMU	Modiator: Develop a specialized Modelica Web-App
520	**220**	**309**	**501**	**310**

14:45 Coffee Break with Poster Presentations

Main-Entrance, Poster-Exhibition, Sponsor-Exhibition

15:15 Tutorials continued

16:30 Short Break

16:45 1 Platinum and 3 Gold and 1 Silver Vendor Presentations: LTX, Dassault Systèmes, Modelon, Tongyuan, OpenModelica

Audi-Max

7 Silver Sponsor Presentations: JuliaHub, Wolfram, XRG, orthogonal, eXXcellent, Claytex, MathWorks

Forum

19:05 Welcome Reception

Main-Entrance

Tuesday, 9th September

Start

08:30 Welcome Coffee
Main-Entrance

08:50 Conference Opening by Ulf Christian Müller
Audi Max

09:00 Keynote of Mishra Siddhartha on Physics-Informed AI
Audi Max

09:45 Modelica and FMI News by Dirk Zimmer
Audi Max

10:00 Short Coffee Break with Poster Presentations
Main-Entrance, Poster-Exhibition, Sponsor-Exhibition

	Scientific Track				Industrial Track
	General Modelica	**Energy**	**Control & AI**	**FMI and related**	**Industrial Users**
10:20	Modelica Tool Development **Session Red: 202**	Power System Simulation **Session Green: Audi-Max**	Modelica & AI **Session Blue: Audi-Midi**	FMI Tool Developement **Session Yellow: Forum**	Modelica Applications **Session Black: 203**
12:00	Lunch **Main-Entrance**				
13:00	Chemics, Pharmacology and Medicin **Session Red: 202**	Thermal Management for Green Energy Systems **Session Green: Audi-Max**	Robotics **Session Blue: Audi-Midi**	Layered Standards **Session Yellow: Forum**	Aerospace **Session Black: 203**
14:15	Coffee Break with Poster Presentations **Main-Entrance, Poster-Exhibition, Sponsor-Exhibition**				
14:45	Digital Twin **Session Red: 202**	Media Property modeling **Session Green: Audi-Max**	Control for HVAC and Buildings **Session Blue: Audi-Midi**	FMI for energy systems **Session Yellow: Forum**	Credible Simulation, Traceability, SSP **Session Black: 203**
16:00	Panel discussion on the value of open standards **Audi Max**				
17:00	Transfer to Lucerne is individual by Train (Boarding at KKL)				
18:00	Boat-Cruise-Dinner (Departure 18:30 / Arrival 22:30 / 30 min Boarding and Exit)				

Wednesday, 10th September

Start

08:00 Welcome Coffe

Main-Entrance

08:30 Keynote of Johan R Åkesson on Opportunities and Challenges in Design and Operation of Integrated Energy Systems

Audi Max

09:15	Simulation and Optimization	Pumps and Vapor Compression	FMI for Embedded Systems and Virtual Prototyping	Workflows in Systems Engineering	FMI Applications
	Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**	**Session Yellow: Forum**	**Session Black: 203**

10:30 Coffee Break with Poster Presentations

Main-Entrance, Poster-Exhibition, Sponsor-Exhibition

11:00	Modeling Methods and Tools	Energy Generation Systems	Control- and AI-based Methods with FMI for Automotive	Maritime Applications	Modelica Applications
	Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**	**Session Yellow: Forum**	**Session Black: 203**

12:40 Lunch

Main-Entrance

13:40 Awards and Announcements

Audi Max

14:10	New Translation Methods and Language Experiments	Fuel Cell Modeling and Control	Control Applications in Modelica	Automotive	FMI and SSP for Model-Based System Engineering
	Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**	**Session Yellow: Forum**	**Session Black: 203**

15:50 Coffee To Go

Main-Entrance

Scientific Track

Tuesday, September 9th, 10:20 – 12:00

General Modelica	Energy	Control & AI
Modelica Tool Development	**Power System Simulation**	**Modelica & AI**
Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**
10:20 *Hans Olsson* Improved Unit Inference and Checking in Modelica	**10:20** *Marcelo de Castro and Luigi Vanfretti* OpenIWPI: Open-Instance Wave-Phasor Interface Library for Power System Simulation Studies in Modelica	**10:20** *Andreas Hofmann and Lars Mikelsons* Towards Integration of PeN-ODEs in a Modelica-based workflow
10:45 *Henrik Tidefelt and Quentin Lambert* Implicit Unit Conversion in Modelica	**10:45** *Srijita Bhattacharjee, Fernando Fachini and Luigi Vanfretti* Expanding an Open-Source Modelica-Compliant Package of Generic Renewable Energy Source Models: Implementation of the REEC_D and REGC_B Models in Modelica and OpenIPSL	**10:45** *Linus Langenkamp, Philip Hannebohm and Bernhard Bachmann* Efficient Training of Physics-enhanced Neural ODEs via Direct Collocation and Nonlinear Programming
11:10 *Zhipeng Chen, Zhichao Huang, Chong Zhou, Yinqi Chen, Qi Liu, Fanli Zhou and Liping Chen* Model Disambiguation Technology in MWORKS.Sysplorer	**11:10** *Herbert Schmidt* Analytical Treatment of Hollow Toroid Flux Tubes	**11:10** *Tim Jonas Hanke, Johannes Brunnemann, Robert Flesch and Jörg Eiden* Status of the SMArtInt Library: Simple Modelica Artificial Intelligence Interface
11:35 *Baptiste Mazurié, Audrey Jardin, Pascal Borel, Didier Boldo, Frans Davelaar and Luis Corona Mesa-Moles* Data Reconciliation for Industrial Experiments	**11:35** *Thomas Egsgaard Kallesen, Søren Waagø Christiansen and Rene Just Nielsen* Master controller concept for power flexible energy systems	**11:35** *Ankush Chakrabarty, Marco Forgione, Dario Piga, Alberto Bemporad and Christopher Laughman* Zero-Shot Parameter Estimation of Modelica Models using Patch Transformer Networks

Industrial Track

Tuesday, September 9th, 10:20 – 12:00

FMI and related

FMI Tool Developement

Session Yellow: Forum

10:20

Luis Sanchez-Heres, Fredrik Olsson and Jan Östh

Liaison: an open-source tool for distributed co-simulations

10:45

Michele Urbani, Michele Bolognese, Luca Pratticò and Matteo Testi

A Tool for the Implementation of Open Neural Network Exchange Models in Functional Mockup Units

11:10

Erik Henningsson, Christian Schulze, Julius Aka, Manuel Gräber, Dag Brück, Elmir Nahodovic and Oliver Lenord

Input Smoothing for Faster Co-Simulation using FMI

11:35

Felix Tischer, Simon Genser, Daniel Watzenig and Martin Benedikt

Comparing the Predictive Event Handling Algorithm LookAhead to Rollback and Early Return

Industrial Users

Modelica Applications

Session Black: 203

10:20

Kanadevia Inova AG

Process-based Life-Cycle Sustainability Analysis of Integrated Solid Waste Management Systems: A Decision-Support Platform using OpenModelica

10:45

Optimation AB

On the challenges of large-scale simulation platforms and our solution to overcome them

11:10

Electric Power Research Institute, US

System Cost of Hydrogen Optimization & Sub-Hourly Comparative Analysis of PEM and Alkaline Electrolyzer Operation

11:35

Smith Group, United States

First Modelica Model: Lessons Learned from Modeling a Chilled Water Plant in Modelica

Scientific Track

Tuesday, September 9th, 13:00 – 14:15

General Modelica

Chemics, Pharmacology and Medicin

Session Red: 202

13:00

Marek Matejak

Chemical 2.0 (Free open-source Modelica library)

13:25

Tomas Kulhanek, Filip Jezek, Jiri Kofranek, Marek Matejak and Stef Rommes

Pharmacolibrary – Free Library to Model Pharmacology

13:50

Clément Coïc and Marco Masannek

Combining static and dynamic optimization approaches for path planning, with collision avoidance

Energy

Thermal Management for Green Energy Systems

Session Green: Audi-Max

13:00

Finn van Ginneken and Alexander Busch

Modelling, Simulation and Validation of thermal propagation for 3D discretized battery cells in Modelica

13:25

Lone Meertens, Jelger Jansen and Lieve Helsen

Development and Experimental Validation of an Unglazed Photovoltaic-Thermal Collector Modelica Model that only needs Datasheet Parameters

13:50

Markus Gillner and Arne Speerforck

Modelling Aquifer Thermal Energy Storage (ATES) System with Buoyancy Flow

Control & AI

Robotics

Session Blue: Audi-Midi

13:00

Sebastian Rojas-Ordoñez, Mikel Segura and Ekaitz Zulueta

Integration of Physical and AI Models Using Open and Interoperable Standards: A Model-Based Methodology for Autonomous Robot Development

13:25

Matthias Reiner

Modelica FMI based hybrid reinforcement learning enhanced trajectory planning for an ADR scenario for combined control of a satellite with a 7-axis robotic arm using Modelica/FMI

13:50

Antoine Pignède and Carsten Oldemeyer

Automatic Modelica Package and Model Generation from Templates and Data Files with Python, Exemplified with URDF

Industrial Track

Tuesday, September 9th, 13:00 – 14:15

FMI and related

Layered Standards

Session Yellow: Forum

13:00

Buffoni, Elmir Nahodovic, Robert Hällqvist, Oliver Lenord, Hans Olsson, Martin Otter, Antoine Vandamme and Adrian Pop

Towards a Common Standard for Uncertainty Quantification

13:25

Tobias Thummerer, Hans Olsson, Chen Song, Julia Gundermann, Torsten Blochwitz and Lars Mikelsons

LS-SA: Developing an FMI layered standard for holistic & efficient sensitivity analysis of FMUs

13:50

Christian Bertsch, Kahramon Jumayev, Andreas Junghanns, Pierre R. Mai, Benedikt Menne, Masoud Najafi, Tim Pfitzer, Jan Ribbe, Klaus Schuch, Markus Süvern and Patrick Täuber

FMI Layered Standard for Network Communication: Applications in Networked ECU Development

Industrial Users

Aerospace

Session Black: 203

13:00

Dassault Aviation

Bridging the gap between System Engineering and Simulation, applied to collaborative design of Aircraft Systems

13:25

Saab Aeronautics

OpenSCALING: A Saab Aeronautics Perspective

13:50

AIRBUS SAS, ALTEN

FMI Standard and Airbus Needs, Usages and Expectations Full Version

Scientific Track

Tuesday, September 9th, 14:45 – 16:00

General Modelica

Digital Twin

Session Red: 202

14:45

Corentin Lepais and Dirk Zimmer

Prototypical Control for the Digital Twin of Aircraft Environmental Control System

15:10

Andreas Heckmann, Alexander Posseckert and Vijaya-Bhaskar Adusumalli

Aspects and Ideas for the FMI-based Modeling of Railway Digital Twins

15:35

Gerhard Hippmann and Blas Blanco Mula

Collaborative Digital Twin Development for Railway Braking and Traction Applications

Energy

Media Property modellling

Session Green: Audi-Max

14:45

Pascal Borel, Rafik Moulouel, Antoine Chupin and Felix Marsollier

TAeZoSysPro: A Modelica Library for Thermal Aeraulic and Buildings Thermodynamics Calculations

15:10

Rohit Dhumane, Dan Gorman, Rajkumar K S and Dongping Huang

Development of a Refrigerant Mixture Package for Dynamic Simulation of Auto-Cascade Refrigeration: A Case Study with R23/R134a

15:35

Hubert Blervaque and Félix Marsollier

A Generic Non-Miscible Liquid-Gas Medium Model in Modelica with Analysis of Incompressibility Assumptions

Control & AI

Control for HVAC and Buildings

Session Blue: Audi-Midi

14:45

Michael Wetter, Yan Chen, Karthik Devaprasad, Paul Ehrlich, Antoine Gautier, Jianjun Hu, Anand Prakash and Marco Pritoni

Modelica Meets ASHRAE: Towards A Digital Standard for Building Control

15:10

Karl Walther, Michael Wetter, Anand Prakash and Jianjun Hu

CDL-PLC translator: From Modelica HVAC control design to IEC 61131 PLC implementation

15:35

Lucas Bex, Muhammad Hafeez Saeed, Lucas Verleyen, Lieve Helsen and Geert Deconinck

Yet Another Residential District Simulator: yards for Controller Development in the Residential Built Environment

Industrial Track

Tuesday, September 9th, 14:45 – 16:00

FMI and related

FMI for energy systems

Session Yellow: Forum

14:45

Karim Besbes

An innovative heterogeneous modeling approach to build a cooling system for battery thermal management with common fluid properties involving FMI terminals

15:10

Sagnik Basumallik, Luigi Vanfretti, Mohammad Ali Dashtaki, Ziang Zhang, Reza Pourramezan and Hossein Hooshyar

Enhancing Large-Scale Power Systems Simulations through Functional Mockup Unit-based Grid-Forming Inverter Models

15:35

Ruirui Zeng, Hui Gao, Wei Liu, Lei Huang, Qi Liu, Jian Liu and Xingjian Han

Design and Simulation Validation of Steam Power Systems Based on MBSE

Industrial Users

Credible Simulation, Traceability, SSP

Session Black: 203

14:45

AVL List GmbH, Robert Bosch GmbH

Integration of systems engineering and simulation based on standards: The needs, challenges and solutions from an industrial perspective

15:10

Robert Bosch GmbH, Dassault Systèmes AB, eXXcellent solutions GmbH

Towards a Credible System Simulation Architecture applicable to Heat Pump Systems using Modelica, FMI and SSP

15:35

Robert Bosch GmbH, PMSF IT Consulting, eXXcellent solutions GmbH

Traceability and Support of Modeling & Simulation using SSP-Traceability Layered Standard

Scientific Track

Wednesday, September 10th, 09:15 – 10:30

General Modelica	Energy	Control & AI
Simulation and Optimization	**Pumps and Vapor Compression**	**FMI for Embedded Systems and Virtual Prototyping**
Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**
09:15 *Francesco Casella, Bernhard Bachmann, Karim Abdelhak, Philip Hannebohm and Teus van der Stelt* Diagnosing Newton's Solver Convergence Failures in the Initialization of Modelica Models	**09:15** *Raphael Gebhart, Martin Düsing, Niels Weber and Franciscus L. J. van der Linden* Centrifugal Pump Model of the DLR Thermofluid Stream Library	**09:15** *Tom Reynaud, Erfan Enferad and Maxime Lefrancois* Facilitating the use of Physics-Based Simulations on Embedded Devices by running FMUs from MicroPython
09:40 *Matteo Luigi De Pascali, Lorenz T. Biegler, Emanuele Martelli and Francesco Casella* Modelica2Pyomo: a tool to translate Modelica models into Pyomo optimization models	**09:40** *Jiacheng Ma and Matthis Thorade* Frost/Defrost Models for Air-Source Heat Pumps with Retained Water Refreezing Considered	**09:40** *Nils Bosbach, Meik Schmidt, Lukas Jünger, Matthias Berthold and Rainer Leupers* FMI Meets SystemC: A Framework for Cross-Tool Virtual Prototyping
10:05 *Linus Langenkamp and Bernhard Bachmann* Enhancing Collocation-Based Dynamic Optimization through Adaptive Mesh Refinement	**10:05** *Scott Bortoff, Vedang Deshpande, Christopher Laughman and Hongtao Qiao* A Dynamic Analysis of Refrigerant Mass in Vapor Compression Cycles	**10:05** *Tobias Kamp, Christoff Bürger, Johannes Rein and Jonathan Brembeck* Hybrid Simulation Models for Embedded Applications: A Modelica and eFMI approach

Industrial Track

Wednesday, September 10th, 09:15 – 10:30

FMI and related

Workflows in Systems Engineering

Session Yellow: Forum

09:15

Mark Williams, Hubertus Tummescheit, Ajaykumar Mst and Jose María Alvarez-Rodríguez

The Fundamental Modeling Practices and Specifications to support the Preservation and Reuse of Analytical Simulations

09:40

Erik Rosenlund, Robert Hällqvist, Robert Braun and Petter Krus

Automation Nation: Taming Complex V&V Workflows

10:05

Christoph Steinmann, Konstantin Wrede, Jens Schirmer and Jens Lienig

Integration of Geometric Tolerance Analysis in System Simulations via Functional Mock-up Units

Industrial Users

FMI Applications

Session Black: 203

09:15

Robert Bosch GmbH, DLR e.V.

Optimization with FMI and CasADi: Analysis in Industrial Applications

09:40

DNV AS

Accuracy and assurance of co-simulations in marine lifting operations

10:05

Renault

Optimizing Assemblies of FMUs

Scientific Track

Wednesday, September 10th, 11:00 – 12:40

General Modelica

Modeling Paradigms and Language Experiemnts

Session Red: 202

11:00

Gaadha Sudheerbabu, Dragos Truscan, Mikael Manngård and Kristian Klemets

Validation of Dynamic Simulation Models using Metamorphic Testing and Given-When-Then Patterns

11:25

Dirk Zimmer

The Value of Enforcing a Strict Modeling Methodology within Modelica

11:50

Christian Gutsche, Christoph Seidl, Volodymyr Prokopets, Sebastian Götz, Zizhe Wang and Uwe Assmann

Context-Oriented Equation-based Modeling in ModelingToolkit.jl

12:15

Zizhe Wang, Christian Gutsche and Uwe Assmann

Context-Oriented Modelica for Advanced Variability Management

Energy

Energy Generation Systems

Session Green: Audi-Max

11:00

Inga Beyers, Lukas Krebeck, Astrid Bensmann and Richard Hanke-Rauschenbach

Modelling and Impact of Hydraulic Short Circuit Operation in Pumped Hydro Energy Storage

11:25

Igor Belot, Francois Nepveu, Pierre Garcia, Nathan Fournier, Teddy Chedid, Etienne Letournel, Pierre Delmas, Alexis Gonnelle and Guillaume Raigné

Introducing the NewLib Library and its application to multi-level, large-scale solar field models

11:50

Ao Zhang and Xiang Wang

Further Application of Modelica-Based Nuclear Power System Simulation: Tasks in Different Scenarios Driven by Model and Data

12:15

Joy El Feghali, Louis Garbay, Adrien Guironnet, Philibert Parquier, Marco Chiaramello, Martin Franke and Luka Plavec

An Open-Source Industrial-Grade Collection of Renewable Energy Source Generic Models in Modelica Language

Control & AI

Control- and AI-based Methods with FMI for Automotive

Session Blue: Audi-Midi

11:00

Minsu Hyun

A Study on Vehicle Suspension Loads Prediction Method Based on Hybrid Road Simulation using Modelica Library and FMI

11:25

Tobias Thummerer, Fabian Jarmolowitz, Daniel Sommer and Lars Mikelsons

Br(e)aking the Boundaries of Physical Simulation Models: Neural Functional Mock-up Units for Modeling the Automotive Braking System

11:50

Jonathan Brembeck, Ricardo Pinto de Castro, Johannes Ultsch, Jakub Tobolar, Christoph Winter and Kenan Ahmic

VDCWorkbench: A Vehicle Dynamics Control Test & Evaluation Library for Model and AI-based Control Approaches

12:15

Zhiguo Zhou, Xuehua Zhou, Lin Du, Peiquan Ma, Xiang Wang, Ying Chen, Mingjia Liu, Tengyue Wang, Lixin Hui and Cun Zeng

Simulation of Embodied Cyber Physical System Based on Modelica/MWORKS: A Case Study of Intelligent Unmanned Surface Vessel

Industrial Track

Wednesday, September 10th, 11:00 – 12:40

FMI and related

Maritime Applications

Session Yellow: Forum

11:00

Karl Gunnar Aarsæther and Stian Skjong

Shared sea-environment definition and realization for maritime and offshore co-simulations

11:25

Severin Sadjina, Lars Kyllingstad and Stian Skjong

Decreasing Risk in the Design of Large Coupled Systems via Co-Simulation-Based Optimization and Adaptive Stress Testing

11:50

Basilio Puente Varela, Maria Dolores Fernández Ballesteros, Maria Isabel Lamas Galdo and Luis Carral

ShipSIM: A Modelica Library for Ship Maneuverability Modeling and Simulation

12:15

Boudewijn Van Groos, Alje Van Dam, Carsten von Ohlen, Finn Theel, Johannes Brunnemann and Jörg Eiden

Modelica driven development of the thermal management control system for a zero emission yacht

Industrial Users

Modelica Applications

Session Black: 203

11:00

Danfoss AS, TLK Energy GmbH

Optimized usage of heat recovery potentials in modern liquid cooled data centers to minimize their environmental impact

11:25

Lince S.r.L.

Optimal Energy Management of a Biogas Plant Using Model Predictive Control and Forecast-Driven Optimization

11:50

Samsung Electronics

Development of scalable rule-based temperature feedback controls for energyefficient condenser water loops in semiconductor factories

Scientific Track

Wednesday, September 10th, 14:10 – 15:50

General Modelica	Energy	Control & AI
New Translation Methods and Tools	**Fuel Cell Modeling and Control**	**Control Applications in Modelica**
Session Red: 202	**Session Green: Audi-Max**	**Session Blue: Audi-Midi**
14:10 *Benoît Caillaud, Albert Benveniste and Mathias Malandain* Benchmarking the Modular Structural Analysis Algorithm	**14:10** *Michele Bolognese, Emanuele Martinelli, Luca Pratticò and Matteo Testi* Dynamic modelling of an Ammonia to Power application at high efficiency using a solid oxide fuel cell system	**14:10** *Alberto Leva* On the precise and efficient representation of industrial controllers in Modelica
14:35 *Martin Otter and Hilding Elmqvist* Resizable Arrays in Object-Oriented Modeling	**14:35** *Emanuele Martinelli, Michele Bolognese, Nirmala Nirmala, Narges Ataollahi and Matteo Testi* Direct Ammonia Solid Oxide Fuel Cell Stack: Modelling and Experimental Validation	**14:35** *Rüdiger Franke, Marcin Bartosz and Rasmus Nyström* Master controller for offshore wind power and hybrid grids
15:00 *Karim Abdelhak and Bernhard Bachmann* Constant Time Causalization using Resizable Arrays	**15:00** *Markus Pollak, André Thüring and Wilhelm Tegethoff* Dynamic Simulation of a PEM Electrolysis System	**15:00** *Reiko Müller* The FlightControl library for aircraft control design applications
15:25 *Hilding Elmqvist and Martin Otter* Modiator – A Web App for Modelica Simulation	**15:25** *Axelle Hégo, Félix Bosio and Sylvain Mathonnière* Model-Based Control Design for a Multi-Stacks SOC System	**15:25** *Tilman Bünte and Jakub Tobolář* Quasi-Periodic Feedforward Control Based on Inverse Model Tabled FFT

Industrial Track

Wednesday, September 10th, 14:10 – 15:50

FMI and related

Automotive

Session Yellow: Forum

14:10

Massimo Stellato, Alberto Momesso, Theodor Ensbury and Alessandro Picarelli

Race Car Braking System Thermal Model for Real Time Use in a Driving Simulator

14:35

Jaewung Jung, Alessandro Picarelli, David Briant, Kadir Sahin, Garron Fish, Victor-Marie Lebrun, Christopher Stromberger, Arnaud Colleoni and Quentin Prieto

Development of a Multi-Physical Simulation Platform for Durability Prediction for Hyundai & Kia Electric Vehicles

15:00

Jan Friedrich Hellmuth, Markus Pollak, Andreas Schulte, Wilhelm Tegethoff and Jürgen Köhler

Solid-State Battery-Systems and Thermal Management for Electric Long-Distance Buses

Industrial Users

Model-Based Workflows and SSP

Session Black: 203

14:10

DENSO Automotive, BMW Group

MBSE using SSP and SysML for Collaborative Development: An Opensource ADAS Use Case

14:35

DENSO Automotive, PMSF IT Consulting

Transmission Control Unit Use Case for Virtual ECUs and SSP-based Collaborative Development

15:00

Toshiba Digital Solutions Corporation

Cross-Company Collaborative Model-Based Development using FMI3.0 and SSP2.0

15:25

MAN Energy Solutions

Neural Network-Based Reduced-Order Model of a Large-Scale CO_2 Heat Pump for Real-Time Simulation and Digital Twin Applications

Scientific Poster Presentations

Monday, Tuesday and Wednesday

Poster-Exhibition

Philip Hannebohm and Bernhard Bachmann

Selective Evaluation of RHS during Multi-Rate Simulation

Gustavo Canon, Volodymyr Prokopets, Fabian Elizondo Arrieta, Eliécer Arias and Alexander Zeissler

A Thermal Digital Twin of Asphalt Pavements: Implementation and Application to an Instrumented Pavement in Costa Rica

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Micah Condie, Abigaile Woodbury, James Goppert and Joel Andersson

Rumoca: Towards a Translator from Modelica to Algebraic Modeling Languages

---

Requirement Verification with CRML and OpenModelica

Requirement Verification with CRML and OpenModelica

Songchen Tan, Keming Miao, Alan Edelman and Christopher Rackauckas

Scalable Higher-order Nonlinear Solvers via Higher-order Automatic Differentiation

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Markus Gillner, Jan Westphal, Béla Wiegel, Tom Steffen, Julian Urbansky, Anne Hagemeier, Stefanie Ruppert, Annika Heyer, Jörn Benthin, Tim Hanke, Johannes Brunnemann, Christian Becker and Arne Speerforck

Status of the TransiEnt Library: Transient Simulation of Complex Integrated Energy Systems

---

Carles Ribas Tugores, Gerald Zotter and Carina Seidnitzer-Gallien

Absolut Modelica library

Marcelo Muro, Guido Sassaroli and Riccardo Lazzari

MultiEnergySystem: A Modelica Library for Dynamic Modeling and Simulation of District Heating and Gas Networks

---

Christophe Montsarrat, Pascal Borel and Ana Paez

Calibration of a Chiller Modelica model with experimental data

---

Pierre Blaud and Imad Mourtaji

A Dynamic Simulation Model of Outdoor Swimming Pool with Thermal Energy Storage, Boiler and Solar Thermal Collectors

Joshua Brun, Thomas Sergi, Sylvan Mutter, Tim Arnold and Ulf Christian Müller

From Simulation to Reality: Deployment of Reinforcement Learning-Based Neural Network Controllers Trained with Modelica Models

A. Phong Tran and Fatma Cansu Yücel

Safe and Efficient Control of a Brayton Cycle Heat Pump Using Reinforcement Learning

Robert Weber, Staša Gejo, Rainer Gehring and Lars Mikelsons

Identification and Elimination of Instabilities During Simulation of Highly Stiff Vehicle Electrical Power System Models

Mathieu Specklin, Elie Solai, Clémence Rouge and Michael Deligant

Dynamic modeling of a liquid piston compressor system including conjugate heat transfer

Fabian Lagerstedt, Samuel Kärnell, Marcus Rösth and Liselott Ericson

Modeling and Simulation of a Direct Heat Recovery System for Cabin Heating in Battery-Powered Mobile Machines

Stefan H. Reiterer, Alexander Meierhofer, Ivan Vidovic, Marco Forberger, Benjamin Stuntner and Jochen Nowotny

Railway Marketplace for Data, Know-How and Services

Simon Müller, Abdulrahman Dahash, Shariq Akbar, David Schmitt, Peter Bayer and Tobias Schrag

Integrating a Seasonal Thermal Energy Storage FMU in a MATLAB/Simscape Thermal Source Network Model

Alberto Romero, Johannes Angerer, Elias Steinkellner and Luca Belforte

A low complexity physics-based aging model for lithium ion cells with solid electrolyte interphase and lithium plating side-reactions

Li Zuo, Yuanhui Dong, Shubin Zhang, Yuxin Li, Haiming Zhang, Ji Ding, Fanli Zhou, Qi Liu and Liping Chen

Dynamic Simulation of Off-Grid Energy Island with Wind-PV-Storage Hydrogen Production

Bahareh Bakhsh Zahmatkesh, Mina Shahi and Amirhoushang Mahmoudi

Physics-Based Dynamic Modeling of Solar-Powered Off-Grid Cold Storage for Perishables Using Modelica: A Case Study – Xingalool, Somalia

Social Program

The conference dinner will take place on Tuesday, September 9, 2025, as an evening boat cruise on Lake Lucerne aboard the MS Diamant. Where you can enjoy a relaxed evening on the lake with dinner, drinks, and beautiful views of the surrounding mountains.

Boarding begins at 18:00 at Luzern KKL landing stage 5 or 6, located right next to Lucerne's main train station in the city center. The ship will depart at 18:30 and return to the same location at 22:30. Guests may remain on board until 23:00.

Please note that participants are responsible for arranging their own transportation from the conference venue in Rotkreuz to the boat departure point in Lucerne and for arriving on time.

Practical Information

Registration Desk
The registration desk opens on Monday, September 8, 2025, at 11:30 and remains open throughout the entire conference.

Conference Website & App

All updated conference information can be found at the website

Conference App

The conference program, papers, and abstracts will be available in the web application

Conference Venue Location
The conference will be held at the Rotkreuz campus of the Lucerne University of Applied Sciences and Arts. The campus is located directly next to the Rotkreuz train station and is easily accessible by public transport.

Hochschule Luzern
Suurstoffi 1
6343 Rotkreuz
Switzerland

WIFI Connection
Campus guests log in using the “public” network and authenticate the connection via text message (guides available for macOS / Windows).

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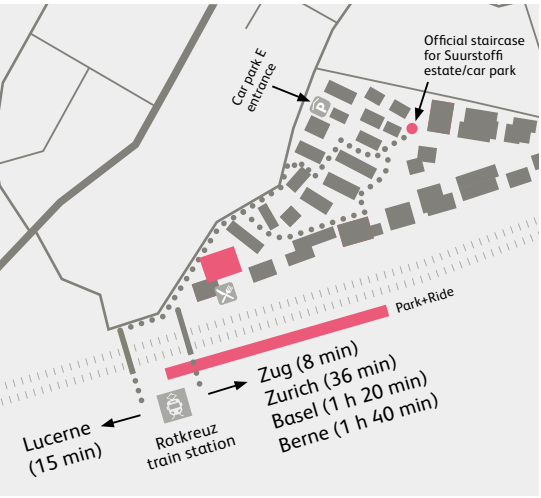
Students and members of other universities can use the “eduroam” network, provided their home institution supports it.

Parking
We recommend traveling by public transportation, as parking in the vicinity of the conference venue is limited and subject to relatively high fees.



HSLU offers a small number of paid parking spaces on the Suurstoffi site at the Parking Garage E (access via Birkenstrasse, Suurstoffi 29), approximately a 5-minute walk from the conference venue. Please follow the signage and only use the designated paid parking spaces in the rear section E2.

On the opposite side of the train station, the Swiss Federal Railways (SBB) operates a Park & Ride facility. Payment is possible via mobile app only.

Public Transportation (Recommended)
We recommend arriving by train. The campus is a 3-minute walk from Rotkreuz station, which can be reached from Lucerne in as little as 13 minutes.

To plan your journey and purchase tickets, we recommend using the official SBB app (Swiss Federal Railways), available on Google Play and the App Store. It is the most popular way to navigate public transport in Switzerland and provides real-time schedules, ticketing options, and service updates. The app also supports local transportation such as buses and boats in cities across Switzerland, including Lucerne and Zurich.

More information

For special train offers related to Swiss round trips or tourism, we recommend contacting local tourist offices for guidance.

Voltage
Electricity in Switzerland is 230 Volts at 50 Hertz. The power sockets used are Plug Type C (2-pin) and Type J (3-pin). Non-grounded European 2-pin plugs usually fit both socket types. However, compatibility is not guaranteed, as the European prongs are slightly bigger. Other plugs than the European 2-pin ones will mostly not fit, an adapter is needed.

Emergency Numbers
112 – European Emergency Number (Police, Fire Service, Emergency Medical Service)

International Dialing Code for Switzerland: +41

Tourist Information
For more information about Switzerland or Lucerne, visit: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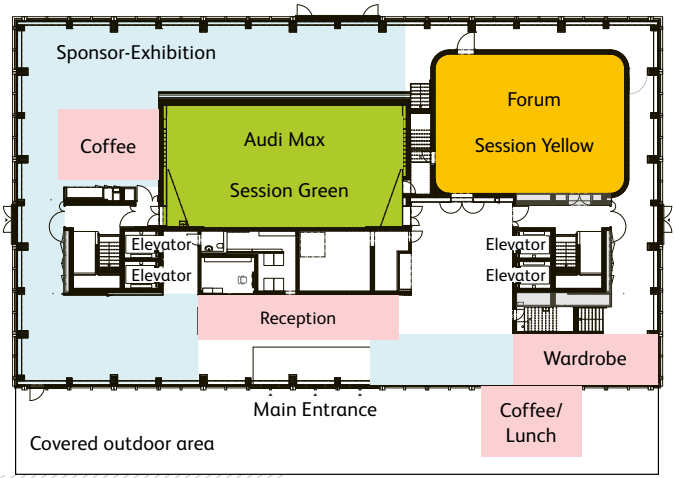
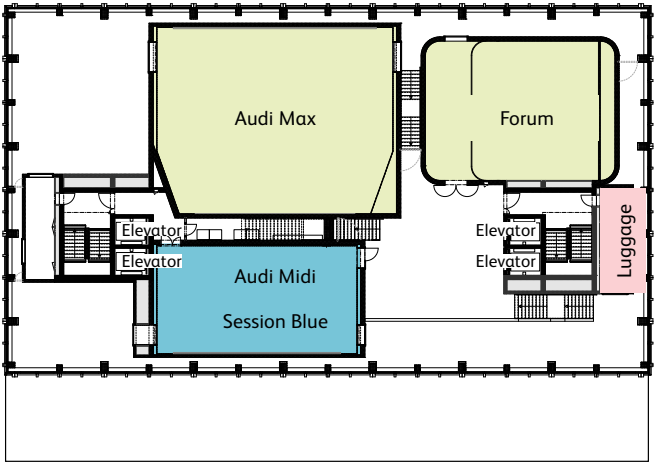
luzern.com

Site Plan

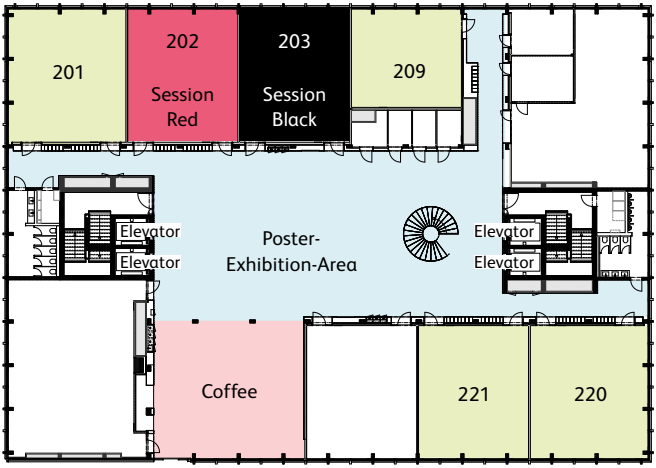
Ground floor



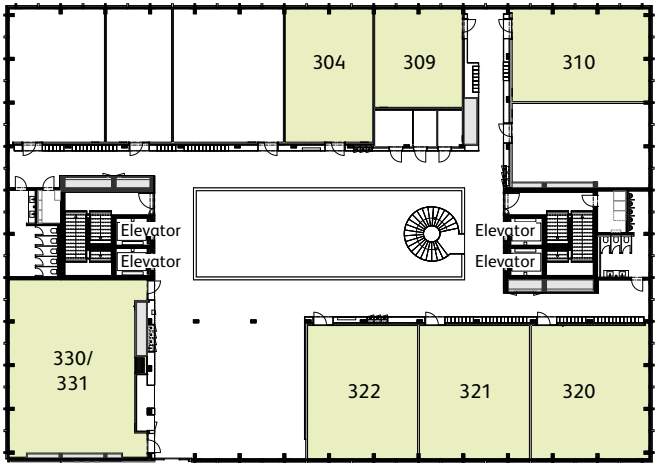
1st floor



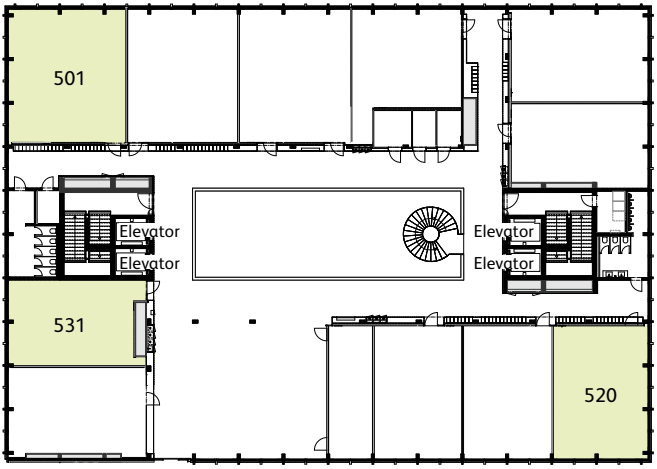
2nd floor



3rd floor



5th floor



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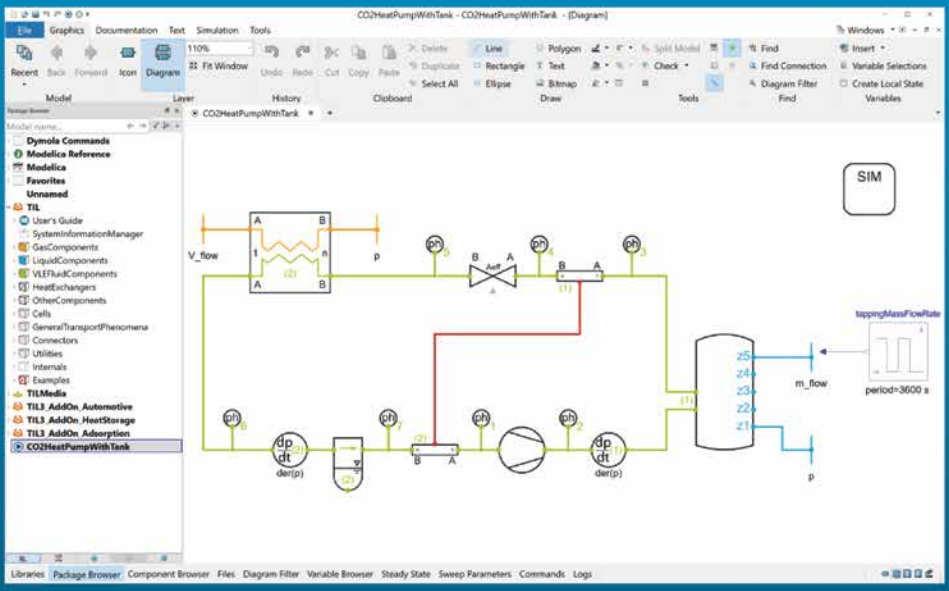

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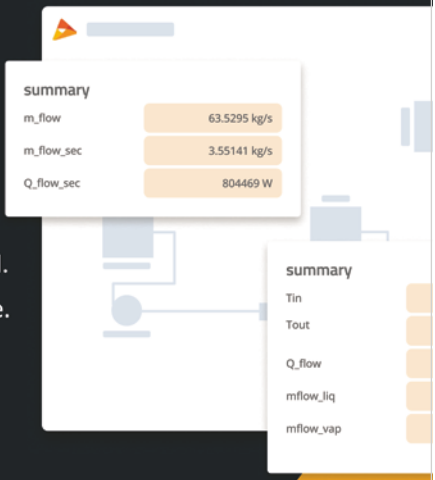

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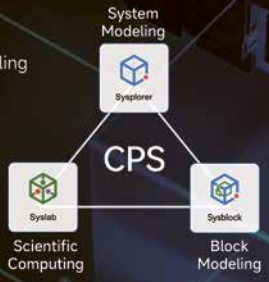

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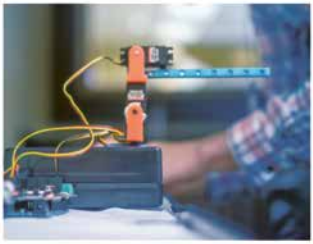

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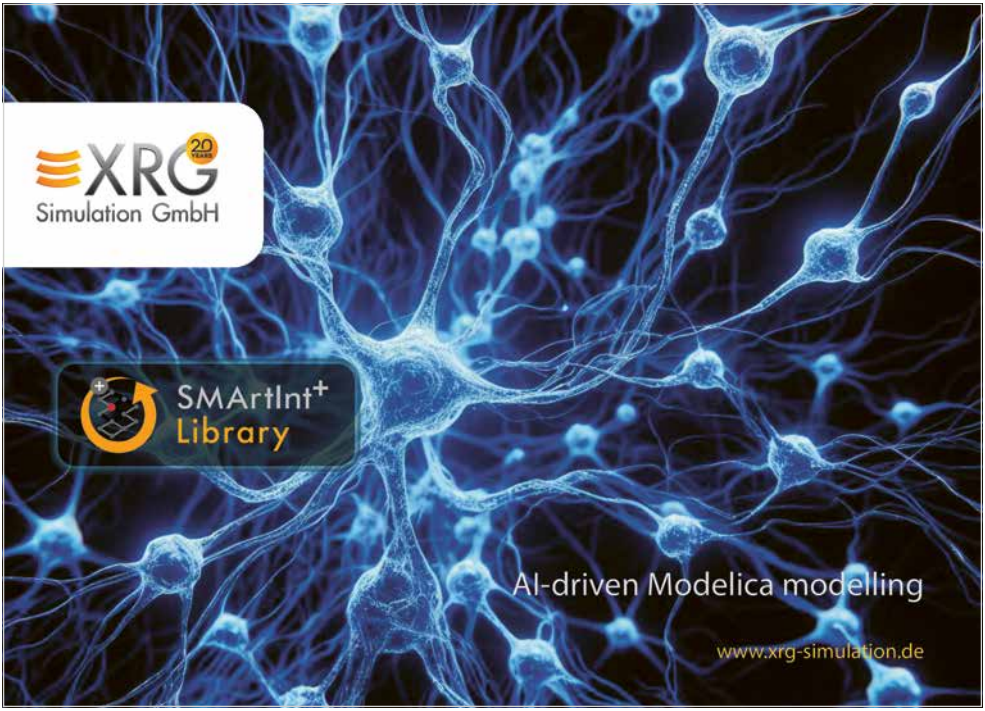

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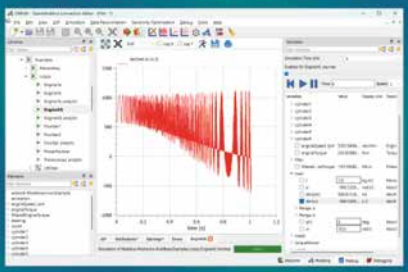
OM OpenModelica

Open-source modeling & simulation

OpenModelica is intended for industrial and academic usage. Its development is supported by the non-profit Open Source Modelica Consortium (OSMC).



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Conference Survey
We value your opinion! Share your impressions of the 16th International Modelica & FMI Conference in our survey, opening Tuesday, September 9.

Thank you
for your feedback

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6048 Horw

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08-2025