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Konferenzbeiträge / Atti / Proceedings

Building Simulation Applications BSA 2017

3rd IBPSA Italy conference
Bozen-Bolzano, 8th – 10th February 2017

Edited by
Giovanni Pernigotto, Francesco Patuzzi, Alessandro Prada, Vincenzo Corrado, Andrea Gasparella

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Preface

The third edition of Building Simulation Applications BSA 2017, the biannual conference of IBPSA Italy hosted by the Free University of Bozen-Bolzano, proved to be at least as successful as the previous events. From February 8th to 10th 2017, it featured more than 100 participants and more than 75 presentations, about 40 % of which from abroad – Austria, US, South Korea, Ireland, Switzerland and the UK, among the first contributors. In addition, besides researchers, it also hosted a half-day special roundtable discussion about the potential and limitations of a set of simulation tools, attended by about 80 practitioners, to discuss the opportunities opened up to professionals by the use of building simulation, as well as the main barriers preventing its broader diffusion.

This was one of the reasons for presenting awards to some distinguished examples of use of building simulation in practice with the second edition of the IBPSA Italy Project Award, and, since the student of today will be the practitioner and the designer of tomorrow, for starting the first edition of a simulation introductory school for students.

Regarding the topics, some clear trends were documented in BSA 2017, as highlighted by the four keynotes.

If parametric simulation has increased the possibility of investigating a broader range of configurations, the adoption of optimization techniques allows the identification of the best design or operative configuration. Real time optimization, in particular, enables model-predictive control strategies in which the building model is used to identify and update the best control actions based on short-term weather and occupancy forecasts. Gregor Henze (University of Colorado Boulder, USA – Department of Civil, Environmental and Architectural Engineering) addressed those aspects in his keynote "Exploration of Building Model Complexity for Residential and Commercial Model Predictive Control".

Multi-domain simulation is at the base/bottom of an integrated analysis of building performance, allowing the occupant to effectively become the aim of the design and operation activities. Energy efficiency, global cost and environmental sustainability in this perspective are only constraints, which need to be considered in the light of the quality of the indoor environment. Humans are at the very core of the project, and buildings have to be designed to interpret their needs and to facilitate their interactions in order to achieve high performance levels, as Panagiota Karava (Purdue University, USA – School of Civil Engineering) clarified in her speech about "Cyber-Physical-Human Systems for High Performance Buildings".

Reinhard Radermacher (University of Maryland, USA – Center for Environmental Energy Engineering) reminded the audience about a long-lasting trend in building simulation dealing with the constant increase in the simulation detail and complexity and the co-simulation of building and technical systems. Design of high-performance buildings requires careful use of natural resources, from solar gains to renewable energy sources, using new technologies whose potentialities need to be explored and evaluated by means of coupled simulation of building and HVAC systems, as emerged from the keynote "Thoughts on Emerging Technologies and Simulation Aspects for HVAC in Buildings".

Finally, in the keynote "Urban Energy Computing: an Hourglass Model", Ardeshir Mahdavi (Technische Universität Wien, Austria – Department of Building Physics and Building Ecology) reported about an additional tendency, related to multi-scale simulation. Buildings interact with each other and with the external environment, especially in urban contexts, and such an intertwined performance needs to be studied simultaneously. The capability of predicting the behavioral whole of urban areas is then of crucial importance but, nonetheless, still challenging and requiring innovative approaches.

Andrea Gasparella, Free University of Bozen-Bolzano