ENTOOL 2013

Symposium, Workshop & Summer School

Tools and Data for energy-optimized Buildings,
Neighborhoods, Residential Areas and Cities

in the rooms of the
SLUB Library

by the
Dresden University of Technology (TUD)
Institute of Building Climatology (IBK)

June 10-14, 2013

Prof. Dr.-Ing. John Grunewald
Coordinator

The EnTool Initiative is supported by funding from the German Federal Ministry of Economics and Technology (BMWi). The research works are conducted in close collaboration with the EnOB (energy-efficient buildings) and Eneff-Stadt (energy-efficient cities) programs of the BMWi.

WHERE AND WHEN

The EnTool 2013 Symposium, Workshop and Summer School will take place at the SLUB Library on the campus of the Dresden University of Technology in June 10-14, 2013. The event will be organized by the Institute of Building Climatology (IBK).

AIMS

The EnTool 2013 Symposium, Workshop and Summer School aims at combining international efforts in development of research tools and gathering data for design, planning, commissioning and operation of energy-optimized buildings, neighborhoods, residential areas and cities. It will establish a platform for knowledge transfer from building research to construction practice.

The EnTool platform will serve a new generation of research scientists and PhD candidates to develop, to calibrate and to validate the next generation of simulation tools. The EnTool initiative aims at supporting this work by resources from research, national and international administrative bodies and associated industrial sectors.

The EnTool 2013 Symposium, Workshop and Summer School in Dresden include three main events (see chapter “Related Information” for more specific information on the items below):

1. **2nd international Symposium on Integral Planning and Simulation in Building Physics and Building Services**

   This is a continuation of the 1st (national) Symposium on Integral Planning and Simulation at the TUD, organized by the IBK in 2012. Now, the Symposium has arrived at the international level.

2. **CHAMPS 2013 Symposium & Workshop**

   CHAMPS stands for Coupled Heat, Air, Moisture and Pollutant Simulation. This is the 8th CHAMPS workshop after Nanjing in 2011 and Tokyo in 2012. American, Asian and European research teams collaborate in this effort.

3. **International PhD Summer School on Building Physics**

   This is a follow-up action of the well-attended PhD Summer School held in Curitiba (Brasil) which was organized by the Pontifical Catholic University of Paraná (PUCPR) in conjunction with the Annex 55 meeting.

CONTEXT

The EnTool concept relates to international events, projects and programs (see chapter "Related Information" for more specific information on the items below):

1. **World Summit on Building Simulation Research, T.C. Chan Center, Philadelphia**

   The conclusions from the World Summit are taken as an inspiration to formulate the ambitious visions and aims of the EnTool concept. Attendees of the World Summit are invited speakers of the plenary session.

2. **IEA ECBCS Annex 55 Project**

   The achieved results (collected statistical data) and stochastic methods (for classification and clustering of generic data) from the Annex 55 project will be adapted and used in EnTool.

3. **IEA ECBCS Annex 60 Project**

   The results of EnTool pilot research projects will generate input to the Annex 60 project. Anticipated results are on both, Building Information Modeling (BIM) and Co-Simulation, based on the Modelica and Functional Mockup Interface standards.

4. **BMWi EnOB Program**

   The EnTool core team works in close collaboration with the EnOB Accompanying Research Team. New generation simulation tools will contribute to the Building Physical Learning Network (EnOB Lernnetz).

5. **BMWi Eneff-Stadt Program**

   The EnTool core team conducts research projects in the Eneff-Stadt program. New generation simulation tools will be used to carry out simulations of demanding buildings and residential areas at a higher level.

TOPICS AND TARGET AUDIENCE

Topics will be energy, sustainability and durability performance modeling and simulation at

- Material and assembly level
- Room/space environmental level
- Whole building performance level and
- Neighborhood, residential area and city level.

The target audience is constituted by Researchers, PhD-Students, Post-Docs and Engineers from technical disciplines such as Architecture, Civil Engineering, Mechanical Engineering, Software Engineering, Informatics, Math and Building Physics & Services.

PROGRAM[1]

See program is on following pages.

[1] subject to modifications

EnTool 2013 Symposium, Workshop & Summer School

June 10-14, 2013, Institute of Building Climatology, TU Dresden, Zellescher Weg 17

Program

Day/Time	Title	Presenter	Organisation	Country
Mon, June 10	**Opening & CHAMPS Plenary Presentations**			
Plenary Room				
Opening ceremony				
09:00	Welcome note by the Dean of the Faculty Architecture	Gerald Staib	Dresden University of Technology	Germany
09:10	Welcome note by the Dean of the Faculty Civil Engineering	Rainer Schach	Dresden University of Technology	Germany
09:20	Introduction to EnTool 2013	John Grunewald	Dresden University of Technology	Germany
09:30	*Coffee Break*			
Plenary Presentations of International Research Centers				
10:00	CHAMPS Activities of the Technical University of Denmark	Carsten Rode	Technical University of Denmark	Denmark
10:30	Map input requirements between Visual Design Studio and EnergyPlus	Lixing Gu	University of Central Florida	USA
11:00	Dynamic Life Cycle Building Energy Information Modeling	Khee Poh Lam	Carnegie Mellon University	USA
11:30	*Lunch*			
Plenary Presentations of International Research Centers				
13:00	CHAMPS Activities of the Nanjing University	Menghao Qin	Nanjing University	China
13:30	Indoor Air Quality Simulation in Real Buildings: Case Study and Model Validation	Xudong Yang	Tsinghua University	China
14:00	Virtual Design Studio and its applications	Jianshun Zhang	Syracuse University	USA
14:30	*Coffee Break*			
Introduction to the EnTool-Progam				
15:00	The EnTool Research Programme Funding Policy	Rolf Stricker	Project Management Jülich	Germany
15:30	EnTool-Initiative: Idea, Definitions, Aims	John Grunewald	Dresden University of Technology	Germany
16:00	New generation computational tools for buildings and community energy systems	Christoph van Treeck	RWTH Aachen	Germany

Tue, June 11	**EnTool Presentations and Discussions**			
Plenary Room				
Introduction to Building Information Modeling (BIM)				
09:00	European Project HESMOS and ISES	K. Baumgärtel, R. Hoch	Dresden University of Technology	Germany
09:30	Autodesk and PKPM Software	NN	PKPM China	China
10:00	*Coffee Break*			
Integration of Modelica and BIM-Processes				
10:30	Introduction to the Project and Research Association "EnTool:BIM"	Christoph van Treeck	RWTH Aachen	Germany
10:45	Fraunhofer ISE Contribution to the Project	Dominik Wystrcil	Fraunhofer-Institute for Solar Energy Systems	Germany
11:00	Visualisation of BIM Building Geometry Data	Felix Beck	Karlsruhe Institute of Technology (KIT)	Germany
11:15	Co-Simulation of Building Energy Systems between Modelica and other IDEs	Christoph Nytsch-Geusen	Universität der Künste Berlin	Germany
11:30	*Lunch*			
Introduction to Co-Simulation and Model Exchange				
13:00	Modelisar project: The Fuctional Mockup Interface	NN	ITI GmbH	Germany
13:30	Co-Simulation of Modelica and Complex Models using High Performance Solvers	Andreas Nicolai	Dresden University of Technology	Germany
13:45	Fraunhofer IIS Contribution to Co-Simulation	Christoph Clauss	Fraunhofer Institute for Integrated Circuits	Germany
14:00	EA Systems Contribution to Co-Simulation	Rene Unger	EA Systems Dresden GmbH	Germany
14:15	ITI GmbH Contribution to Co-Simulation	NN	ITI GmbH	Germany
14:30	*Coffee Break*			
Knowledge Transfer to Practice, Conclusions and Roadmap				
15:00	Integral Building Design & Planning with LEC	Hans-Peter Leimer	HAWK-HHG Hildesheim	Germany
15:30	Open Discussion on Roadmap & Next Actions, Raising Funds	John Grunewald	Dresden University of Technology	Germany
16:00				

Wed, June 12	**Parallel PhD Candidate and Postdoc Presentations**			
Room 1				
Material and assembly level characterization and modeling				
09:00	Innovative Insulation Products with Hygric Properties	Lasse Juhl	Danish Technical University	Denmark
09:30	Internally insulated traditional buildings in UK: experimental results and case studies	Valentina Marincioni	Bartlett School of Graduate Studies, UCL	UK
10:00	*Coffee Break*			
10:30	Stochastic material property modeling	Jianhua Zhao	Dresden University of Technology	Germany
11:00	Hygrothermal behaviour of Wooden beam heads	Daniel Kehl	Dresden University of Technology	Germany
11:30	*Lunch*			
Room/space/building environmental modeling				
13:00	HAJAWEE - A new thermal room model	Katja Naumann	Dresden University of Technology	Germany
13:30	Assignability of thermal comfort models for non- standard occupants	Peggy Freudenberg	Dresden University of Technology	Germany
14:00	*Coffee Break*			
14:30	Technical and sociological aspects of user's behaviour	Jan Schneider	HAWK-HHG Hildesheim	Germany
15:00	Energy Efficient School Buildings: Prospects and Challenges	Manuel Winkler	University of Applied Sciences Munich	Germany
Room 2				
Model Libraries, Tool Coupling Technology, High Performance Numerics & Solvers				
09:00	3D modeling techniques & parallel computation	Stefan Vogelsang	Dresden University of Technology	Germany
09:30	NANDRAD solver technology for multizone building performance simulation	Anne Paepcke	Dresden University of Technology	Germany
10:00	*Coffee Break*			
10:30	IDF converter and EnergyPlus HVAC models	Dirk Weiß	Dresden University of Technology	Germany
11:00	Numerical simulation of freezing and thawing processes	Luisa Sontag	Dresden University of Technology	Germany
11:30	*Lunch*			
Urban Physics / Urban Energy Information Modeling				
13:00	An Interactive platform to communicate simulation based high fidelity building energy analysis using GIS	Shalini Ramesh	Carnegie Mellon University	USA
13:30	A new Method to calculate Catch Ratios for Wind Driven Rain	Gao Ge	Dresden University of Technology	Germany
14:00	*Coffee Break*			
14:30	Rain climate data evaluation	Ulrich Ruisinger	Dresden University of Technology	Germany
15:00				

Thu, June 13	**Parallel PhD Candidate and Postdoc Presentations**			
Room 1				
Whole building performance characterization and modeling				
09:00	Overview of Modelica based HVAC & Control models	Jia Zile	Dresden University of Technology	Germany
09:30	Energy Plus Simulations in the Design Process of an Office Building	Christian Scholz	Dresden University of Technology	Germany
10:00	*Coffee Break*			
10:30	TEK-Tool – Building performance analysis with characteristic values	Niklas Alsen	Kassel University	Germany
11:00	SEMERGY: Web-Based Simulation Support for Building Design Optimization	Neda Ghiassi	Vienna University of Technology	Austria
11:30	*Lunch*			
Whole building performance characterization and modeling				
13:00	Probabilistic assessment of need for renovation and service life of Estonian apartment buildings	Simo Ilomets	Tallinn University of Technology	Estonia
13:30	Tools for design, evaluation and planning: experiences and proposal	Floriberta Binarti	University of Atma Jaya Yogyakarta	Indonesia
14:00	*Coffee Break*			
14:30	Long-term formaldehyde simulation and model validation in real building	Weihui Liang	Tsinghua University	China
15:00	Properties of Waste-Based Materials and their Effects on Hygrothermal Conditions and IAQ in Buildings	Barbora Krejcirikova	Technical University of Denmark	Denmark
Room 2				
Energy-efficient Neighborhoods, Residential Areas and Cities				
09:00	Optimization of Building Energy Management Solutions	Matthias Franke	Fraunhofer Institute for Integrated Circuits	Germany
09:30	Integrated District Energy Assessment Simulation (IDEAS): Tool development and data requirements	Ruben Baetens	K.U. Leuven	Belgium
10:00	*Coffee Break*			
10:30	HoEff-QuickCheck: A Quick Evaluation Method For Existing University Buildings	Rene Regel	University of Applied Sciences Munich	Germany
11:00	Certification of Plus-Energy Buildings and Residential Areas	Volker Stockinger	University of Applied Sciences Munich	Germany
11:30	*Lunch*			
Monitoring Projects, Model Calibration & Validation				
13:00	The Energy Concept & Monitoring of the Ludmilla Residential Area	Volker Stockinger	University of Applied Sciences Munich	Germany
13:30	Monitoring-based optimization-assisted simulation model calibration	Farhang Tahmasebi	Vienna University of Technology	Austria
14:00	*Coffee Break*			
14:30	Investigation of Robust Monitoring Techniques for Building System Performance Realization	Clayton Miller	ETH Zurich	Switzerland
15:00				

Fri, June 14	**Parallel Open-Topic Workshops (select topics from below) & Closing Ceremony**			
Room 1				
Software developers workshop				
09:00	Introduction to new open source Python & R programming libraries	Clayton Miller	ETH Zurich	Switzerland
	Numerics: Basics and Exercises	A. Nicolai, S. Vogelsang	Dresden University of Technology	Germany
	2D Benchmarks for HAM Tools			
	Functional mockup interface technology			
	Numerics for HAM-models and Whole Building Simulation			
	Air convection with HM			
	Material modeling HM & VOC			
	Boundary conditions			
	Salts and Ice			
	Toolkits:COMSOL, Matlab, Modelica			
	High order methods (Discontinuous Galerkin mehods) to model night free cooling at the room scale	Arnaud Candaele	Cenaero	Belgium
Room 2				
Software users workshop		J. Grunewald, H. Fechner	Dresden University of Technology	Germany
09:00	Definitions, Balance equations, constitutive equations, transport coefficients			
	Finite control volume method, semi-discretisation, time integration method			
	Hygrothermal material characterization, Material parameters and functions			
	Boundary condition models, External climate from weather stations			
	Program user interfaces, project management, post-processing of results			
	Hygrothermal loads leading to Frost, Mould Growth, Rot, and Corrosion damage			
	Uncertain material properties, probabilistic hygrothermal modeling			
	Validation/Check of Simulation Results (HAMSTAD, EN, ect.)			
	Performance Criteria (freezing-thawing-cycles, thermal bridges)			
	Building performance data analysis using Phyton & R libraries	Clayton Miller	ETH Zurich	Switzerland
Closing ceremony				
Plenary Room				
15:00	Concluding Remarks & Goodbye	John Grunewald	Dresden University of Technology	

RELATED INFORMATION

2nd Symposium on Integral Planning and Simulation in Building Physics and Services

Web link of the 1st Symposium: www.bauklimatik.de

As an outcome of the research project “Development of a Thermal Room Model and its integration into a Multi-zone Simulation Framework”, the Institute of Building Climatology organized the 1st Symposium on Integral Planning and Simulation in Building Physics and Services in March 2012. This was conducted as a 3 days event, including plenary presentations, parallel workshops for developers and users of building simulation software tools and an open forum discussion with free presentations. The Symposium was attended by more than 70 persons from building technology research disciplines, software development and administrative bodies. The R&D funding programs EnOB and Eneff:Stadt of the BMWi were presented by the Project Carrier Jülich (PTJ).

The 2nd Symposium on Integral Planning and Simulation in Building Physics and Services will be integral part of the EnTool symposium 2013. It will wrap up the results achieved in the project “Development of a Thermal Room Model and its integration into a Multi-zone Simulation Framework”, and report first results from the project on “Internal Insulation of Buildings with Wooden Beam Heads”.

CHAMPS 2013 Symposium & Workshop

Web link: www.champs-international.org

The CHAMPS events were initiated as workshops for software developers in the field of indoor air quality. Regular meetings take place on annual basis since 2003. Recent workshops were organized and hosted by the TU Dresden, Syracuse University, University of La Rochelle, Nanjing University and Tokyo University.

The CHAMPS software for Heat, Air, Moisture and Pollutant Transfer in Building Envelope Systems (CHAMPS-BES) is a tool for analysis of the indoor air quality. It takes the VOC emissions from building materials and the outdoor pollution loads into account.

The program is an outcome of a joint effort between Building Energy and Environmental Systems Laboratory (BEESL) @ Syracuse University, U.S.A. and the Institute for Building Climatology (IBK) @ University of Technology Dresden (TUD), Germany. CHAMPS-BES is a tool for free non-commercial use. Its user community includes research institutes and consulting companies. Research and developmental works include following areas

- Small and full-scale laboratory experiments and field tests
- Long-term energy and indoor environmental quality of building envelope systems
- Real-time predictive control of building environmental systems.

International PhD Summer School 2013

The last International PhD Summer Schools on “Heat, Air and Moisture Transfer through Insulated Envelopes and Risk Assessment of Building Energy Performance” took place at the Vienna University of Technology in 2012 and the Pontifícia Universidade Católica do Paraná (PUCPR) in Curitiba in April 2013. About 20 international PhD candidates attended the fife-days-events for lectures and exercises given by renowned researchers from leading Institutes in these fields.

The Dresden International PhD Summer School is organized in conjunction with the EnTool symposium and the CHAMPS workshop. This will generate added value to the PhD candidates since the workshop/summer school topics are in line with the symposium topics.

PhD candidates should exchange information with experienced researchers and get support in selection of the right tools for their projects. They should be enabled to focus on development of their specific models according to their research questions. Side track workloads and overheads should be reduced as much as possible by sharing tools and data on a common platform and repository.

World Summit on Building Simulation Research

Web link: http://tcchancenter.com/bsimworldsummit/

The T.C. Chan Center hosted the World Summit on Building Simulation Research at the University of Pennsylvania on Thursday, 28 March 2013. The summit brought together leading international experts in building simulation. The focus was on the current state of research worldwide with the goal of providing direction for the future of building simulation research. The event included one full day of presentations, speakers, and panelists, as well as an evening networking reception. Speakers and panelists included members of leading academic institutions covering a broad range of topics.

IEA ECBCS Annex 55

Web link: http://www.ecbcs.org/annexes/annex55.htm

The scope of the project is to develop and provide decision support data and tools for energy retrofitting measures. The tools will be based on probabilistic methodologies for prediction of energy use, life cycle cost and functional performance. The impact of uncertainty on the performance and costs will be considered. Methods based on probability give powerful tools that can provide us with reliable ranges for the outcome.

The ultimate outcome of the project will be to develop knowledge and tools that support the use of probability based design strategies in retrofitting of buildings to ensure that the anticipated energy benefits can be realized. These will give reliable information about the true outcome of retrofitting measures regarding energy use, cost and functional performance.

The principle objective will hence be realized by merging hygrothermal building physics with probability and economic analyses. The methods developed will then be applied to optimize energy retrofitting methods.

IEA ECBCS Annex 60

Web link: http://www.iea-annex60.org

The objectives of Annex 60 are to develop and demonstrate next-generation computational tools that allow building and community energy grids to be designed and operated as integrated, robust, performance based systems.

Annex 60 will share, further develop and deploy free open-source contributions of currently uncoordinated activities in modeling and simulation of energy systems of buildings and communities, based on the Modelica and Functional Mockup Interface standards. The project will create and validate tool-chains that link Building Information Models to energy modeling, building simulation to controls design tools, and design tools to operational tools. Invention and deployment of integrated energy-related systems and performance-based solutions for buildings and communities will be accelerated by extending, unifying and documenting existing Modelica libraries and by linking existing building performance simulation tools with Modelica through the Functional Mockup Interface standard. The technology will allow optimized design, analysis and operation of multi-domain systems as posed by building and community energy systems. It will also allow using models across the whole building life cycle to ensure realization and persistence of design intent.

EnOB - Research for energy-optimized construction

Web link: http://www.enob.info/en/

"Buildings of the future" is the guiding concept behind EnOB – research for energy-optimized construction. The BMWi supports research on demonstration projects which are buildings with minimal primary energy demand, high occupant comfort, moderate investment costs and significantly reduced operating costs. A focus is on scientific evaluation of energy-optimized buildings by long term monitoring of energy-relevant performance indicators.

The EnOB research program requires sophisticated building concepts and innovative technologies. For this reason, EnOB places an emphasis on research and development in construction engineering and technical building equipment, such as low-exergy systems, building elements with vacuum insulation, or innovative glazing and facade systems. The demonstration projects support the knowledge transfer from R&D to construction practice.

EnEff:Stadt and EnEff:Wärme - Research for Energy Efficient Cities

Web link: http://www.eneff-stadt.info/en/

In addition to the energetic optimization of individual buildings, the aim of raising energy efficiency depends crucially on a comprehensive approach to urban areas as well as to local and district heating networks. This potential can be improved significantly via intelligent use and networking of innovative technologies with research and pilot projects. “Efficient Energy Use” plays a crucial role. The Federal Ministry of Economics and Technology (BMWi) therefore promotes research on energy efficient cities (EnEff:Stadt) and energy efficient heating and cooling networks (EnEff:Wärme).

ORGANIZATIONAL DETAILS

Invited plenary presentations & workshop contributions

Plenary presentations are given by invited speakers.

If you are PhD candidate, please inform us if you are interested to give a presentation to one of the workshops. See travel support.

Symposium proceedings

Presenters are asked to bring their pptx-presentations along with them. We will produce pdf's for download and distribute a CD after the Symposium.

Accommodation

Room reservations have been made for EnTool 2013 participants in these hotels:

- Days Inn Dresden, http://www.daysinndresden.com/en, Stehlener Straße 20, 01069 Dresden, Tel.: 0351-4664-0, Fax: 0351-4664-100, E-Mail: info@daysinndresden.com
- Gästehaus "Am Weberplatz" TU-Dresden, http://www.tu-dresden.de/service/gaestehaeuser/am_weberplatz, Weberplatz 3, 01217 Dresden, Tel.: 03 51-4 67 93 00 - Fax: 03 51-4 67 93 94, E-Mail: gha@mail.zih.tu-dresden.de

Please feel free to book your room under "EnTool 2013 Symposium, Workshop and Summer School".

Travel support

Invited speakers and PhD candidates who will give a presentation during the workshop can receive financial support. Guideline values depending on the country are taken as an estimation how much can be paid without showing tickets. Higher costs for travel tickets will be reimbursed on showing them.

Food service

Coffee and buffet service will be provided at the conference location. Regular lunch is provided by the student's restaurant nearby.

Registration

There is no registration fee for the Symposium, Workshop and Summer School.

Everyone can participate. The total number of participants is limited to 75. Please send your confirmation of participation to following contact address:

john.grunewald@tu-dresden.de

You will receive more information once you are registered.