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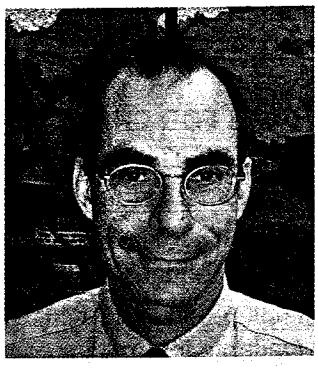
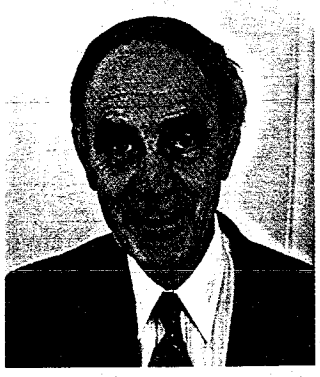
Simulation of Energy and Indoor Environment in Buildings



J. Hensen



F. Drkal

In order to reduce the emmission of greenhouse gasses and to provide substantial improvements in fuel consumption and comfort levels, there is a need to treat buildings and the systems which service them as complete optimised entities and not as the sum of a number of seperately designed and optimised sub-systems or components. Since there are real opportunities to affect the building energy use and indoor environment through tradeoffs in building siting, orientation, spatial definition and envelope configuration, waiting until these have been completed, and perhaps even the heating, ventilating and air-conditioning (HVAC) and other systems are defined, can result in missed opportunities for improvements. Building performance simulation is ideal for this because it is not restricted to the building structure itself but should include the indoor environment, while simultaneously taking into account the outdoor environment, mechanical, electrical or structural systems, and traditional and renewable energy supply systems.

Most design practitioners will be aware of the emerging building simulation technologies and its benefits in terms of environmental performance assessment of building and HVAC designs. However, as yet, few practitioners are able to claim expertise in the application of building performance simulation. This situation is rapidly changing with the advent of: performance based standards; societies dedicated to the effective deployment of simulation - such as the International Building Performace Simulation Association (IBPSA); appropriate training and continuing education; and the growth in small-to-medium sized practices offering simulation-based services.

This paper will attempt to outline the current state-of-the-art in integrated building performance simulation as a design tool. An example will be given of a software system where integrated simulation is a core philosophy behind the development. The current state and future developments are illustrated with examples. The importance of the interoperability is discussed in the area of fluid flow, air flow, computational fluid dynamics (CFD), HVAC systems, renewable energy systems, lighting, and power flow modelling.

The use of integrated simulation for performance prediction will be illustrated by one or two case studies regarding the design of HVAC systems.

Finally, the paper will argue that for building simulation to penetrate the design profession in the near future, there is a need for appropriate training and professional technology transfer initiatives, for example in the context of REHVA.

Professors J. Hensen and F. Drkal, Czech Technical University in Prague

Utilisation and Possibilities of Renewable Energy Sources in Hungary

F. Meszaros

president of ÉTE, Hungary

The price of fossil fuels and the pollution of the environment has risen considerably over the past years. As a result of this, renewable energy sources have spread significantly in Hungary. According to the Action Program of the government, their current utilisation, 28 PJ/year, will have to be raised to 50 PJ/year by 2010.

Thanks to its geographical position, Hungary is in favourable energy sources can play a major role in satisfying the country's energy demand. The author gives an overview of the utilisation and possibilities offered by the various renewable energy sources.