16th Modelica & fmi Conference

Preliminary Program

times and content may be subject to change

	Start					
Monday, 8. Sep.	11:30	Arrival / Reception in Rotkreuz with Welcome Coffee				
	13:00	Welcome Speech				
	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
		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
		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
	15:00	Coffee Break with Poster Presentations				
	15:30	Tutorials continued				
	16:45	4 Platin and Gold Vendor Presentations: **LTX, Dassault Systèmes, Modelon, Tongyuan**			6 Silver Sponsor Presentations: **JuliaHub, Wolfram, XRG, orthogonal, OpenModelica, eXXcellent**	
	18:45	Welcome Reception				
Tuesday, 9 Sep.	08:30	Welcome Coffee				
	08:50	Conference Opening by Ulf Christian Müller				
	09:00	**Keynote of Prof. Mishra Siddhartha on Physics-Informed AI**				
	09:45	Modelica and FMI News by Dirk Zimmer				
	10:00	Short Coffee Break with Poster Presentations				
	10:20	**Scientific Track on General Modelica** Modelica Tool Development	**Scientific Track on Energy** Power System Simulation	**Scientific Track on Control & AI** Modelica & AI	**Scientific Track on FMI and related** FMI Tool Developement	**Industrial Users Presentations** Modelica Applications
	12:00	Lunch				
	13:00	Chemics, Pharmacology and Medicin	Thermal Management for Green Energy Systems	Robotics	Layered Standards	Aerospace
	14:15	Coffee Break with Poster Presentations				
	14:45	Digital Twin	Media Property modellling	Control for HVAC and Buildings	FMI for energy systems	Credible Simulation, Traceability, SSP
	16:00	Panel discussion on the value of open standards				
	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, 10 Sep.	08:00	Welcome Coffe				
	08:30	**Keynote of Dr. Johan R Åkesson on Opportunities and Challenges in Design and Operation of Integrated Energy Systems**				
	09:15	Simulation and Optimization	Pumps and Vapour Compression	FMI for Embedded Systems and Virtual Prototyping	Workflows in Systems Engineering	FMI Applications
	10:30	Coffee Break with Poster Presentations				
	11:00	Modeling Methods and Tools	Energy Generation Systems	Control- and AI-based Methods with FMI for Automotive	Maritime Applications	Modelica Applications
	12:40	Lunch				
	13:40	**Awards and Announcements**				
	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
	15:50	Coffee To Go				

	Scientific Track				Industrial Track
	General Modelica	**Energy**	**Control & AI**	**FMI and related**	**Industrial Users**
Tue, 10:20	**Modelica Tool Development**	**Power System Simulation**	**Modelica & AI**	**FMI Tool Developement**	**Modelica Applications**
	Hans Olsson Improved Unit Inference and Checking in Modelica	*Marcelo de Castro and Luigi Vanfretti* OpenIWPI: Open-Instance Wave-Phasor Interface Library for Power System Simulation Studies in Modelica	*Andreas Hofmann and Lars Mikelsons* Towards Integration of PeN-ODEs in a Modelica-based workflow	*Luis Sanchez-Heres, Fredrik Olsson and Jan Östh* Liaison: an open-source tool for distributed co-simulations	*Kanadevia Inova AG* Process-based Life-Cycle Sustainability Analysis of Integrated Solid Waste Management Systems: A Decision-Support Platform using OpenModelica
	Henrik Tidefelt and Quentin Lambert Implicit Unit Conversion in Modelica	*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	*Linus Langenkamp, Philip Hannebohm and Bernhard Bachmann* Efficient Training of Physics-enhanced Neural ODEs via Direct Collocation and Nonlinear Programming	*Michele Urbani, Michele Bolognese, Luca Prattico and Matteo Testi* A Tool for the Implementation of Open Neural Network Exchange Models in Functional Mockup Units	*Optimation AB* On the challenges of large-scale simulation platforms and our solution to overcome them
	Zhipeng Chen, Zhichao Huang, Chong Zhou, Qi Liu, Fanli Zhou and Liping Chen Model State Solidification Technology	*Herbert Schmidt* Analytical Treatment of Hollow Toroid Flux Tubes	*Tim Jonas Hanke, Johannes Brunnemann, Robert Flesch and Jörg Eiden* Status of the SMArtInt Library: Simple Modelica Artificial Intelligence Interface	*Erik Henningsson, Christian Schulze, Julius Aka, Manuel Gräber, Dag Brück, Elmir Nahodovic and Oliver Lenord* Input Smoothing for Faster Co-Simulation using FMI	*Electric Power Research Institute, US* Optimization of Hybrid Energy Systems Utilizing a Custom System Cost of Hydrogen Estimation Method
	Baptiste Mazurié, Audrey Jardin, Pascal Borel, Didier Boldo, Frans Davelaar and Luis Corona Mesa-Moles Data Reconciliation for Industrial Experiments	Thomas Egsgaard Kallesen, Søren Waagø Christiansen and Rene Just Nielsen Master controller concept for power flexible energy systems	Ankush Chakrabarty, Marco Forgione, Dario Piga, Alberto Bemporad and Christopher Laughman Zero-Shot Parameter Estimation of Modelica Models using Transformer Networks	Felix Tischer, Simon Genser, Daniel Watzenig and Martinf Benedikt Comparing the Predictive Event Handling Algorithm LookAhead to Rollback and Early Return	Smith Group, United States First Modelica Model: Lessons Learned from Modeling a Chilled Water Plant in Modelica
Tue, 13:00	**Chemics, Pharmacology and Medicin**	**Thermal Management for Green Energy Systems**	**Robotics**	**Layered Standards**	**Aerospace**
	Marek Matejak Chemical 2.0 (Free open-source Modelica library)	*Finn van Ginneken and Alexander Busch* Modelling, Simulation and Validation of thermal propagation for 3D discretized battery cells in Modelica	*Jose 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	*Amin Bajand, L. Viktor Larsson, Lena Buffoni, Elmir Nahodovic, Robert Hällqvist, Hans Olsson and Martin Otter* Towards a Common Portable Standard for Model Credibility	*Dassault Aviation* Bridging the gap between System Engineering and Simulation, applied to collaborative design of Aircraft Systems
	Tomas Kulhanek, Filip Jezek, Jiri Kofranek, Marek Matejak and Stef Rommes Pharmacolibrary - Free Library to Model Pharmacology	*Lone Meertens, Jelger Jansen and Lieve Helsen* Development and Experimental Validation of an Unglazed Photovoltaic-Thermal Collector Modelica Model that only needs Datasheet Parameters	*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	*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 over FMUs	*Saab Aeronautics* OpenSCALING: A Saab Aeronautics Perspective
	Clément Coïc and Marco Masannek Combining static and dynamic optimization approaches for path planning, with collision avoidance	*Igor Belot, Francois Nepveu, Pierre Garcia, Nathan Fournier, Teddy Chedid, Etienne Letournel, Pierre Delmas and Alexis Gonnelle* Introducing the NewLib Library and its application to multi-level, large-scale solar field models	*Antoine Pignède and Carsten Oldemeyer* Automatic Modelica Package and Model Generation from Templates and Data Files with Python, Exemplified with URDF	*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	*AIRBUS SAS, ALTEN* FMI Standard and Airbus Needs, Usages and Expectations Full Version
Tue, 14:45	**Digital Twin**	**Media Property modellling**	**Control for HVAC and Buildings**	**FMI for energy systems**	**Credible Simulation, Traceability, SSP**
	Corentin Lepais and Dirk Zimmer Prototypical Control for the Digital Twin of Aircraft Environmental Control System	*Pascal Borel, Rafik Moulouel, Antoine Chupin and Felix Marsollier* TAeZoSysPro: A Modelica Library for Thermal Aeraulic and Buildings Thermodynamics Calculations	*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	*Karim Besbes* An innovative heterogeneous modeling approach to build a cooling system for battery thermal management with common fluid properties involving FMI terminals	*AVL List GmbH, Robert Bosch GmbH* Integration of systems engineering and simulation based on standards: The needs, challenges and solutions from an industrial perspective
	Andreas Heckmann, Alexander Poßeckert and Vijaya-Bhaskar Adusumalli Aspects and Ideas for the FMI-based Modeling of Railway Digital Twins	*Rohit Dhumane, Dan Gorman and Rajkumar K S* Refrigerant Mixture Package for Dynamic Simulation of Auto-Cascade Refrigeration	*Karl Walther, Michael Wetter, Anand Prakash and Jianjun Hu* CDL-PLC translator: From Modelica HVAC control design to IEC 61131 PLC implementation	*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	*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
	Gerhard Hippmann and Blas Blanco Mula Collaborative Digital Twin Development for Railway Braking and Traction Applications	*Hubert Blervaque and Félix Marsollier* A Generic Non-Miscible Liquid-Gas Medium Model in Modelica with Analysis of Incompressibility Assumptions	*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	*Ruirui Zeng, Hui Gao, Wei Liu, Lei Huang, Qi Liu, Fanli Zhou and Liping Chen* Design and Simulation Validation of Steam Power Systems Based on MBSE	*Robert Bosch GmbH, PMSF IT Consulting, eXXcellent solutions GmbH* Traceability and reuse of simulation using SSP-Traceability Layered Standard

Wed, 09:15	**Simulation and Optimization**	**Pumps and Vapour Compression**	**FMI for Embedded Systems and Virtual Prototyping**	**Workflows in Systems Engineering**	**FMI Applications**
	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	*Raphael Gebhart, Martin Düsing, Niels Weber and Franciscus L. J. van der Linden* Centrifugal Pump Model of the DLR Thermofluid Stream Library	*Tom Reynaud, Erfan Enferad and Maxime Lefrancois* Facilitating the use of Physics-Based Simulations on Embedded Devices by running FMUs from MicroPython	*Mark Williams, Hubertus Tummescheit, Ajaykumar Mst and Jose Maria Alvarez-Rodríguez* The Fundamental Modeling Practices and Specifications to support the Preservation and Reuse of Analytical Simulations	*Robert Bosch GmbH, DLR e.V.* Optimization with FMI and CasADi: Analysis in Industrial Applications
	Matteo Luigi De Pascali, Lorenz T. Biegler, Emanuele Martelli and Francesco Casella Modelica2Pyomo: a tool to translate Modelica models into Pyomo optimization models	*Jiacheng Ma and Matthis Thorade* Frost/Defrost Models for Air-Source Heat Pumps with Retained Water Refreezing Considered	*Nils Bosbach, Meik Schmidt, Lukas Jünger, Matthias Berthold and Rainer Leupers* FMI Meets SystemC: A Framework for Cross-Tool Virtual Prototyping	*Erik Rosenlund, Robert Hällqvist, Robert Braun and Petter Krus* Automation Nation: Taming Complex V&V Workflows in—Domain-Specific Language—Style	*DNV AS* Accuracy and assurance of co-simulations in marine lifting operations
	Linus Langenkamp and Bernhard Bachmann Enhancing Collocation-Based Dynamic Optimization through Adaptive Mesh Refinement	*Scott Bortoff, Vedang Deshpande, Christopher Laughman and Hongtao Qiao* A Dynamic Analysis of Refrigerant Mass in Vapor Compression Cycles	*Tobias Kamp, Christoff Bürger, Johannes Rein and Jonathan Brembeck* Hybrid Simulation Models for Embedded Applications: A Modelica and eFMI approach	*Christoph Steinmann, Konstantin Wrede, Jens Schirmer and Jens Lienig* Integration of Geometric Tolerance Analysis in System Simulations via Functional Mock-up Units	*Renault* Optimizing Assemblies of FMUs
Wed, 11:00	**Modeling Paradigms and Language Experiemnts**	**Energy Generation Systems**	**Control- and AI-based Methods with FMI for Automotive**	**Maritime Applications**	**Modelica Applications**
	Gaadha Sudheerbabu, Dragos Truscan and Mikael Manngård Validation of Dynamic Simulation Models using Metamorphic Testing and Given-When-Then Patterns	*Inga Beyers, Lukas Krebeck, Astrid Bensmann and Richard Hanke-Rauschenbach* Modelling and Impact of Hydraulic Short Circuit Operation in Pumped Hydro Energy Storage	*Minsu Hyun* A Study on Vehicle Suspension Loads Prediction Method Based on Hybrid Road Simulation using Modelica Library and FMI	*Karl Gunnar Aarsæther and Stian Skjong* Shared sea-environment definition and realization for maritime and offshore co-simulations	*Electric Power Research Institute, Modelon* Model Predictive Controller Development in Modelica
	Dirk Zimmer The Value of Enforcing a Strict Modeling Methodology within Modelica	*Markus Gillner and Arne Speerforck* Modelling Aquifer Thermal Energy Storage (ATES) System with Buoyancy Flow	*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 Systems	*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	*Danfoss AS, TLK Energy GmbH* Optimized usage of heat recovery potentials in modern liquid cooled data centers to minimize their environmental impact
	Christian Gutsche, Christoph Seidl, Volodymyr Prokopets, Sebastian Götz, Zizhe Wang and Uwe Assmann Context-Oriented Equation-based Modeling in ModelingToolkit.jl	*Ao Zhang and Xiang Wang* Further Application of Modelica-Based Nuclear Power System Simulation: Tasks in Different Scenarios Driven by Model and Data	*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	*Basilio Puente Varela, Maria Dolores Fernández Ballesteros, Maria Isabel Lamas Galdo and Luis Carral* ShipSIM: A Modelica Library for Ship Maneuverability Modeling and Simulation	*Lince S.r.L.* Optimal Energy Management of a Biogas Plant Using Model Predictive Control and Forecast-Driven Optimization
	Zizhe Wang, Christian Gutsche and Uwe Assmann Context-Oriented Modelica for Advanced Variability Management	*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	*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	*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	*Samsung Electronics* Development of scalable rule-based temperature feedback controls for energy-efficient condenser water loops in semiconductor factories
Wed, 14:10	**New Translation Methods and Tools**	**Fuel Cell Modeling and Control**	**Control Applications in Modelica**	**Automotive**	**Model-Based Workflows and SSP**
	Benoît Caillaud, Albert Benveniste and Mathias Malandain Benchmarking the Modular Structural Analysis Algorithm	*Michele Bolognese, Emanuele Martinelli, Luca Prattichò and Matteo Testi* Dynamic modelling of an Ammonia2Power (A2P) system at high efficiency using a solid oxide fuel cell (SOFC) system	*Alberto Leva* On the precise and efficient representation of industrial controllers in Modelica	*Massimo Stellato, Alberto Momesso, Theodor Ensbury and Alessandro Picarelli* Race Car Braking System Thermal Model for Real Time Use in a Driving Simulator	*DENSO Automotive, BMW Group* Open-source ADAS Use Case for MBSE and Seamless Collaboration using SSP
	Martin Otter and Hilding Elmqvist Resizable Arrays in Object-Oriented Modeling	*Emanuele Martinelli, Michele Bolognese, Nirmala Nirmala, Narges Ataollahi and Matteo Testi* Direct Ammonia Solid Oxide Fuel Cell Stack: Modelling and Experimental Validation	*Rüdiger Franke, Marcin Bartosz and Rasmus Nyström* Master controller for offshore wind power and hybrid grids	*Filip Cieslar* Integrated Multidomain Simulation for Noise Reduction in Automotive Headlamp Cooling Systems	*DENSO Automotive, PMSF IT Consulting* Transmission Control Unit Use Case for Virtual ECUs and SSP-based Collaborative Development
	Karim Abdelhak and Bernhard Bachmann Constant Time Causalization using Resizable Arrays	*Markus Pollak, André Thüring and Wilhelm Tegethoff* Dynamic Simulation of a PEM Electrolysis System	*Reiko Müller* The FlightControl library for aircraft control design applications	*Jan Friedrich Hellmuth, Markus Pollak, Andreas Schulte, Wilhelm Tegethoff and Jürgen Köhler* Solid-State Battery-Systems and Thermal Management for Electric Long-Distance Buses	*Toshiba Digital Solutions Corporation* Cross-Company Collaborative Model-Based Development using FMI3.0 and SSP2.0
	Hilding Elmqvist and Martin Otter Modiator - a Web App for Modelica Simulation	*Axelle Hégo, Félix Bosio and Sylvain Mathonnière* Model-Based Control Design for a Multi-Stacks SOC System	*Tilman Bünte* Quasi-Periodic Feedforward Control based on Inverse Model tabled FFT	*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	*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

Mon, Tue, Wed, all day

Philip Hannebohm and Bernhard Bachmann Selective Evaluation of RHS during Multi-Rate Simulation	*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	*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	*Stefan H. Reiterer, Alexander Meierhofer, Ivan Vidovic, Marco Forberger, Benjamin Stuntner and Jochen Nowotny* Railway Marketplace for Data, Know-How and Services
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	*Carles Ribas Tugores, Gerald Zotter and Carina Seidnitzer-Gallien* Absolut Modelica library	*A. Phong Tran and Fatma Cansu Yücel* Safe and Efficient Control of a Brayton Cycle Heat Pump Using Reinforcement Learning	*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
Micah Condie, Abigaile Woodbury, James Goppert and Joel Andersson Rumoca: Towards a Translator from Modelica to Algebraic Modeling Languages	*Marcelo Muro, Guido Sassaroli and Riccardo Lazzari* MultiEnergySystem: A Modelica Library for Dynamic Modeling and Simulation of District Heating and Gas Networks	*Robert Weber, Staša Gejo, Rainer Gehring and Lars Mikelsons* Identification and Elimination of Instabilities During Simulation of Highly Stiff Vehicle Electrical Power System Models	*Alberto Romero, Johannes Angerer, Elias Steinkellner and Luca Belforte* A low complexity physics-based aging model for lithium ion cells with solid electrolite interface and lithium plating side-reactions
Requirement Verification with CRML and OpenModelica Requirement Verification with CRML and OpenModelica	*Christophe Montsarrat, Pascal Borel and Ana Paez* Calibration of a Chiller Modelica model with experimental data	*Mathieu Specklin, Elie Solai, Clémence Rouge and Michael Deligant* Dynamic modeling of a liquid piston compressor system including conjugate heat transfer	*Li Zuo, Yuanhui Dong, Shubin Zhang, Yuxin Li, Ji Ding, Qi Liu, Fanli Zhou and Liping Chen* Dynamic Simulation of Off-Grid Energy Island with Wind-PV-Storage Hydrogen Production
Songchen Tan, Keming Miao, Alan Edelman and Christopher Rackauckas Scalable Higher-order Nonlinear Solvers via Higher-order Automatic Differentiation	*Pierre Blaud and Imad Mourtaji* A Dynamic Simulation Model of Outdoor Swimming Pool with Thermal Energy Storage, Boiler and Solar Thermal Collectors	*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	*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