

# *ibpsa*NEWS

January 1990

International Building Performance Simulation Association, Inc.  
Post Office Box 282, Orleans, Ontario, CANADA K1C 1S7

Volume 3, Number 1

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## **BUILDING SIMULATION '89 A BIG SUCCESS!**

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IBPSA wishes to thank all who contributed to the success of Building Simulation '89, the society's first conference. Thank you to all of the speakers and attendees for an excellent technical dialogue. Thank you to the financial sponsors: Bonneville Power Administration, British Columbia Hydro, Electric Power Research Institute, Gas Research Institute, Public Works Canada, U. S. Army Corps of Engineers, and U. S. Department of Energy. And most of all, special thanks to the conference organizers: Carol Gardner, Ed Knipe, and Marianne Scott.

The conference was very successful and exceeded all expectations. There were 49 papers presented which were selected from 98 abstracts submitted. The total attendance was 170 persons from over a dozen countries. In addition, IBPSA picked up 56 new members in the process! Because IBPSA had virtually no funds at the time planning was initiated, the contributions from the financial sponsors were timely and crucial to the success of the conference. With the good turnout and the support of the sponsors, the meeting was financially successful, and it appears that IBPSA will have a solid financial surplus after all of the bills are paid. These funds will be used to solidify the IBPSA organization, improve member services, and plan new conferences. In fact, plans for Building Simulation '91, to be held in Europe, are well underway. Again, thanks to everyone who contributed to the success of Building Simulation '89!

**IBPSA GENERAL MEETING  
AND ELECTION OF OFFICERS**  
Saturday, February 10, 1990  
7:00-9:00 P.M., Room 311  
Georgia World Congress Center  
Atlanta, Georgia, USA

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## **FEBRUARY IBPSA MEETING TO BE HELD IN ATLANTA**

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The next meeting of IBPSA will be held on Saturday, February 10, in conjunction with the ASHRAE Winter Meeting in Atlanta, Georgia, USA. This general IBPSA meeting will begin at 7 p.m. and will be held in Room 311 of the Georgia World Congress Center in Atlanta. Highlighting this meeting will be the election of officers. See below for more information regarding the election. This meeting is open to anyone interested in building simulation; only paid IBPSA members may vote.

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## **WELCOME NEW IBPSA MEMBERS!**

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IBPSA gained 56 new members as a result of the Building Simulation '89 conference. We extend a hearty welcome to all of you and invite you to take an active role in the society. *ibpsaNEWS* is currently the society's primary publication and its content is shaped by the needs of the membership. If you have items to contribute or requests for future articles, please send it to the editors. For address and format information, please see the end of this newsletter. Back issues of *ibpsaNEWS* are available upon request.

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## **IBPSA TO ELECT OFFICERS AND BOARD OF DIRECTORS**

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*by Dwight Beranek, IBPSA Secretary*

The first regular election of officers and Board of Directors will be conducted at the IBPSA General Meeting in Atlanta this February. All paid up IBPSA members are eligible to vote.

A slate of officers and directors prepared by a nominating committee of current board members was presented to the members by letter from the secretary dated October 31, 1989. Additional nominations may be filed with the secretary (*See IBPSA TO ELECT on p. 2*)

**IBPSA TO ELECT (cont'd from p. 1)**

provided they are received prior to the January 11, 1990, deadline which is established in accordance with the IBPSA bylaws. All nominations received by that date will be presented to the members for a vote at the election.

The slate of officers and board members nominated by the committee are as follows:

**Officer Nominees**

**President:** Edward Sowell

**Vice President/President Elect:**  
Dan Seth

**Secretary:** Dwight Beranek

**Treasurer:** Taghi Alereza

**Board Nominees**

Jean LeBrun

Rik Van de Perre

Joe Clarke

Gren Yuill

Ed Knipe

Zulfi Cumali

Marx Ayres

Fred Winkelmann

Linda Lawrie

Robert Sonderegger

John Mitchell

If you have any questions or comments regarding the elections, please call the IBPSA Secretary, Dwight Beranek, at (202)272-0430.

**FEATURED RESEARCH TOPIC**

*by Henry Amistadi*

Periodically, the results of international surveys of current activities in a specific research area will be summarized in *ibpsaNEWS*. To help make sure that these surveys are of interest to the membership, please rank the following list of possible topics and send additional topic suggestions to the editors.

- Mathematical Techniques in Building Simulation
- Computer Codes and Building Simulation
- Computing Techniques in Building Simulation
- Integrated Databases and Building Simulation
- Building and Computer Standards Related to Building Simulation
- HVAC System Simulation
- Building Envelope Simulation
- Climatic and Meteorological Models for Building Simulation
- Occupant Usage and Scheduling Models for Building Simulation

**COMMITTEE REPORTS****Publications Committee**

The publications committee is working to improve the technical content of *ibpsaNEWS*. Several new departments appear in this issue and more are in the works. The currently planned departments are listed below:

- Officers' Report
- Forum
- Society News
- Committee Reports
- Research News
- Featured Research Topic
- Software Announcements and Reviews
- User Feedback
- Standards News
- Performance Data Exchange
- Member News
- Classified Advertising

**Your help is needed for a successful newsletter:**

The editors request your help with gathering information and writing articles, especially for news from outside North America. Please review the above departments and volunteer to help with one or more. Thank you in advance for your assistance.

**NEXT TIME IN EUROPE!  
BUILDING SIMULATION '91**

*by Rik Van de Perre*

The IBPSA BS '89 conference was a success, not the least for its truly international character. Participants from a dozen countries outside of North America showed up in Vancouver last June.

In various countries in Europe, several local associations with objectives similar to IBPSA's are already working to improve the state of the art, and the use in practice, of building simulation tools (ALMETH in France, BAG in Belgium, BEPAC in the UK, ...). International research in Europe in the field of environmental building performance assessment is defined by the International Energy Agency (IEA) and the Commission of the European Communities (CEC). The CEC has taken a leading role in supporting research programs in this field as well as efforts to harmonize building performance assessment methods in the scope of the European 1992 internal market.

In order to improve the international and trans-continental technology transfer, it has been decided to organize the next Building Simulation conference (BS '91) in Europe. 1991 is an appropriate moment to link up various complementary initiatives and to put them in a world-wide context.

At this point in time, it has been determined that a conference in Europe is feasible. A selection of an appropriate date and location is expected by the end of January 1990. A call for papers will be released by the end of February 1990.

The 1991 European conference will be an excellent opportunity for non-European corporations and researchers to explore new possibilities for cooperation and joint ventures with European organizations from both East and West. A significant contribution from North-American sponsors is expected, so costs for North-American participants can be reduced accordingly, ensuring in this way the same 'international' character that the Vancouver conference had.

More practical information about BS '91 will be published in the next IBPSA newsletter. However, further inquiries about the planned conference may be addressed immediately to:

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Pleinlaan 2  
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BELGIUM

FAX: 32/2/641.22.82  
E-mail: rvdperre@zone2.vub.ac.be

## UPCOMING CONFERENCES AND MEETINGS

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### *The 3rd International Conference on System Simulation in Buildings*

December 3-5, 1990

Liège, Belgium

*For more information, contact:*

Georges LIEBECQ  
University of Liège  
Laboratory of Thermodynamics  
Rue Ernest Solvay, 21  
B-4000 Liège  
Belgium  
Phone: 32-41-52.01.80  
Telex: 41.397 univlg b  
FAX: 32-41-52.54.39

### *The 3rd International Heat Pump Conference*

March 12-15, 1990

Tokyo, Japan

*For more information, contact:*

IEA Heatpump Centre  
FAO Mr. H. J. Laue  
Fachinformationszentrum Karlsruhe  
Leopoldshafen 2  
D-7514 Eggenstein  
FRG-West Germany

### *In-Situ Heat Flux Measurements in Buildings -- Applications and Interpretation of Results*

May 22-23, 1990

Hanover, New Hampshire, USA

*For more information, contact:*

Steve Flanders  
U.S. Army CRREL  
72 Lyme Road  
Hanover, New Hampshire  
USA  
Phone: (603)646-4302  
FAX: (603)646-4278

### *International Symposium on Energy, Moisture, Climate in Buildings*

September 3-6, 1990

Rotterdam, The Netherlands

Sponsored by CIB International Council of  
Building Research

### *Hypertext Standardization Workshop*

January 16-18, 1990

Gaithersburg, Maryland, USA

*For more information, contact:*

Jean Baronas  
B266 Technology Building  
NIST  
Gaithersburg, Maryland 20899  
USA  
Phone: (301)975-3338

### *IEA Workshop -- Field Monitoring -- For a Purpose*

April 2-5, 1990

Gothenburg, Sweden

*For more information, contact:*

Chalmers  
University of Technology S-41286  
Gothenburg  
Sweden

## SOFTWARE ANNOUNCEMENTS AND REVIEWS

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### *To all building performance simulation software developers:*

Please submit news releases announcing new products and significant product improvements. These announcements will be published in *ibpsaNEWS* free of charge.

## PERFORMANCE DATA EXCHANGE

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If you have used or tested a material or piece of equipment and have gained information that would be of interest to fellow IBPSA members, publish it here in the performance data exchange. Potential topic areas for this department include:

- Control Equipment Data and Protocols
- Building Component Data
- Mechanical Equipment Data
- Computer Hardware
- Instrumentation Equipment and Protocols

Coming in a future issue of *ibpsaNEWS* will be a review of some of the 386 computer hardware which is available in the USA.

## FORUM

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Dialogue of interest to the IBPSA membership may be submitted for publication in this section of *ibpsaNEWS*. Letters which are addressed to a specific IBPSA member will be forwarded to that person for reply prior to publication. The editors reserve the right to edit all submissions.

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To: George Walton  
From: Ed Sowell  
Subject: Sparse Matrix Methods vs. SPANK

George, in your paper at the Vancouver Building Simulation '89 Conference [Walton 1989] you attempted some comparisons between sparse matrix methods for building simulation and the techniques used in SPANK. While some of your points are valid; there are others I'd like to take issue with.

First, I must comment on your order-of-magnitude (asymptotic) comparison. For the sparse comparative you use your very special problem that does well with a particular sparse solver. But you compare this to the results of *randomly generated*

graphs for SPANK's reduction! Is that fair? If you look at actual HVAC networks [Sowell 1989], you will see that we get reductions of 50, not 4, so that if we accept your method of comparison the systems would have to be of the order of 100,000 before your method would be better. Even so, I believe (not proven) that if structure allows sparse solution in  $O(N^2)$ , so will the SPANK approach. Basically, you are working with a system in which the band width is constant as  $N$  grows; I believe the graph representation would show a direct relationship between the band width and the minimum cutset for this structure. More importantly, the graph method is general, whereas your approach, like most sparse methods, seems to be custom fitted to particular problems.

Second, I have to reject your idea that "if it's not sparse it's bad." You criticize SPANK for crunching the problem down to a small, dense Jacobian, but that's the whole point. Sparsity is the enemy of matrix methods because it means that vast amounts of memory and calculation cycles are wasted on zeros. (Said another way, the matrix is ill suited for representing sparse problems.) Therefore if we can represent the same problem with a smaller, denser matrix (for the necessary iterative portion of the problem) we have conquered the enemy, not lost the war!

Finally, while you do recognize a "convergence" between the matrix methods and SPANK methods, you seem to imply that the former has already arrived and SPANK is gradually coming to the same belated conclusions. You credit the sparse methods with all possible extensions and SPANK with none. For example, as you agreed in our e-mail dialogue, with either method we should break the problem into "separately solvable" pieces (strong components) *before* initiating the iterative solution. While SPANK does not do this at the moment, it is a relatively straightforward extension. You give no explicit acknowledgement of this advantage to SPANK. Yet you are quick to take credit for "ordering to maintain numerical stability," and "combined implicit and explicit methods" for the sparse approach, even though these are poorly defined concepts and not routinely done. Also, it seems obvious that to compete with SPANK's small cutset idea the sparse method has to attempt row-column interchanges so as to minimize the set that has to be solved simultaneously. To my knowledge, typical sparse packages *do not* include this step *for the general case*, and you don't mention it at all. I know that Lars Eriksson at the Swedish Institute of Applied

Mathematics is attempting this, but I have yet to see general algorithms published. On the other hand, it should not be difficult to develop such algorithms using the equivalent graph and cutset algorithms! But then I must ask, if it is not stored as a matrix, is not manipulated like a matrix, and certainly the original problems we are trying to model don't bring a matrix strongly into mind, what is the advantage of maintaining the fiction of a matrix at all? Is it to "take advantage of the sparse techniques?"

We both recognize we are shooting at moving targets: SPANK keeps improving, and "sparse techniques" covers a lot of ground so we are never quite sure exactly what we are comparing. That is why in our paper [Sowell 1989] Fred Buhl and I attempted to extrapolate both approaches to the limit for our comparison discussion, concluding that if both ideas are *pursued sufficiently far*, they should produce similar efficiencies. Even in this event, however, the matrix appears more and more to be valuable as a notational scheme at best, because the techniques that really get to the heart of the matter are based on underlying graphs.

#### References

Sowell, E. F. and W. F. Buhl. 1989. "Object-oriented Programming, Equation-based Submodels, and System Reduction in SPANK." *Proceedings of Building Simulation '89*, Vancouver, June 1989.

Walton, G. N. 1989. "Considerations for Advanced Building Thermal Simulation Programs." *Proceedings of Building Simulation '89*, Vancouver, June 1989.

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## RESEARCH NEWS

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by Henry Amistadi

Research news will include the following topics:

- New Releases
- Publications, Software, and Databases
- People in Research
- National and Laboratory Research Plans
- News from Other Societies

#### New Releases

A review of newly released publications and software from National Laboratories, ASHRAE, and Universities will appear in this department of *ibpsaNEWS*. Bibliographic citations will be collected in topical areas taken from the IBPSA research topics list.

If you work at a research institution, please add Henry Amistadi, P.O. Box 904, Brunswick, Maine, 04011, USA, to your mailing lists for annual reports, program summaries, and report bibliographies. This will help to insure that these listings are complete. If you know of any reports that have been missed in this listing, please send the complete citation to Henry Amistadi at the above address.

#### Publications

Abbreviations used in these citations:

- LBL Lawrence Berkeley Laboratory, Berkeley, California, USA.
- ORNL Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA.
- SERI Solar Energy Research Institute, Golden, Colorado, USA.
- DE Catalog Number for National Technical Information Service, Springfield, Virginia, USA.

#### Climate Data and Models

"Investigation of a Cloud-Cover Modification to SPCTRAL2, SERI's Simple Model for Cloudless-Sky, Spectral Solar Irradiance," SERI/TR-215-3038, DE87001177, June 1987, R. E. Bird, C. J. Riordan, and D. R. Myers.

"Extraterrestrial Spectral Solar Irradiance Data for Modeling Spectral Solar Irradiance at the Earth's Surface," SERI/TR-215-2921, DE87001179, C. J. Riordan.

*Building Envelopes and Heat Transfer: Envelope*  
 "Building Envelope Thermal Anomaly Analysis," ORNL/SUB/85-00294/1, B. S. Melton, P. Mulroney, T. Scott, and K. W. Childs.

#### *Building Envelopes and Heat Transfer: Thermal Break Systems*

"Structural Thermal Break Systems for Building -- Heat Transfer Characteristics of Lightweight Structural Concrete Walls," ORNL/SUB/84-21006/3, M. B. Van Geem.

"Heat Transfer Characteristics of Insulated Concrete Sandwich Panel Walls," ORNL/SUB/79-42539/8.

#### *Building Envelopes and Heat Transfer: Roofs*

"Cooling Energy Measurements of Single-Family Houses with Attics Containing Radiant barriers in Combination with R-11 and R-30 Ceiling Insulation," ORNL/CON-226, W. P. Levins and M. A. Karnitz.

"Model for Roof Thermal Performance," ORNL/CON-274, July 1989, K. E. Wolkes.

"Radiant-Barrier Research Plan," ORNL/CON-256, K. E. Wilkes and D. W. Yarbrough.

*Building Envelopes and Heat Transfer: Below Ground and Snow*

"Energy Efficient Building Foundation Design Handbook," ORNL/SUB/86-72143/1, Sept. 1989, Many authors from Underground Space Center, LBL, ORNL, and others.

*Building Envelopes and Heat Transfer: Infiltration*  
"Air Infiltration Measurement Techniques," LBL-27656, Aug. 1989, M. H. Sherman.

"Development and Validation of a Simplified Multizone Infiltration Model," LBL-23036, 1989, H. E. Feustel and J. L. Scartezzini

*Building Envelopes and Heat Transfer: Internal Convection*

"A Theoretical convection-Transport Model of Indoor Radon Decay Products," LBL-20096, July 1989, G. E. Schiller.

*Mechanical Systems: Furnaces*

"A combustion System Seasonal Efficiency Meter - A Preliminary Assessment of Laboratory Model," ORNL/SUB/85-53142/1, Noel Pearman.

*Mechanical Systems: Heat Pumps*

"Laboratory Study of the Dynamic Losses of s Single-Speed, Split-System Air to Air Heat Pump with Tube and Plate Fin Heat Exchanger," ORNL/CON-253, Sept. 1989.

*Mechanical Systems: Refrigerants*

"Measurements of Heat-Transfer Coefficients of Nonazeotropic Refrigerant Mixtures condensing Inside Horizontal Tubes," ORNL/SUB/81-7762/6&01, D. DeGrush and W. F. Stoecker.

"Absorption Fluids Data Survey: Final Report on Worldwide Data," ORNL/SUB/84-47989/3, R. A. Macriss, J. M. Gutraj and T. S. Zawacki.

*Mechanical Systems: Vents*

"A Model for Predicting Air Flow Through Venting Systems for Multiple Combustion Applications," LBL-23151, 1988, D. Dumortier and M. P. Modera.

"Jacket and Stack Losses From Multifamily Boilers," *Proceedings of the 1988 ACEEE Summer Study*, Asilomar, California, USA, M. P. Modera.

*Other Models: Natural and Artificial Lighting*

"A Daylight Design Tool Using Hypercard on the Macintosh," 3rd National Conference on Microcomputer Applications in Energy, LBL-26263, Nov. 1988, J. Schuman, R. Sullivan, S. Selkowitz, M. Wilde and M. Kroelinger.

*Computer Techniques: Simulation Studies*

"Thermal Mass -- BLAST Residential Parametric Simulations," ORNL/SUB/83-70373/1, Aug. 1989, W. L. Carroll, R. Sullivan, A. Mertol.

"An Analytical Investigation of Energy Use in Commercial Buildings," ORNL/CON-250, GRI-8770318, H. A. McLain, J. M. MacDonald, D. J. Downing.

*Computer Techniques: Integrated Software Techniques: Energy Kernel*

"Prototype Object-Based System for HVAC Simulation," *Proceedings of the Second Systems Simulation Conf.*, Liège, Belgium, LBL-22106, 1986, E. F. Sowell.

"Dynamic Extension of the Simulation Problem Analysis Kernel," LBL-26262, 1988, E. F. Sowell, W. F. Buhl.

*Computer Techniques: Software Reliability: Validation*

"International Energy Agency Design Tool Evaluation Procedure," SERI/TP-254-3371, July 1988, DE88001173.

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## CLASSIFIED ADVERTISING

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Place your advertisement in front of the key people in the building performance simulation field. Please contact the editors for rate information. Current classifications are:

- Announcements
- Books and Reports for Sale
- Employment
- Hardware for Sale
- Position Wanted
- Requests for Proposal
- Software for Sale

**IBPSANEWS NOW PRINTED ON  
RECYCLED PAPER**

*ibpsaNEWS* is now printed on recycled paper. As recycling efforts expand in the U.S. and around the world, it is important that we close the loop by using recycled products. Please do your part to encourage recycling and use of recycled products. As members of the world technical community, we have a responsibility to practice and promote the wise use of our resources.

**MEMBER NEWS**

*The following IBPSA members have changed jobs:*

**Jeff Haberl**  
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*Please submit information regarding promotions, moves, or other personal news of interest to the IBPSA membership. Please send to the address listed below; indicate clearly if any information should not be published.*

*ibpsaNEWS* is published periodically by the International Building Performance Simulation Association, Inc. The editors are Henry Amistadi and Michael Witte.

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If possible, please submit material in magnetic form on either IBM-PC (3.5 inch preferred, 5.25 inch acceptable) or Macintosh diskette or via electronic mail. Acceptable formats are: Microsoft Word (MS-DOS or Macintosh), MacWrite, ASCII text only, RTF interchange format, PICT format, PAINT format. Please do not hyphenate or justify ASCII text.

*Please include a printed copy of the material.*