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**Conference Overview Chart**

**General Information**
- Conference Information: 1-4
- Social Events: 3
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- Plenary Sessions: 4

**Compressor Engineering Conference Technical Program**

**Refrigeration & Air Conditioning Conference Technical Program**

**High Performance Buildings Conference Technical Program**

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### Registration for the Conference
Register for the conferences in the East Foyer of the Stewart Center on July 12-13, 2012. Registration is available at Room 110, Stewart Center from 8:00 a.m. to 4:30 p.m. on any other day after Monday, July 16th. Official receipts are received at check-in.

### Registration Fee
Includes attendance at any session for all conferences, a CD-ROM containing the proceedings for all conferences, copies of 20 papers, the Monday evening Reception, Tuesday Luncheon and Wednesday night's Steak Barbeque at The Trails and Thursday's box lunch.

**NOTE:** Thursday Box Lunches - Thursday's lunch will be free to attendees who stay through Thursday afternoon. You must have a ticket in order to pick up a box lunch. You may have received a ticket at registration but, if not, you need to sign up in Room 306 on Monday, July 16th.

### Conference Office
- Conference Office is located in Room 306 in the Stewart Center; Telephone Number: 765/ 494-8828.
- Messages will be posted on a bulletin board in Room 306 throughout the conferences. *Refreshments are available daily in Room 306.
- Conference attendees are asked to dispose of trash, bottles and cans that can be recycled in the proper containers provided.

### Paper Center
The Paper Center is located in Room 302, Stewart Center. Attendees may obtain copies of the conference papers by presenting the tickets from their attendees' bags. Additional CD-ROMs may be purchased during the conference at the Paper Center. Printed proceedings may be ordered at the Paper Center for delivery AFTER the conferences. The Paper Center can also help you with shipping needs.

### Operation Hours:
- Sunday afternoon: 4:00 p.m. to 6:00 p.m.
- Monday: 8:00 a.m. to 4:00 p.m.
- Tuesday: 8:00 a.m. to 4:00 p.m.
- Wednesday: 8:00 a.m. to 4:00 p.m.
- Thursday: 8:00 a.m. to 12:00 p.m.

**Tickets:** Each attendee receives tickets for 20 free papers. Additional tickets are available for $1 per paper.

### Banks and Credit Union Located Near the Purdue Campus (With ATM's)
- Regions Bank: Stadium Square Center, 728 Northwestern Avenue, West Lafayette, IN Telephone – 476-8205; Monday-Thursday 9:00 a.m. – 5:00 p.m.; Friday 9:00 a.m. – 6:00 p.m.
- Chase Bank: Chauncey Village, 210 West State Street, West Lafayette, IN Telephone – 423-0412 Monday – Friday 9:00 a.m. – 6:00 p.m.; Saturday 9:00 a.m. – 2:00 p.m.
- Purdue Employees Federal Credit Union: ATMs available at Purdue Memorial Union in the Stewart Center Lobby, Northwestern Avenue and Garfield Streets Monday – Friday 9:00 a.m. – 6:00 p.m.; Saturday 9:00 a.m. – 2:00 p.m.

### Breakfast for Presenters, Chairpersons and Vice Chairpersons
A complimentary brunch (on Monday) and breakfast (Tuesday – Thursday) is scheduled in the Purdue Memorial Union, West Faculty Lounge for presenters of technical papers scheduled for each day along with the Session Chairpersons and Vice Chairpersons. (Check the Conference Overview Chart in this book for times.). It is important to attend the speaker brunch or breakfasts if you are presenting a paper. Presentations will be loaded onto laptops at this time and you will meet your Session Chairperson and Vice Chairperson. Instructions concerning audio/visual/projection systems and technical session organization will be addressed. Presenters should attend the brunch or breakfasts only on the day of their scheduled presentation. If you have presentations scheduled for different days, you should attend the brunch or breakfasts each day so that you can meet your Session Chairperson and the other Presenters. If you are the Presenter in more than one session on the same day, please meet both Session Chairpersons. If you are a Presenter but not an author of a technical paper, you should be the person who attends this breakfast so that you may alert the Chairpersons that you are the Presenter.
Computer and Internet Access
Computers and Internet access will be available in the Conference Office, Room 306. Computers will be available for viewing conference CDs and accessing the Internet. Access to the computers will be limited and you may be asked to allow other attendees access if you exceed the posted time limit. Information that allows wireless access will be available at registration check in or make arrangements with Kathy Walters, Purdue Conferences.

Conference Venues
Advisory Committee Meetings
ASHRAE Student Meetings
Author Brunch & Breakfasts
Conference Office & Breaks
IIR Meetings
Luncheon
Meeting Rooms
Opening Session
Paper Room
Plenary Sessions
Reception
Steak Barbeque
Tours
Holiday Inn Lafayette – City Centre & Stewart Center
Stewart Center
Purdue Memorial Union, West Faculty Lounge
Stewart Center, Room 306, 3rd Floor
Stewart Center
Purdue Memorial Union, North & South Ballrooms
Stewart Center, 2nd and 3rd Floors
Stewart Center, Loeb Theatre
Stewart Center, Room 302, 3rd Floor
Stewart Center, Fowler Hall
Holiday Inn Lafayette – City Centre, Downtown Lafayette
The Trails, Burnett's Road, West Lafayette
Herrick Laboratories, Bowen Labs and InHome Solar Home on Tuesday

Directions to The Herrick Laboratories
Exit Stewart Center on the Loeb Theatre side, go out the door, turn left, walk toward State Street. Because there is construction on State Street this year, you may want to stay close to the north side of the street. At the stoplight on State Street, turn right (west), walk down State Street about four blocks. Turn left at the stoplight at the corner of Russell and State Streets, walk south on Russell about half a block, turn right (west) at the round-shaped Grounds Building. Walk west past the Grounds Building and enter the Herrick Laboratories at the main entrance (east). Maps are available in Room 306.

Display Center
There will be several tables available in the Conference Office/Refreshment Room, Stewart Center, Room 306. Please check with Mrs. Freeman before displaying any material on these tables. No commercialism is allowed. There is also a Bulletin Board where messages can be posted for other attendees or up-to-date information to the attendees posted by the Organizing Committee.

Ordering Proceedings and Conference Materials
You may order additional 2012 CD-ROMs for $100 each and the printed proceedings of each conference for $100 per conference that will be delivered after the conferences. You may pay for the CDs and printed proceedings at the Paper Room in Stewart Center, Room 302.

You can order prior conference and short course materials at Purdue's Printing Services Department. Printing Services has moved to a new location. Check with the personnel at the Paper Center or check the Purdue campus map for accurate location. Ask for Marti Hatke-Oteham.

Parking on Campus
Parking is available in garages on the Purdue campus. The Grant Street Garage is the closest garage to the Purdue Memorial Union and Stewart Center. Attendees may park in that garage for a maximum price of $10. Guests at the Union Club Hotel can park free. Visitors can purchase “A” garage permits or multiple day passes at the Parking facilities office (494-9494) Monday-Friday 7:30-4:30. Price is $5.00/day and allows parking in any garage EXCEPT Grant Street. Do not park in marked parking spaces or you will be ticketed. We are not able to get your ticket dismissed.

Pictures and Videotaping During the Conferences & Picture Phones
Conference attendees may NOT take pictures, videotapes, nor use picture phones at any presentation without the consent of the author or presenter. An official photographer will be taking pictures during the conferences. Attendees may NOT take pictures during the tours because the research is often highly sensitive.

Printing, Copying and Faxing
Attendees may print from a CD/disk/memory stick, make copies and send faxes at The BoilerCopy Maker in the Purdue Memorial Union, Second Floor. Charges vary for the different services. There are also businesses in The Village where attendees can find printers.

Program Format
The technical programs are continuous. In case of a “no show”, presentations will be moved up in the schedule.

Smoking Policies on Campus
As of July 1, smoking is prohibited on the West Lafayette Campus, except in designated smoking areas. All smoking material shall be extinguished and disposed of in an appropriate receptacle at the perimeter of the campus. Designated smoking areas are published in maps around the Purdue campus and there will be some available in Room 306. Please honor these no-smoking regulations.

Temperatures Inside & Outside During the Conferences
Outside summer temperatures in Indiana are usually between 75-95°F and very humid. Room temperatures in technical session rooms are often cool for our European visitors; come prepared!

Time during Conferences
The time in Indiana is Eastern Daylight Time. (Same time as New York City in the summer.)
Tours
There will be organized tours of The Ray W. Herrick Laboratories, Bowen Laboratories and INhome Solar Home on Tuesday hosted by students. Transportation will be provided but you may sign up for only one tour.

Transportation During the Conference
There will be organized transportation available for the Conference Social Events or you may choose to use your own vehicles. The Conference Hotels will provide shuttle service between the hotels and the Purdue Memorial Union. They do not operate on a regular schedule so you may call for pick-up service. Please make sure that you obtain a contact number for your hotel shuttle. The Greater Lafayette Transit System’s buses and trolleys will also be available. See the schedule on the flyer in your attendee packet.

Trolley Route

Hotel Locations on the Map & Telephone Contact Numbers

<table>
<thead>
<tr>
<th>Four Points by Sheraton</th>
<th>765/463-5511 (Located on U.S. 52, West of campus)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C</strong> The Union Club Hotel at Purdue University</td>
<td>765/494-8900</td>
</tr>
<tr>
<td><strong>G</strong> Holiday Inn -Lafayette City Center</td>
<td>765/423-1000</td>
</tr>
<tr>
<td><strong>B</strong> Hilton Garden Inn – West Lafayette Wabash Landing</td>
<td>765/743-2100</td>
</tr>
<tr>
<td><strong>C</strong> University Residences</td>
<td>765/494-0926 (Located at C or D)</td>
</tr>
</tbody>
</table>

Limo Service to and from Indianapolis and Chicago Airports
Lafayette Limo Service provides service to and from the Indianapolis International Airport. 765/497-3828 or laflimo@lafayettelimo.com
Star of America shuttle service to and from the Indianapolis International Airport 1/800-933-0097 or StarofAmerica.com
Express Air Coach provides shuttle service to and from the Chicago O’Hare Airport 765/743-3120 or expressaircoach.com
Check their websites. Attendees must contact the companies themselves.

Taxi Cab Service
City Cab 765/477-1234
Four Star Taxi 765/742-8400

Train Service
Amtrak 800/872-7245 Riehle Plaza/Big Four Depot, 200 North 2nd Street
Greyhound Bus 800/231-2222 Riehle Plaza/Big Four Depot, 200 North 2nd Street or 765/742-8836

Rental Cars Available in Area
See List in Room 306

SOCIAL EVENTS
These events are included in your registration fee.

Monday, July 16th – Reception at the Holiday Inn Lafayette - City Centre, Lafayette, Indiana
The reception is hosted by Grundfos Pumps Corporation of Olathe, Kansas and will be held from 6:00 to 8:00 p.m. at the Holiday Inn Lafayette - City Centre in Downtown Lafayette. Shuttle buses will depart from the Grant Street Parking Garage between 5:45 and 6:00 p.m. transporting attendees and guests to the reception. Attendees may also use CityBus and the Trolleys or walk to the Reception. There will be transportation available after the Reception for return to Purdue. You may need to arrange shuttle service with your individual hotels. Some local restaurants and bars are open on Monday evenings in downtown Lafayette and the Purdue campus.

Tuesday, July 17th – Luncheon – Purdue Memorial Union, North & South Ballrooms
The buffet luncheon will be held from 12:00 to 1:30 p.m. It is hosted by Danfoss, Inc.

Wednesday, July 18th – Steak BBQ – The Trails Banquet Facility, West Lafayette
The informal steak barbeque will be held from 6 p.m. to dusk and is hosted by Emerson Climate Technologies. Buses will begin departing from the Grant Street Parking Garage across from the Union Club Hotel at 5:45 p.m. The last bus will leave at approximately 6:15 p.m. for the barbeque. There will be games and a beer wagon and a chance to visit outside. The buses will return attendees and guests to the Purdue Memorial Union, University Inn, Holiday Inn and the Hilton Garden Inn after the barbeque. You may also drive your own vehicle to this venue.
Directions: From Grant Street Parking Garage, exit on North Street, turn left. Turn right on Grant Street, turn right on Northwestern Avenue (stop light) immediately curve left on Wiggins Street. Follow US 231 (on right) down the hill to State Road 43 North. Turn left on State Road 43 North. Proceed 5-1/2 miles to Burnetts Road, turn right. The Trails will be on your right.

KEYNOTE & PLENARY SESSIONS & Tuesday LUNCHEON

MONDAY, July 16 • 9:30 to 11:30 a.m. • Opening Session, Welcome and Keynote Address (Loeb Theatre, Stewart Center)
Prof. Dr. Jean-Louis Scartezzini of the Solar Energy and Building Physics Laboratory and the Swiss Federal Institute of Technology in Lausanne, Switzerland will speak on “Toward Net Zero Energy Buildings: Here and Now”.

TUESDAY, July 17 • 8:30 to 9:30 a.m. • Plenary Session (Fowler Hall, Stewart Center)
Marcio Luiz Todescat, R&D Procurement Vice President, Embraco, Brazil will speak on “Domestic Refrigeration: Historical aspects and Future Prospects”.

TUESDAY, July 17 • 12:00 to 1:30 p.m. • Luncheon in North and South Ballrooms, Purdue Memorial Union
Dr. Gerald Hines of Hines, Inc., Houston, Texas, USA will speak on “Future Buildings and Planning of Urban Communities”.

WEDNESDAY, July 18 • 8:30 to 9:30 a.m. • Plenary Session (Fowler Hall, Stewart Center)
Dr. Joost J. Brasz, Danfoss Turbocor Compressors, Inc., Syracuse, NY, USA will speak on “Past, Present and Future of Turbo Machinery in the HVAC&R Industry”.

THURSDAY, July 19 • 8:30 to 9:30 a.m. • Plenary Session (Fowler Hall, Stewart Center)
Dr. J. Michael McQuade, United Technologies Corporation, Hartford, CT, USA will speak on “Grand Challenges in Increasing Energy Efficiency in Buildings”.
All sessions will be in Stewart Center unless otherwise noted.

Chair — W. Travis Horton, Assistant Professor of Civil Engineering, Purdue University

Paper Presenter, Session Chairpersons & Vice Chairpersons Breakfast
If you are the Presenter of a paper, a Session Chairperson or a Vice Chairperson, please attend the complimentary breakfast or brunch on the day of your presentation(s). Presentations will be loaded onto laptops at this time. Final instructions will be given concerning how the session will be conducted and you will meet the other Presenters and Chairperson in your session. If you are the Presenter in more than one session on the same day, please contact both Session Chairpersons.

Presentations at the Conference
Each Presenter will have fifteen minutes for presentation and five minutes for discussion. If time permits, the Session Chairperson may extend the discussion period. No Videotaping, Pictures or Picture Phones are allowed without the Author’s Permission.

MONDAY — JULY 16, 2012 SESSIONS

C-1: Selected Student Research Papers
Room 310  Monday, July 16, 2012  12:30pm - 3:00pm

ID: 1133
A Sensitivity Analysis of a Miniature-Scale Linear Compressor for Electronics Cooling using a Comprehensive Model
Craig Bradshaw, Eckhard A. Groll, Garimella Suresh
Purdue University, United States of America

ID: 1169
Modelling of an Air Compressor Using Energetic Macroscopic Representation
Mahbod Heidari, Martel Tsirinomeney, Alfred Rufer, Philippe Barrade
LEI,EPFL, Switzerland

ID: 1307
Theoretical Study of a Novel Multi Vane Rotary Compressor
Abd Rahim Mat Sarip1, Md Nor Musa2
1Universiti Pertahanan Nasional Malaysia, Malaysia; 2Universiti Teknologi Malaysia, Malaysia

ID: 1438
Elasto-Hydrodynamic Lubrication Effect in Thrust-Slide Bearings of Scroll Compressors
Noriaki Ishii1, Takuma Tsuji1, Tatsuya Oku1, Keiko Anami4, Takashi Morimoto5, Atsushi Sakuda5, Kiyoshi Sawa5, Charles W. Knisely6
1Dept. of Mechanical Engineering, Osaka Electro-Communication University, Japan; 4Research and Development Center, Mayekawa MFG. Co., Ltd., Japan; 5Dept. of Mechanical Engineering, Ashikaga Institute of Technology, Japan; 6Air-Conditioning and Cold Chain Development Center, Corporate Engineering Division, Appliances Company, Panasonic Corporation, Japan.; 7Dept. of Mechanical Engineering, Hiroshima Institute of Technology, Japan.; 8Dept. of Mechanical Engineering, Bucknell University, USA.

ID: 1567
Aditya Mushyam, Josep M Bergada
Technical University of Catalunya, Spain

ID: 1576
CFD Modelling in Screw Compressors With Complex Multi Rotor Configurations
Sham Ramchandra Rane, Ahmed Kovacevic, Madhulika Kethidi
Centre for Positive Displacement Compressor Technology, City University, United Kingdom

ID: 1585
Numerical Study on Rotor Deformation of Multiphase Twin-Screw Pumps Under High Gas Volume Fraction Conditions
Bin Hu, Feng Cao, Ziwen Xing
Xi'an Jiaotong University, People's Republic of China
C-2: Rotary Compressors
Room 314  Monday, July 16, 2012  12:30pm - 3:00pm

ID: 1227
Improvement of Abnormal Wear Between The Vane-lot And Vane In Rotary Compressor
Bo Huang, Guoqiang Gao
Shanghai Hitachi Electrical Appliances Co., Ltd., People's Republic of China

ID: 1207
Modal Analysis of the Rotor-Journal Bearing System of Rotary Compressor
Zengli Wang, Quanke Feng, Fangyuan Zhang, Xiaoling Yu
Xi'an Jiao Tong University, People's Republic of China

ID: 1202
CFD Analysis of Oil Discharge Rate in Rotary Compressor
Liying Deng, Shebing Liang, Qiang Liu, Jun Wu, Jia Xu
Compressor and Motor Institute of Gree Electric Appliances, Inc. of Zhuhai, People's Republic of China

ID: 1205
Research On The Properties Of Rotary Compressor Vane Coating
Chunhui Liu, Yang Liu, Jian Cai
Shanghai Hitachi Electrical Appliances Co., Ltd., People's Republic of China

C-3: Scroll Compressors I
Room 310  Monday, July 16, 2012  3:20pm - 5:20pm

ID: 1371
Derivation of Optimal Scroll Compressor Wrap for Minimization of Leakage Losses
Ian H. Bell1, Eckhard A. Groll2, James E. Braun3, W. Travis Horton4
1Bell Thermal Consultants, United States of America; 2Purdue University, United States of America

ID: 1380
Numerical Simulation of Wrap Scroll Temperature for Refrigeration and Air Conditioning Compressors
Jordi Rovira, Joaquim Rigola, Carlos D. Pérez-Segarra, Assensi Oliva
CTTC - UPC, Spain

ID: 1365
Development of DC Inverter Scroll Compressor used for Marine Container Refrigeration Unit
Tomomi Yokoyama, Katsumi Kato, Nobuhiro Nojima, Keiji Yoshimura, Hiroshi Kitaura
DAIKIN Industries, Ltd., Japan

ID: 1222
Visualization of Flow in Scroll Compressor by Radiography
Masatsugu Chikano1, Hayato Shimizu2, Takeshi Tsuchiya2, Kenji Tojo2
1Hitachi Research Laboratory / Hitachi, Ltd., Japan; 2Shimizu Air Conditioning Works / Hitachi Appliances, Inc., Japan

ID: 1373
R410A Scroll Compressor Design Verification used with Finite Element Analysis
Yangguang Liu, Yueh-ju Tang, Yu-Choung Chang
Industrial Technology Research Institute, Taiwan, Republic of China

C-4: Reciprocating Compressors
Room 314  Monday, July 16, 2012  3:20pm - 5:20pm

ID: 1340
Design and Development of Three Phase Permanent Magnet Brushless DC (PM BLDC) Motor for Variable Speed
Srinivas Mallampalli, Adnan Bohori, Subhrajit Dey
General Electric, India

ID: 1443
Calculated Optimal Mechanical Efficiency of a Large Capacity Reciprocating Compressor
Takuma Tsuji1, Tatsuya Oku1, Noriaki Ishii1, Keiko Anami1, Charles W. Knisely2, Takashi Maeda1, Atsushi Yamamoto2
1Dept. of Mechanical Engineering, Osaka Electro-Communication University, Japan; 2Research and Development Center, Mayekawa MFG. Co., Ltd., Japan.; 3Dept. of Mechanical Engineering, Ashikaga Institute of Technology, Japan.; 4Dept. of Mechanical Engineering, Bucknell University, USA.
ID: 1184
An Experimental and Numerical Analysis of Refrigerant Flow Inside the Suction Muffler of Hermetic Reciprocating Compressor
Dr. Kemal Sarıoğlu, Ahmet Refik Ozdemir, Emre Oğuz, Atilla Kaya
Arçelik A.S. Research & Development Center Tuzla, 34950, Istanbul, Turkey

ID: 1226
Simulation of Reciprocating Compressor Start-Up and Shut down under Loaded and Unloaded Conditions
Vasillaq Kacani
Leobersdorfer Maschinenfabrik GmbH & Co.KG, Austria

ID: 1276
A Simplified CFD Model for Simulation of the Suction Process Of Reciprocating Compressors
Evandro L. L. Pereira, Claudio J. Santos, Cesar J. Deschamps, Rodrigo Kremer
1Embraco - Research and Development Group, Brazil; 2Federal University of Santa Catarina,Brazil

TUESDAY — JULY 17, 2012 SESSIONS

C-5: Valves I
Room 310  Tuesday, July 17, 2012  9:30am - 12:00pm

ID: 1345
A Procedure to Optimize Reed Type Valves Considering Efficiency and Bending Fatigue
Ernane Silva, Cesar J. Deschamps, Eduardo A. Fancellu
Federal University of Santa Catarina, Brazil

ID: 1314
On the Modification of Suction Valves Aperture of a Reciprocating Compressor
Gustavo Myria1, Andrey Silva2, Arcanjo Lenzê1, Claudio Pellegrini2
1Federal University of Santa Catarina, Brazil; 2Federal University of Santa Maria, Brazil; 3Embraco, Brazil

ID: 1283
An Efficient Immersed Boundary Method for Solving the Unsteady Flow through Actual Geometries of Reed Valves
José Luiz Gasche1, Franco Barbi1, Milena Martins Villar2
1Ufes - Ilha Solteira, Brazil; 2Federal University of Uberlandia, Brazil

ID: 1126
Modeling the Stiction Effect in Automatic Compressor Valves
Rodrigo Adrian Pizarro-Recabarren, Jader Barbosa Jr., Cesar J. Deschamps
Federal University of Santa Catarina, Brazil

ID: 1252
A Valve Design Methodology For Improved Reciprocating Compressor Performance
Aditya Bhakta1, Sandeep Dhar1, Vaibhav Bahadur1, Shruti Angadi1, Subhrajit Dey1
1General Electric Global Research Center, Bangalore, India; 2General Electric Global Research Center, Niskayuna, NY, USA

C-6: Alternative Refrigerants
Room 314  Tuesday, July 17, 2012  9:30am - 12:00pm

ID: 1162
Development of R744 Two Stage Compressor for Commercial Heat Pump Water Heater
Youhei Hotta1, Yoshiyuki Kimata1, Hajime Sako2, Hiroyuki Kobayashi1, Hisao Mizuno1
1Mitsubishi Heavy Industries, Ltd. Air-Conditioning & Refrigeration Systems, System Headquarters, Japan; 2Mitsubishi Heavy Industries, Ltd Nagoya Research and Development Center, Japan

ID: 1113
Compressor Performance Comparison When Using R134 and R1234YF as Working Fluids
Kim Tiow Ooi
School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

ID: 1332
Research of R290 Compressor Effect on RAC System Charge Amount
Bin Gao, Zhenhua Chen, Qiang Gao
Guang Dong Meizhi Compressor Limited, People's Republic of China

ID: 1336
Minimum Viscosity for Bearing Reliability in R290 Rotary Compressors
Xingbiao Zhou
Guangdong Meizhi Compressor Co. Ltd., People's Republic of China
C-7: Noise, Vibration and Harshness I
Room 310  Tuesday, July 17, 2012  1:40pm - 3:40pm

ID: 1200
The Experimental And Simulation Analysis Of The Transmission Loss Of The Muffler In The Rotary Compressor
Rongting Zhang, Huanhuan Gu, Jia Xu
Gree Electric Appliances, Inc. of Zhuhai, Peoples Republic of China

ID: 1437
Topology Optimization of Suction Muffler for Noise Attenuation
Jin Woo Lee, Dong Wook Choi
Ajou University, Korea, Republic of (South Korea)

ID: 1304
Gas Pulsations: A Shock Tube Mechanism
Paul Xiubao Huang
Hi-Bar MC Tech. LLC., United States of America

ID: 1419
Sound Attenuation in Elliptic Mufflers Using a Regular Perturbation Method
Subhabrata Banerjee, Anthony M. Jacobi
University of Illinois at Urbana Champaign, United States of America

ID: 1181
The Influence of Optimization Algorithm on Suction Muffler Design
Talita Wajczyk, Rodrigo Link
Embraco, Brazil

C-8: Novel Compressors I
Room 314  Tuesday, July 17, 2012  1:40pm - 3:40pm

ID: 1349
Development of a New Mechanism for Dual Rotary Compressor
Koji Hirano, Jafet Monasry
Toshiba Carrier, Japan

ID: 1111
Investigation of the Centrifugal Force Effect to a Revolving Vane (RV) Machine
Alison Subiantoro, Kim Tiow Ooi
School Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

ID: 1154
Internal Cooling of the Piston Rod in Non-Lubricated Piston Compressors
Christiane Hammer, Gotthard Will, Ullrich Hesse
TU Dresden, Germany

ID: 1257
Performance and Operating Characteristics of a Novel Rotating Spool Compressor
Joe Orosz¹, Greg Kemp¹, Craig Bradshaw¹, Eckhard A. Groll²
¹TORAD Engineering, United States of America; ²Purdue University, Ray W. Herrick Laboratories, United States of America

ID: 1259
Spool Seal Design and Testing for the Spool Compressor
Greg Kemp¹, Joe Orosz¹, Craig Bradshaw¹, Eckhard A. Groll²
¹TORAD Engineering, United States of America; ²Purdue University, Ray W. Herrick Laboratories, United States of America

ID: 1142
A Comprehensive Model of a Novel Rotating Spool Compressor
Craig Bradshaw¹, Greg Kemp¹, Joe Orosz², Eckhard A. Groll¹
¹Purdue University, United States of America; ²Torad Engineering LLC, United States of America
ID: 1291
Development of Dual Compressor System using Compressor Combined with Expander for CO2-Heat-Pump Hot Water Heating System
Yu Shiotani, Takeshi Ogata, Masanobu Wada, Osamu Kosuda
Panasonic Corporation, Japan

C-9: Lubrication I
Room 310 Tuesday, July 17, 2012 4:00pm - 6:00pm

ID: 1410
Solubility Study in Hermetic Reciprocating Compressor to Remove an Alien Noise at Starting Household Refrigerator
Yongyeoun Kim
Comp R&D Group/Samsung Electronics, Korea, Republic of (South Korea)

ID: 1439
An Experimental Study of Lubrication in Thrust Slide-Bearings of Scroll Compressors - Effect of Thickness and Inside Form of Thrust Plate -
Takuma Tsuji1, Noriaki Ishii1, Tatsuya Oku2, Keiko Anami1, Kouichi Nokiyama1, Charles W. Knisely4, Takashi Morimoto2, Atsushi Sakuda2, Hiroaki Nakai2, Kiyoshi Sawai1
1Dept. of Mechanical Engineering, Osaka Electro-Communication University, Japan; 2Research and Development Center, Mayekawa MFG. Co., Ltd., Japan; 3Dept. of Mechanical Engineering, Ashikaga Institute of Technology, Japan; 4Air-Conditioning and Cold Chain Development Center, Corporate Engineering Division, Appliances Company, Panasonic Corporation, Japan; 5Dept. of Mechanical Engineering, Hiroshima Institute of Technology, Japan; 6Dept. of Mechanical Engineering, Bucknell University, USA

ID: 1583
An Investigation of Refrigerant Oil Retention in an Air Conditioning System with Two Inverter Compressors in Parallel
Cheng-Shu Kuo, Wei-Yueh Cheng, Wen-Der Hsieh, Yangguang Liu
Industrial Technology Research Institute, Taiwan, Peoples Republic of China

C-10: Noise, Vibration and Harshness II
Room 314 Tuesday, July 17, 2012 4:00pm - 6:00pm

ID: 1482
Acoustic Calculation With the Free Solver Code_Aster
David Leray1, Yvon Goth2
1Tecumseh Europe, France; 2CETIM, France

ID: 1151
Nearfield Acoustical Holography Research & Application On Compressor & Refrigerator
Xu Jianwen1, Fabian Fagotti2, Weikang Jiang3
1Beijing Embraco snowflake compressor Company Ltd., People's Republic of China; 2Beijing Embraco Snowflake Compressor Company Ltd., People's Republic of China; 3Shanghai Jiao Tong University, Institute of Vibration, Shock & Noise, People's Republic of China

ID: 1436
Comparison of the Sound Quality Characteristics for the Outdoor Unit according to the Compressor Model.
Sang-Gil Park, Jeong-Taek Park, Ki-Won Seo, Gil-Bong Lee
LG Electronics, Korea, Republic of (South Korea)

ID: 1199
Identifying Noise And Vibration Of The Discharge Stage In The Rotary Compressor Based On Angle Domain Analysis Method
Huanhuan Gu, Rongting Zhang, Jia Xu
Gree Electric Appliances, Inc. of Zhuhai, Peoples Republic of China

ID: 1415
The Correlation between Noise of Outdoor Unit and Thermodynamic Properties of Cycle at Transient Condition of Room Air Conditioner
Youngboo Son, Seungmock Lee, Jonghun Ha, Byeongchul Lee
LG Electronics, Korea, Republic of (South Korea)
C-11: Screw Compressors I
Room 310       Wednesday, July 18, 2012       9:30am - 12:00pm

ID: 1427
Noise and Vibration Characteristic Studies of Twin Screw Compressor in Different Operating Conditions
Bor-Tsun Wang1, Chang-Hung Hsieh1, Wen-Chi Wang1, Chia-Liang Liu2
1Department of Mechanical Engineering, National Pingtung University of Science and Technology, Pingtung, 912, Taiwan; 2Hanbell Precise Machinery Co., LTD., Taoyuan, 328, Taiwan

ID: 1520
Screw Compressor Rotor Profile Defined For Appropriate CMM Measurement
Lars Sjöholm, YoungChun Ma, Cody Kleinboehl
Ingersoll Rand Climate Solutions/Thermo King, United States of America

ID: 1138
Investigation of Start Up Process in Oil Flooded Twin Screw Compressors
Ekaterina Chukanova, Nikola Stosic, Ahmed Kovacevic, Ashvin Dhunput
City University London, United Kingdom

ID: 1454
Some Aspects of Estimating Geometric Characteristics of Screw Compressors
David Buckney1,2, Ahmed Kovacevic1,2, Elvedin Mujic1, Nikola Stosic2
1Howden Compressors Ltd., United Kingdom; 2City University London, Centre for Positive Displacement Compressor Technology, UK; 3Bitzer Kühlmashinenbau GmbH, Germany

ID: 1281
Non-Uniform Clearance between Rotor Surfaces and Its Effect on Machine Performance in Twin-Screw Compressors
Hsiang-Hui Hsiao, Yu-Ren Wu, Ho-Chun Hsieh
Department of Mechanical Engineering, National Pingtung University of Science and Technology, Taiwan, R.O.C

ID: 1272
Design and Performance Evaluation of a Twin Screw Water Vapor Compressor
Zhi-long He, Jiubing Shen, Wenqing Chen, Ziwen Xing
School of Energy and Power Engineering, Xi’an Jiaotong University, People’s Republic of China

C-12: Scroll Compressors II
Room 314       Wednesday, July 18, 2012: 9:30am - 12:00pm

ID: 1249
Development of a R744 Low Side Variable Speed Scroll Compressor for Bottle Cooler Application
Yueh-ju Tang, Yangguang Liu
Industrial Technology Research Insitute, Taiwan

ID: 1267
Performance of the Use of Plastics in Oil-Free Scroll Compressors
Bryce R Shaffer1,2, Eckhard A. Groll1
1Purdue University; 2Air Squared, USA

ID: 1268
Parametric Representation of Scroll Geometry with Variable Wall Thickness
Bryce R Shaffer1,2, Eckhard A. Groll1
1Purdue University, United States of America; 2Air Squared, USA

ID: 1274
A Numerical Study of Convective Heat Transfer in the Compression Chambers of Scroll Compressors
Evandro L. L. Pereira, Cesar J. Deschamps
Federal University of Santa Catarina

ID: 1341
A Lumped Thermal Parameter Model for Scroll Compressors Including the Solution of the Temperature Distribution along the Scroll Wraps
Marco C. Diniz1, Evandro L. L. Pereira2, Cesar J. Deschamps2
1Federal University of Santa Catarina, Brazil; 2Embraco, Brazil
C-13: Lubrication II  
Room 310 Wednesday, July 18, 2012 1:00pm - 3:00pm

ID: 1127  
Analytical and CFD Modeling of the Fluid Flow in an Eccentric-Tube Centrifugal Oil Pump for Hermetic Compressors  
Marcus Alves, Jader Barbosa Jr., Alvaro Prata  
Federal University of Santa Catarina, Brazil;  

ID: 1407  
The Research On The Performance Of Oil-gas Cyclone Separators In Oil Injected Compressor Systems With Considering The Collision And Breakup Of Oil Droplets  
Xiang Gao, Yaopeng Zhao, Xin Yang, Yunfeng Chang, Xueyuan Peng  
Xi'an Jiaotong University, People's Republic of China  

ID: 1301  
The Friction And Wear Characteristic Of Fe-based P/M Materials In Scroll Compressor  
Zhengliang Shi  
Free Electric Appliance, Inc. of Zhuhai, People's Republic of China;  

ID: 1140  
An Experimental Study of Refrigerant Desorption from a Refrigerant-Oil Mixture Subjected to Rapid Depressurization  
Fabio Fortkamp, Moises Marcelino Neto, Jader Barbosa Jr.  
Federal University of Santa Catarina, Brazil  

C-14: Noise, Vibration, and Harshness III  
Room 314 Wednesday, July 18, 2012 1:00pm - 3:00pm

ID: 1120  
Comparing FEM Transfer Matrix Simulated Compressor Plenum Pressure Pulsations to Measured Pressure Pulsations and to CFD Results  
Keith Novak, Jack Sauls  
Ingersoll Rand - Trane, United States of America  

ID: 1121  
Incorporating 3D Suction or Discharge Plenum Geometry into a 1D Compressor Simulation Program to Calculate Compressor Pulsations  
Jack Sauls, Keith Novak  
Ingersoll Rand - Trane, United States of America  

ID: 1201  
Abnormal Compressor Noise Diagnosis Using Sound Quality Evaluation And Acoustic Array Method  
Jinquan Zhang, Rongting Zhang, Huanhuan Gu, Zhiming Wen, Jia Xu  
Gree Electric Appliances, Inc. of Zhuhai, People's Republic of China  

ID: 1302  
Identification of Energy Path in the Interaction between Compressor and Refrigerator  
Giovanni Bra In 1, Otávio Santini Junior 2, Edmar Baars 3, Renato Barbieri 3, Claudio Pellegrini 2, Olavo Silva 1, Arcanjo Lenzi 1  
1Federal University of Santa Catarina, Brazil; 2Empresa Brasileira de Compressores - Embraco, Brazil; 3State University of Santa Catarina, Brazil  

ID: 1315  
Rigid-Frame Porous Material Acoustic Attenuation on Compressor Discharge  
Paulo Henrique Mareze 1, Arcanjo Lenzi 1, Claudio Pellegrini 2  
1Federal University of Santa Catarina, Brazil; 2Embraco, Brazil  

C-15: Linear Compressors  
Room 310 Wednesday, July 18, 2012 3:20pm - 5:20pm

ID: 1134  
Linear Compressors for Electronics Cooling: Energy Recovery and the Useful Benefits  
Craig Bradshaw, Eckhard A. Groll, Suresh Garimella  
Purdue University, United States of America  

ID: 1115  
Performance Investigation of Linear Compressor With One Side Springs  
Huiming Zou 1, Shuangquan Shao 1, Mingsheng Tang 1,2, Liguang Zhang 1,2, Guohong Peng 1,2  
1Technical institute of physics and chemistry, CAS, China, People's Republic of; 2Graduate University of Chinese Academy of Sciences, People's Republic of China  

ID: 1453  
Study on Iron Loss in Two Kinds of Moving-magnet Linear Motors  
Longyi Wang 1,2, Chaoyong Xiong 2, Yinong Wu 1, Zhihua Gan 1  
1Institute of Refrigeration and Cryogenics, Zhejiang University, China, People's Republic of; 2Shanghai Institute of Technical Physics, Chinese Academy of Science, People's Republic of China
C-16: Modeling I
Room 314  Wednesday, July 18, 2012: 3:20pm - 5:20pm

ID: 1182
Effect of the Turbulence Modeling in the Prediction of Heat Transfer in Suction Mufflers
Tadeu Tonheiro Rodrigues, Rodrigo Link
Embraco, Brazil

ID: 1246
Thermal Modelling for the Motor in Semi-hermetic Screw Refrigeration Compressor under Part-load Conditions
Wenqing Chen, Jiebing Shen, Zhilong He, Huagen Wu, Zwen Xing
School of Energy and Power Engineering, Xi’an Jiaotong University, People’s Republic of China

ID: 1343
A Heat Transfer Model Combining Differential and Integral Formulations for Thermal Analysis of Reciprocating Compressors
Joel Sanvezzo Jr, Cesar J. Deschamps
Federal University of Santa Catarina, Brazil

ID: 1568
Theoretical and Experimental Analysis of the Superheating in Heat Pump Compressors
Jose Nilton Fonseca, Rodrigo Kremer, Thiago Dutra
EMBRACO - Whirlpool S.A. Compressor Unit, Brazil

ID: 1342
Development of an In-Cylinder Heat Transfer Correlation for Reciprocating Compressors
Femanda P. Di Conzzi, Cesar J. Deschamps, Evandro L. L. Pereira
Federal University of Santa Catarina, Brazil

ID: 1546
Working Fluid Selection and Operating Maps for Organic Rankine Cycle Expansion Machines
Sylvain Quoilin, Sébastien Declaye, Arnaud Legros, Ludovic Guillaume, Vincent Lemort
University of Liège, Belgium

THURSDAY – JULY 19, 2012 SESSIONS

C-17: Measurement Techniques
Room 310  Thursday, July 19, 2012  9:30am - 12:00pm

ID: 1163
Use Of New Generation Instruments In Measurement Of New Steam Expander
Ashvin Dhunput, Ian K Smith, Nikola Stosic, Ahmed Kovacevic
City University London, United Kingdom

ID: 1288
Development of Performance Test Facility of Positive Displacement CO2 Refrigerant Compressor
Rujin Wang, Xiuping Zhang, Lei Jia, Yu Zhong, Yawei Wu
State Key Laboratory of Compressor Technology, Hefei General Machinery Research Institute, People’s Republic of China

ID: 1338
A New Mechanical Oil Sensor Technology
Weihua Guo, Qiang Liu, Ruqiang Wang, Hongshan Li
Emerson Climate Technology Suzhou R&D Co., Ltd, People’s Republic of China

ID: 1405
Multivariable Identification and Control of a Calorimeter Used for Performance Evaluation of Refrigerant Compressors
Rodolfo C. C. Flesch1, Julio E. Normey Rico1, Carlos A. Flesch1, André P. Rosa2
1Universidade Federal de Santa Catarina, Brazil; 2Whirlpool / Embraco, Brazil

ID: 1418
Development of New High-Side Shell Scroll Compressor with Real-Time Oil Level Sensor
Byungkil Yoo1, Seheon Choi1, Inho Won1, Inwon Park2, Byeongchul Lee1, Kwangnoh Eom2, Jeonghun Kim2
1LG electronics, EC R&D Lab., Republic of (South Korea); 2LG electronics, EC Business unit, Republic of (South Korea)

ID: 1532
Theoretical and Experimental Study of Signal Processing Techniques for Measuring Hermetic Compressor Speed through Pressure and Current Signals
Miguel Burg Demay1, Carlos A. Flesch1, Rodolfo C. C. Flesch1, Cesar A. Penz1, André P. Rosa2
1Universidade Federal de Santa Catarina, Brazil; 2Whirlpool / Embraco, Brazil
C-18: Novel Compressors II
Room 314  Thursday, July 19, 2012  9:30am - 12:00pm

ID: 1581
Development of Lightweight and High Efficiency Swing Type Compressor using New Interior Permanent Magnet Synchronous Motor
Tempei Sekiguchi
Daikin Industries, Ltd., Japan

ID: 1561
Modeling of a Novel Spool Compressor With Multiple Injection Ports
Margaret M. Mathison¹, James E. Braun², Eckhard A. Groll²
¹Marquette University, United States of America; ²Purdue University, United States of America

ID: 1258
Spool Compressor Tip Seal Design Considerations and Testing
Greg Kemp¹, Joe Orosz¹, Craig Bradshaw¹, Eckhard A. Groll¹
¹TORAD Engineering, United States of America; ²Purdue University, Ray W. Herrick Laboratories, United States of America

ID: 1369
Experimental Testing of Oil-Flooded Hermetic Scroll Compressor
Ian H. Bell¹, Eckhard A. Groll², James E. Braun², W. Travis Horton³
¹Bell Thermal Consultants, United States of America; ²Purdue University, United States of America

ID: 1208
Study On A Cooling System For Rotary Compressor
Haifeng Zhang, Shuoyuan Wang, Fei Xie
Shanghai hitachi electrical appliances co., ltd, People's Republic of China

ID: 1305
Under-Compression (Over-Expansion) – An Isochoric Or Adiabatic Process?
Paul Xiubao Huang
Hi-Bar MC Tech. LLC., United States of America

ID: 1230
CFD Analysis inside a CO2 Rotary Compressor Shell to Improve Oil Separation and Reduce the Shell Size
Tetsuhide Yokoyama¹, Keisuke Shingu¹, Shin Sekiya¹, Hideaki Maeyama², Nobuya Nishimura³
¹Advanced Technology R&D Center, Mitsubishi Electric Corporation; ²Shizuoka Works, Mitsubishi Electric Corporation; ³Graduate School of Engineering, Osaka City University

C-19: Modeling II
Room 310  Thursday, July 19, 2012  1:00pm - 3:00pm

ID: 1180
Optimization of Compression Chamber to Reduce the Viscous Friction in the Piston-Cylinder Clearance
Rodrigo Link
Embraco, Brazil

ID: 1385
Use of a Low-Mach Model On a CFD&HT Solver for the Elements of An Object Oriented Program to Numerically Simulate Hermetic Refrigeration Compressors
López Mas Joan¹, Lehmkuhl Oriol¹2, Rigola Joaquim¹, Carlos D. Pérez-Segarra¹
¹CTTC, Spain; ²Termo Fluids SL

ID: 1103
A Computationally Efficient Hybrid Leakage Model for Modeling Leakage in Positive Displacement Compressors
Ian H. Bell¹, Eckhard A. Groll², James E. Braun², W. Travis Horton³
¹Bell Thermal Consultants, United States of America; ²Purdue University, United States of America;

ID: 1145
Performance Optimization Of Screw Compressors Based On Numerical Investigation Of The Flow Behaviour In The Discharge Chamber
Maria Pascu¹, Ahmed Kovacevic², Nsikan Udo³
¹Howden Compressors Ltd, United Kingdom; ²City University, London, United Kingdom

ID: 1339
Simulation Analysis of a Two Rolling Piston Expander Replacing Throttling Valve in Conventional Refrigerant Heat Pump System
Li Zhao, Minxia Li, Yitai Ma, Zhongyan Liu
Tianjin University, People's Republic of China

ID: 1478
Thermodynamic Design of Screw Motors for Constant Waste Heat Flow at Medium Temperature Level
Jan Hütker, Andreas Brümmer
Chair of Fluidics - Technische Universität Dortmund, Germany
C-20: Valves II
Room 314 Thursday, July 19, 2012 1:00pm - 3:00pm

ID: 1461
Numerical Evaluation of Performance Curves of a High Frequency Microcompressor
Celso Kenzo Takemori, Fabian Fagotti
Embraco, Brazil

ID: 1375
Numerical Simulation of the Turbulent Fluid Flow Through Valves Based on Low Mach Models
Joaquim Rigola¹, Oriol Lehmkuhl¹, Jordi Ventosa¹, Carlos D. Pérez-Segarra¹, Assensi Oliva¹
¹CTTC - UPC, Spain; ²Termo Fluids, S.L.

ID: 1344
Modeling of Gas Leakage through Compressor Valves
Leandro R. Silva, Cesar J. Deschamps
Federal University of Santa Catarina, Brazil

ID: 1278
Fast-Acting Suction-Valve Control: Capacity Modulation and Impact on Valve Dynamics
Andreas Brandl¹, Olaf Bielmeier¹, Bernhard Spiegl¹
¹HOERBIGER Ventilwerke GmbH & Co KG, Austria; ²HOERBIGER Kompressortecnhik GmbH, Germany; ³HOERBIGER Kompressortecnhik Holding, Austria

ID: 1210
Capturing Valve Dynamics in Reciprocating Compressors Through Computational Fluid Dynamics
Hiteshkumar Mistry¹, Aditya Bhakta¹, Sandeep Dhar¹, Vaibhav Bahadur¹, Subhrajit De⁴
¹General Electric Global Research Center, Bangalore, India; ²General Electric Global Research Center, Niskayuna, NY, USA;

C-21: Modeling III
Room 310 Thursday, July 19, 2012 3:20pm - 5:20pm

ID: 1391
The Application of Monte Carlo Method for Sensitivity Analysis of Compressor Components
Marcos Giovani Dropa de Bortoli, Julio César Silva
Embraco, Brazil

ID: 1564
Properties of Refrigerant Affect Compressor Design
Hubert Bukac
Little Dynamics, Inc., United States of America

ID: 1150
A Rotary Compressor-Accumulator Component Simulation Model in Consideration of (±) Suction Gas Superheat Degrees
Ke-jia Ye, Hong Tao, Jun Yang, Chun-hui Liu
Shanghai HITACHI Electrical Applicances Co.Ltd, China, People's Republic of China

ID: 1449
A Two-Stage Centrifugal Refrigeration Compressor Designed for Both Economized and Non-Economized Duty.
Turner Thornton, Joost Brasz
Danfoos Turbocor Compressors Inc. Tallahassee, Florida, USA;

C-22: Screw Compressors II
Room 314 Thursday, July 19, 2012 3:20pm - 5:20pm

ID: 1209
A New Design of the Tooth Profile for Single Screw Compressors
Jian Li, Feilong Liu, Quanke Feng, Welfeng Wu
Xi'an Jiaotong University, People's Republic of China

ID: 1171
Approach To The Numeric Geometry Analysis of Positive Displacement Compressors, Its Application To A Single Screw Compressor Simulation And Verification By Experiment
Kirill Michailovich Ignatiev
Emerson Climate Technologies, Inc., United States of America

ID: 1387
Numerical Analysis of Performance, Rotor Temperature Distributions, and Rotor Thermal Deformation of an R134a Screw Compressor
Shenghung Hsieh¹, Wenhsin Hsieh¹, Chishun Huang², Yuhua Huang²
¹Department of Mechanical Engineering and Advanced Institute of Manufacturing for High-Tech Innovations, National Chung Cheng University, Chia-Yi, Taiwan, R.O.C.; ²Hanbell Precise Machinery Co., Tao-Yuan Hsien, Taiwan, R.O.C
ID: 1445
Screw Compressors With a Novel Flexible Discharge Port Design
Yan Tang
Kaishan Compressor, People's Republic China

ID: 1553
The Condition Monitoring of an Upstream Oil and Gas Dry Screw Compressor Drive Train and its Impact on the Control System.
William James Milligan
Howden Process Compressors, United Kingdom

ID: 1535
Numerical Calculation and Analysis of Lubricating Water Film Cavitation of A Water Flooded Air Single Screw Compressor
Rui Huang, Ting Li, Quanke Feng, Weifeng Wu
Xi'an Jiaotong University, People's Republic of China

ID: 1447
Influence of Thermal Deformation on the Characteristic Diagram of a Screw Expander in the Automotive Application of Exhaust Heat Recovery
Alexander Nikolov, Christopher Huck, Andreas Brümmer
Chair of Fluidics - Technische Universität Dortmund, Germany
All sessions will be in Stewart Center unless otherwise noted

Chair — James E. Braun, Professor of Mechanical Engineering, Purdue University

Paper Presenter, Session Chairpersons & Vice Chairpersons Breakfast
If you are the Presenter of a paper, a Session Chairperson or a Vice Chairperson, please attend the complimentary breakfast or brunch on the day of your presentation(s). Presentations will be loaded onto laptops at this time. Final instructions will be given concerning how the session will be conducted and you will meet the other Presenters and Chairperson in your session. If you are the Presenter in more than one session on the same day, please contact both Session Chairpersons.

Presentations at the Conference
Each Presenter will have fifteen minutes for presentation and five minutes for discussion. If time permits, the Session Chairperson may extend the discussion period. No Videotaping, Pictures or Picture Phones are allowed without the Author's Permission.

MONDAY — JULY 16, 2012 SESSIONS

R-1: Heat Transfer I
Room 218A&B    Monday, July 16, 2012    12:30pm - 3:00pm

ID: 2586
Forced Bulk Boiling At High Heat Fluxes
Tobias Knipping1, Michael Arnemann2, Ullrich Hesse3, Frank Humpfer1, Matthias Ganz1
1Karlsruhe UAS, Institute of Materials and Processes (IMP), Germany; 2Karlsruhe UAS, Institute of Refrigeration, Air Conditioning and Environmental Engineering (IKKU), Germany; 3TU Dresden, BITZER Chair of Refrigeration-, Cryo- and Compressor Technology, Germany

ID: 2430
Boiling Heat Transfer of R-1234yf in Horizontal Circular Small Tubes
Jong-Taek Oh1, Kwang-II Choi1, Chien Ba Nguyen2, Kyoo-wan Kim2
1Chonnam National University, Korea, Republic of (South Korea); 2Graduate School, Chonnam National University, Korea, Republic of (South Korea)

ID: 2165
Experimental Investigation on Evaporation Heat Transfer and Pressure Drop Characteristics of HFC-161 in a Horizontal Smooth Tube
Peng Li, Xue Hui Wang, Xiaohong Han, Guangming Chen
Institute of Refrigeration and Cryogenics, Zhejiang University, China, People's Republic of China

ID: 2472
Experimental and Theoretical Study on Condensation Heat Transfer of Nonazeotropic Refrigerant Mixtures R1234yf/R32 Inside a Horizontal Smooth Tube
Linlin Wang, Chaobin Dang, Eiji Hihara
The University of Tokyo, Japan

ID: 2411
Flow Boiling Heat Transfer of Binary Mixtures HFO1234yf/R32 in a Smooth Horizontal Tube
Minxia Li1, Chaobin Dang2, Eiji Hihara2
1Tianjin University, China, People's Republic of; 2The University of Tokyo

ID: 2250
Saturated Flow Boiling Heat Transfer in Horizontal Square Tube
Juan Shi1,2, Anthony M. Jacob1, Zhenqian Chen1
1Southeast University, PR China; 2University of Illinois at Urbana-Champaign

R-2: Low GWP Refrigerants I
Room 214C&D    Monday, July 16, 2012    12:30pm - 3:00pm

ID: 2233
Low Global Warming Potential (GWP) Alternative Refrigerants Evaluation Program (Low-GWP AREP)
Xudong Wang1, Karim Amrane1, Phillip Johnson1
1Air-Conditioning, Heating, and Refrigeration Institute, United States of America; 2McQuay International, United States of America
R32 And HFOs As Low-GWP Refrigerants For Air Conditioning
Hung M. Pham¹, Rajan Rajendran²
¹Emerson Climate Technologies, Inc., United States of America; ²Emerson Climate Technologies, Inc., United States of America

Performance and Capacity Comparison of Two New LGWP Refrigerants Alternative to R410A in Residential Air Conditioning Applications
Auvi Biswas, Lorenzo Cremaschi
Oklahoma State University, United States of America

Drop-in Performance of Low GWP Refrigerants in a Heat Pump System for Residential Applications
Atharva Barve, Lorenzo Cremaschi
Oklahoma State University, United States of America

Study of R161 Refrigerant for Residential Air-conditioning Applications
Yingwen Wu, Xiangfei Liang, Xiaoping Tu, Rong Zhuang
Chinese National Engineering Research Center of Green Refrigeration Equipment, People's Republic of China

R-3: System Modeling I
Room 214A&B  Monday, July 16, 2012  12:30pm - 3:00pm

A Simulation Model for the Application of Nanofluids as Condenser Coolants in Vapor Compression Heat Pumps
José Alberto Reis Parise
PUC-Rio, Brazil

Charge Reduction Potentials of Several Refrigerants Based on Experimentally Validated Micro-Channel Heat Exchangers Performance and Charge Model
Yadira Padilla Fuentes, Predrag S. Hrnjak
University of Illinois at Urbana Champaign, United States of America

Experimental Load Emulation for Multi-Evaporator Air Conditioning and Refrigeration Systems
Justin Peter Koeln, Megan Diane Kania, Neera Jain, Andrew G. Alleyne
University of Illinois Urbana-Champaign, United States of America

Modular Simulation of Vapour Compression Systems With an Object Oriented Tool
Nicolas Ablanque¹, Carles Ollet¹,², Joaquim Rigola¹, Oriol Lehmkühl¹,², Carlos D. Pérez-Segarra¹
¹CTTC - UPC, Spain; ²Termo Fluids, S.L.

System Modeling of Gas Engine Driven Heat Pump
Isaac Mahderekal, Bo Shen, Edward A. Vineyard
Oak Ridge National Labs, United States of America

Experimental Investigation and Mathematical Modeling of Commercially Available R744 Compressors
Orkan Kurtulus¹, Burak Olgun², Emre Oguz²
¹Purdue University, United States of America; ²Zeta Information Technologies, Turkey; ³Research and Technology Development Center, Arcelik A.S.

R-4: System Improvement I
Room 218A&B  Monday, July 16, 2012  3:20pm - 5:20pm

Performance Comparison of the Vapor-Injection Cycle in Terms of Branching Points of the Injection Stream
Chul Woo Roh, Min Soo Kim
Seoul National University, Korea, Republic of (South Korea)

Gas Vapor Injection on Refrigerant Cycle Using Piston Technology
Sophie Colmek¹, Laurent Goderneaux²
¹Tecumseh Europe, Engineer Departement France; ²Tecumseh Europe, Laboratory Departement, France

Develop 20 IEER Rooftop Unit – A Simulation Study
Bo Shen, Keith Rice, Edward A. Vineyard
Oak Ridge National Labs, United States of America
ID: 2328
Performance Measurement of R32 Vapor Injection Heat Pump System
Yunho Hwang, Xing Xu, Reinhard Radermacher, Hung M. Pham
University of Maryland, United States of America

ID: 2598
Application of a Hybrid Control of Expansion Valves to a 5-ton Domestic Heat Pump
Christian K. Bach, Eckhard A. Groll, James E. Braun
Purdue University, United States of America

R-5:HX Frosting
Room 214C&D  Monday, July 16, 2012  3:20pm - 5:20pm

ID: 2193
Frosting Performance of Fin-and-Tube Evaporators with Small Copper Tubes Diameter
Lorenzo Cremaschi1, Ehsan Moallem1, Daniel E. Fisher1, Tommy Hong1, Sankar Padmanabhan2
1Oklahoma State University, Stillwater, OK, USA; 2Heat Transfer Center of Excellence, Johnson Controls Inc, Norman, OK, USA

ID: 2105
Frost Formation on Fan-Supplied Tube-Fin Evaporators: A Visual and Numerical Analysis
Diogo Londero Da Silva
EMBRACO, Research & Development Group, Brazil

ID: 2261
Frost Growth on Vertical Surfaces with Varying Wettability
Amne El Cheikh, Anthony M. Jacobi
UIUC, United States of America;

ID: 2501
Effect of Louver Angle on Performance of Heat Exchanger With Serpentine Fins and Flat Tubes in Periodic Frosting
Predrag S. Hrnjak1,2, Ping Zhang1, Chris Rennels1
1University of Illinois, USA; 2Zhejiang Vocational College of Commerce; 3CTS - Creative Thermal Solutions, USA

R-6: Small-Scale Cooling Technologies
Room 214A&B  Monday, July 16, 2012  3:20pm - 5:20pm

ID: 2149
Development Of Microclimate Cooling Systems For Increased Thermal Comfort Of Individuals
Stefan Elbel1,2, Chad D. Bowers1, Hui Zhao1, Sang Park1, Predrag S. Hrnjak1,2
1Creative Thermal Solutions, United States of America; 2University of Illinois at Urbana Champaign, United States of America

ID: 2236
Development of a High Ambient Temperature Cooling Unit Based on Microcompressor Technology
Guilherme Borges Ribeiro
Embraco, Brazil

ID: 2285
Personal Cooling System Based on Vapor Compression Cycle for Stock Car Racing Drivers
André Morriesen, Frederico E. Resende, Luciana W. S. L. Ramos, Paulo R. C. Couto, Guilherme Borges Ribeiro
Embraco, Brazil

ID: 2317
Mini Vapour Cycle System For High Density Electronic Cooling Applications
Simone Mancin, Claudio Zilio, Luisa Rossetto
Dipartimento di Ingegneria Industriale, University of Padova, Italy

ID: 2309
Numerical Analysis of Thermal Performance of Flat Heat Pipe
Somusundaram Dhanabal, Mani Annamalai, Kamaraj Muthusamy
Indian Institute of Technology Madras, India

ID: 2225
Experimental Investigation of Temporary Electronics Cooling with Regularly Structured Composite Latent Heat Storages
Ekkehard Lohse, Gerhard Schmitz
Hamburg University of Technology, Germany
R-7: HX New Technologies & Applications
Room 218A&B  Tuesday, July 17, 2012  9:30am - 12:00pm

ID: 2538
Hiechan Kang, Hyeonsik Oh, Minkyoo Lee, Anthony M. Jacobi, Jin Ho Kim, Hye Jung Cho
Kunsan National University, Korea, Republic of (South Korea)

ID: 2194
Comparison of Earth-Air and Earth-Water Ground Tube Heat Exchangers for Residential Application
Christophe T’joen¹, Liping Liu², M. De Paepe³
¹Ghent University – Ugent, Belgium; ²Lawrence Technological University, United States of America; ³Ghent University – Ugent, Belgium

ID: 2265
Experimental Assessment of Metal Foam and Louvered Fins as Air-side Heat Transfer Enhancement for Miniaturized Condensers
Guilherme Borges Ribeiro¹, Jader Barbosa Jr.²
¹Embraco, Brazil; ²Federal University of Santa Catarina, Brazil

ID: 2156
Polymer Material Heat Exchangers Application in Refrigerant Cycles
Ullrich Hesse¹, Thomas Weimer²
¹BITZER Chair for Refrigeration-, Cryo- and Compressor Technology, Technical University Dresden, Germany; ²Makatec GmbH, Germany

ID: 2395
Thermal-Hydraulic Performance of Metal Foam Heat Exchangers
Kashif Nawaz, Jessica Bock, Anthony M. Jacobi
University of Illinois at Urbana Champaign, United States of America

ID: 2480
Plate Heat Exchanger Optimization Using Different Approximation Assisted Multiobjective Optimization Techniques
Khaled Hassan Saleh, Vikrant Aute, Reinhard Radermacher, Shapour Azarm
Center for Environmental Energy Engineering, Department of Mechanical Engineering, University of Maryland College Park, United States of America

ID: 2312
Experimental Measurements Of Air Forced Convection Through Copper Foams
Andrea Diani, Simone Mancin, Claudio Zilio, Luisa Rossetto
Dipartimento Ingegneria Industriale, University of Padova, Italy

R-8: HX Performance & Optimization
Room 214C&D  Tuesday, July 17, 2012  9:30am - 12:00pm

ID: 2188
Plate Heat Exchanger Optimization Using Different Approximation Assisted Multiobjective Optimization Techniques
Khaled Hassan Saleh, Vikrant Aute, Reinhard Radermacher, Shapour Azarm
Center for Environmental Energy Engineering, Department of Mechanical Engineering, University of Maryland College Park, United States of America

ID: 2271
Impact of the Refrigerant Layout and Fin Cuts on the Performance of a Microchannel Condenser and a Gas Cooler
Santiago Martinez-Ballester, José Gonzálvez-Maciá, José M. Corberán
Universidad Politecnica de Valencia, Spain

ID: 2390
Numerical Simulation of Minichannel and Microchannel Evaporators with Headers and Louvered Fins— Investigating the Thermal-Hydraulic Performance of New Refrigerant Mixtures
Justin J. Gossard¹, Xiaohong Han², Mysore Ramalingam³, Andrew D. Sommers¹
¹Department of Mechanical & Manufacturing Engineering, Miami University, Oxford, OH, USA; ²Institute of Refrigeration and Cryogenics, Department of Energy Engineering, Zhejiang University, Hangzhou, PR China; ³Aerospace Power and Propulsion Technologies Division, UES, Inc., 4401 Dayton-Xenia Rd., Dayton, OH 45432 USA

ID: 2143
Optimization of Peripheral Finned-Tube Evaporators Using Entropy Generation Minimization
Bruno Pussoli¹, Jader Barbosa Jr.¹, Luciana da Silva², Massoud Kaviany³
¹Federal University of Santa Catarina, Brazil; ²Embraco Compressors, Brazil; ³University of Michigan, USA
Thermodynamic Design of Condensers and Evaporators: Formulation and Applications
Christian Hermes
Federal University of Parana, Brazil

Effectiveness of Entransy Dissipation Metric and Entropy Generation Units in The Design of Fin-Tube Heat Exchangers
Yunho Hwang, Suxin Qian, Long Huang, Vikrant Aute, Reinhard Radermacher
University of Maryland, United States of America

R-9: Heat-Driven Cycles I
Room 214A&B	Tuesday, July 17, 2012: 9:30am - 12:00pm

Study on Ejector - Vapor Compression Hybrid Air Conditioning System Using Solar Energy
Chaobin Dang, Yoshitaka Nakamura, Eiji Hihara
The University of Tokyo, Japan

Vapor Jet Ejector Used To Generate Free Waste Heat Driven Cooling In Military Environmental Cooling Units
Stefan Eibel 1, Chad D. Bowers 1, Manuel Reichle 1, Jonathan M. Cristiani 1, Predrag S. Hrnjak 1,2
1Creative Thermal Solutions, United States of America; 2University of Illinois at Urbana-Champaign, United States of America

Organic Rankine Cycle System Analysis for Low GWP Working Fluids
Bala Varma Datla, Joost Brasz
Syracuse Turbo Machinery LLC, United States of America

ORC Finned - Tube Evaporator Design and System Performance Optimization
Samer Maalouf, Elias BouLawz Ksayer, Denis Clodic
Ecole des Mines de Paris, France

Experimental Testing of an Organic Rankine Cycle with Scroll-Type Expander
Brandon J. Woodland, James E. Braun, Eckhard A. Groll, W. Travis Horton
Herrick Laboratories, United States of America

Solid State Microchip Based On Thermophotovoltaic And Thermoelectric Conversion
William M. Worek 1, Christopher Brown 1, Rebecca Trojanowski 1, Thomas Butcher 1, Edward Horne 2
1University of Illinois at Chicago, United States of America; 2Brookhaven National Laboratory, United States of America

R-10: Selected Student Research Papers
Room 322	Tuesday, July 17, 2012 9:30am - 12:00pm

Application Of A Hybrid Control Of Expansion Valves To A 3-Ton Large Room Cooling System
Christian K. Bach, Eckhard A. Groll, James E. Braun
Purdue University, United States of America

Study of the Effects of Microgroove Geometry on Frost Structure
Md Ashiqur Rahman, Anthony M. Jacobi
University of Illinois at Urbana-Champaign, United States of America

New Correlations for the Air-Side Heat Transfer Coefficient of Microchannel Heat Exchangers Under Quasi-Steady State Frosting Operating Conditions
Ehsan Moallem, Lorenzo Cremaschi, Daniel E. Fisher
Oklahoma State University, United States of America

Thermal and Chemical Analysis of Fouling Phenomenon in Condensers for Cooling Tower Applications
Xiaoxiao Wu, Lorenzo Cremaschi
Oklahoma State University, United States of America

Evaluating Fault Detection and Diagnostics Protocols Applied to Air-Cooled Vapor Compression Air-Conditioners
David P. Yuill, James E. Braun
Purdue University, United States of America
Inverse Modeling to Simulate Fault Impacts for Vapor Compression Equipment Part 2: System Modeling and Validation
Howard Cheung, James E. Braun
Purdue University, United States of America

Non-Intrusive Fault Detection in Reciprocating Compressors
Christopher James Schantz, Steven Leeb
Massachusetts Institute of Technology, United States of America

Extremum Seeking Control for Energy Optimization of Vapor Compression Systems
Daniel Burns, Christopher Laughman
Mitsubishi Electric Research Laboratories

Development Of An On-line Adaptive ANN-based Controller For A Direct Expansion Air Conditioning System
Ning Li, Liang Xia, Shiming Deng, Xiangguo Xu, Mingyin Chan
Department of Building Services Engineering, The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)

Comparison of Equation-based and Non-equation-based Approaches for Transient Modeling of a Vapor Compression Cycle
Hongtao Qiao, Vikrant Aute, Reinhard Radermacher
University of Maryland, United States of America

Modelica Based Transient Modeling of a Flash Tank Vapor Injection System and Experimental Validation
Hongtao Qiao, Xing Xu, Vikrant Aute, Reinhard Radermacher
University of Maryland, United States of America

A Thermodynamic Basis for Predicting Falling-Film Mode Transitions
Anthony M. Jacobi, Xiaofei Wang
University of Illinois, United States of America

HFO1234yf Condensation Inside A Brazed Plate Heat Exchanger
Giovanni A. Longo, Claudio Zilio
University of Padova - Dept. of Management and Engineering, Italy

Dominant Flow Mechanisms in Falling-Film and Droplet Mode Evaporation Over Horizontal Rectangular Tube Banks
John G. Bustamante, Srinivas Garimella
Georgia Institute of Technology, United States of America

Inlet Temperature Effects on Sensible Heat Transfer to Falling Liquid Films on Horizontal Round Tubes
Binglu Ruan, Huan Li, Anthony M. Jacobi
Mechanical Science and Engineering, University of Illinois, Urbana, IL, USA, 61801; Department of Thermal Engineering, Tsinghua University, Beijing, Peoples Republic of China
R-13: Industrial/Commercial Refrigeration
Room 214A&B  Tuesday, July 17, 2012  1:40pm - 3:40pm

ID: 2153
Drop-in Testing of Next-Generation R134a Alternates in a Commercial Bottle Cooler/Freezer
Doron Shapiro
Hussmann Corp., United States of America

ID: 2596
Omar Abdelaziz, Brian Fricke, Edward A. Vineyard
Oak Ridge National Laboratory, United States of America

ID: 2382
Modeling and Simulation of a Desiccant Assisted Brayton Refrigeration Cycle
Carlos E.L. Nobrega¹, Leandro Alcoforado Sphaier¹
¹CEFET-Rio, Brazil; ²Universidade Federal Fluminense, Brazil

ID: 2569
Taking a Sensible Choice of Sustainable Super Market Refrigeration Equipment
Rafiqul Islam
Austral Refrigeration Pty Ltd, Australia

ID: 2485
Evaluation Of Defrost Options For Secondary Coolants in Multi-temperature Indirect Transport Refrigeration: Mathematical Modelling & Sensitivity Analysis
Donal Patrick Finn¹, Andreas Cabello-Portoles², Shane Smyth³, Barry Brophy¹
¹School of Mechanical & Materials Eng., University College Dublin, Dublin, Ireland; ²Escuela Técnica Superior de Ingenieros Industriales, Universidad Politécnica de Valencia, Spain; ³ThermoKing Ltd., Monivea Road, Galway, Ireland

R-14: Heat Transfer III
Room 218A&B  Tuesday, July 17, 2012  4:00pm - 6:00pm

ID: 2519
Effect of Oil on Flow Boiling Heat Transfer and Flow Patterns of CO₂ in 11.2 mm Horizontal Smooth and Enhanced Tube
Seongho Kim, Predrag S. Hrnjak
University of Illinois at Urbana-Champaign, United States of America

ID: 2572
Condensation Heat Transfer and Pressure Drop with Propane in a Minichannel
Davide Del Col, Bortolin Stefano, Bortolato Matteo, Rossetto Luisa
University of Padova, Italy

ID: 2408
Convective Flow Boiling of R-134a on Micro-Structured Aluminum Surfaces
Andrew D. Sommers¹, Kirk L. Yerkes²
¹Department of Mechanical and Manufacturing Engineering, Miami University, Oxford, OH, USA; ²Propulsion Directorate, Air Force Research Laboratory, Wright-Patterson AFB, Dayton, OH, USA

ID: 2224
Flow Boiling Heat Transfer and Pressure Drop of R1234ze(E) and R32 in a Horizontal Micro-Fin Tube
Daisuke Baba¹, Takafumi Nakagawa¹, Shigeru Koyama²
¹Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan; ²Faculty of Engineering Sciences, Kyushu University, Japan

ID: 2580
Condensation heat transfer and pressure drop in flat tubes having different aspect ratio
Nae-Hyun Kim, Ho-Won Byun, Eul-Jong Lee
University of Incheon, Korea, Republic of (South Korea)

ID: 2347
Ryuhei Kaji, Shun Yoshioka, Hirokazu Fujino
Daikin Industries, LTD, Japan

R-15: HX Modeling
Room 214C&D  Tuesday, July 17, 2012  4:00pm - 6:00pm

ID: 2191
A Generalized Effectiveness-NTU Based Variable Geometry Microchannel Heat Exchanger Model
Long Huang, Vikrant Aute, Reinhard Radermacher
Universy of Maryland, College Park, United States of America
R-16: System Performance
Room 214A&B  Tuesday, July 17, 2012  4:00pm - 6:00pm

ID: 2512
Effect of Condenser Subcooling of the Performance of Vapor Compression Systems: Experimental and Numerical Investigation
Gustavo Pottker¹, Predrag S. Hrnjak¹,²
¹University of Illinois, USA; ©CTS - Creative Thermal Solutions, USA

ID: 2522
Designated vs Non-designated Areas for Condenser Subcooling
Gustavo Pottker, Predrag S. Hrnjak
University of Illinois at Urbana-Champaign, United States of America

ID: 2422
The Simple Performance Evaluation Method of VRF System Using Volumetric Efficiency of Compressor
Naruhiro Sekine¹, Yuma Furuhashi², Shigeki Kametani¹
¹Tokyo University of Marine Science and Technology, Japan; ²Tokyo Gas Co.,LTD., Solution Technology Dept., Japan

ID: 2330
Field Performance Measurements of VRF System with Subcooling Heat Exchanger
Yunho Hwang, Laeun Kwon, Reinhard Radermacher, Byungsoon Kim
University of Maryland, United States of America

ID: 2537
Study On Annual Performance Of Room Air Conditioners Under Partial Load Condition
Hayato Horie, Eiji Hihara
The University Of Tokyo, Japan

R:17 Heat Pumps I
Room 128A&B  Wednesday, July 18, 2012  9:30am - 12:00pm

ID: 2597
Ian H. Bell¹, James E. Braun²
¹Bell Thermal Consultants, United States of America; ²Purdue University, United States of America
Life Cycle Climate Performance Model for Residential Heat Pump Systems
Ming Zhang, Jan Muehlbauer
Optimized Thermal Systems, LLC, United States of America

Simulation of an Air-Source Heat Pump with Two-Stage Compression and Economizing for Cold Climates
Stephen L. Caskey1, Derek Kultgen1, Eckhard A. Groll1, William Hulze1, Tobias Menzi2, Stefan S. Bertsch1
1Purdue University, United States of America; 2NTB Interstate University of Applied Sciences, Buochs, Switzerland

Experimental Results of a Newly Developed Very High Temperature Industrial Heat Pump (140°C) Equipped With Scroll Compressors and Working With a New Blend Refrigerant
Damien Bobelin, Ali Bourig
EDF R&D, France

Experimental Investigation of a New High Temperature Heat Pump Using Water as Refrigerant for Industrial Heat Recovery
Marwan Chamoun1, Romuald Rulliere1, Philippe Haberschill1, Jean-Louis Peureux1
1Université de Lyon, CNRS, INSA-Lyon, CETHIL, UMR5008, Villeurbanne, F-69621, France Université Lyon 1, F-69622, France; 2EDF R&D, Eco-efficiency & Industrial Process Department, Moret sur Loing, F-77818, France

Characteristics of R134a/R410A Cascade Heat Pump and Optimization
Dong Ho Kim, Han Saem Park, Min Soo Kim
Mechanical and Aerospace Engineering / Seoul National University, Korea, Republic of (South Korea)

Capillary Flow of Liquid Metal Occurring in Microchannel Heat Exchanger Fabrication
Hui Zhao, Stefan Elbel, Predrag S. Hrnjak
Creative Thermal Solutions, Inc, United States of America

Measurement and Visualization of R410A Distribution in the Vertical Header of the Microchannel Heat Exchanger
Yang Zou, Predrag S. Hrnjak
University of Illinois at Urbana-Champaign, United States of America

Oil Circulation Effects on Evaporation Heat Transfer in Brazed Plate Heat Exchanger using R134A
Jaekyoo Jang1, Youngsoo Chang2, Byungha Kang1
1Graduate School, Kookmin University, Seoul, South Korea 136-702; 2Department of Advanced Fermentation Fusion Science and Technology, Kookmin University, Seoul, South Korea 136-702

Compensation of Airflow Maldistribution in Fin-and-Tube Evaporators
Martin Ryhl Kærn1, Thomas Tiedemann2
1Technical University of Denmark, Denmark; 2Refrigeration and Air-Conditioning, Offenbach, Germany

Refrigerant Distribution Effects on the Performance of Microchannel Evaporators
Chad D. Bowers1, Helena Mai1, Stefan Elbel1, Predrag S. Hrnjak1
1Creative Thermal Solutions, United States of America; 2University of Illinois, Urbana, Illinois

Experimental and Numerical Study on a Dry-expansion Shell-and-Tube Evaporator Used in Wastewater Source Heat Pump (WWSHP)
Chao Shen1, Yiqiang Jiang1, Yang Yao1, Xinlei Wang1
1Harbin institute of technology, China, People's Republic of; 2University of Illinois at Urbana-Champaign, Urbana, IL, USA

A Virtual EXV Mass Flow Sensor for Applications With Two-Phase Flow Inlet Conditions
Christian K. Bach, James E. Braun, Eckhard A. Groll
Purdue University, United States of America

Extension of a Virtual Refrigerant Charge Sensor
Woohyun Kim, Braun E. James
Herrick Laboratory, Purdue University
Virtual Refrigerant Mass Flow and Power Sensors for Variable-Speed Compressors
Woohyun Kim, James E. Braun
Herrick Laboratory Purdue University

Evaluation of Virtual Refrigerant Mass Flow Sensors
Woohyun Kim, James E. Braun
Herrick Laboratory Purdue University

General Outdoor Air Economizer Fault Detection & Diagnostics Assessment Method
Andrew L. Hjortland, James E. Braun
Purdue University - Herrick Laboratory, United States of America

Experimental Study on Fault Detection Algorithm Using Regression Method for Plural Indoor Units Faults of Multi-Heat Pump System under Heating Mode
Hak Soo Kim, Min Ki Cho, Min Soo Kim
Seoul national university, Korea, Republic of (South Korea)

R-20: System Modeling II
Room 322  Wednesday, July 18, 2012: 9:30am - 12:00pm

Generalized Performance Maps For Single And Dual Speed Residential Heat Pumps
Simbarashe Nyika, Seth O. Holloway, James E. Braun, W. Travis Horton
Purdue University, United States of America

Development of a System Identification Model for an Air Source Heat Pump
Dong Won Han¹, Youngsoo Chang², Seo Young Kim³, Yongchan Kim³
¹Graduate School of Mechanical Engineering, Korea university, Korea, Republic of (South Korea); ²Department of Advanced Fermentation Fusion Science and Technology, Kookmin University, Korea, Republic of (South Korea); ³Energy Mechanics Research Center, Korea Institute of Science and Technology, Korea, Republic of (South Korea); ⁴Department of Mechanical Engineering, Korea University, Korea, Republic of (South Korea);

Semi-Empirical Inverse Model for DX Unit Performance in Residential Buildings
Zhidan Zhao, W. Travis Horton
Purdue University, United States of America

Inverse Modeling to Simulate Fault Impacts for Vapor Compression Equipment Part 1: Component Modeling and Validation
Howard Cheung, James E. Braun
Purdue University, United States of America

Performance Mapping for Variable Ductless Heat Pump Systems in Heating, Cooling and Defrost Operation
Howard Cheung, James E. Braun
Purdue University, United States of America

Yamato Eshima, Yoji Onaka, Akio Miyara
Saga University, Japan

R-21: HX Wetted
Room 218A&B  Wednesday, July 18, 2012: 1:00pm - 3:00pm

Using Surface Tension Gradients to Reduce Condensate Retention and Improve Heat Exchanger Performance in Air Conditioning Systems
Tyler J. Brest¹,², Khalid F. Eid¹, Andrew D. Sommers²
¹Department of Physics, Miami University, Oxford, OH, USA; ²Department of Mechanical & Manufacturing Engineering, Miami University, Oxford, OH, USA

Enhancement of Round Tube and Flat Tube-Louver Fin Heat Exchanger Performance Using Deluge Water Cooling
Yunho Hwang, Sahil Popli, Reinhard Radermacher
University of Maryland, United States of America

Simultaneous Heat and Mass Transfer in a Wetted Heat Exchanger, Part I: Experiments
Feini Zhang¹, Jessica Bock¹, Anthony M. Jacobi¹, Hailing Wu²
¹University of Illinois at Urbana Champaign, United States of America; ²United Technologies Research Center, United States of America
Simultaneous Heat and Mass Transfer in a Wetted Heat Exchanger, Part II: Modeling
Jessica Bock¹, Feini Zhang¹, Anthony M. Jacobi¹, Hailing Wu²
¹University of Illinois at Urbana Champaign, United States of America; ²United Technologies Research Center, United States of America

Room 214C&D Wednesday, July 18, 2012: 1:00pm - 3:00pm

ID: 2161
Stability and Thermal Conductivity Characteristics of Nanofluids (H2O/CH3OH + NaCl + Al2O3 Nanoparticles) for CO2 Absorption Application
Changwei Pang, Yong Tae Kang
Kyung Hee University, Korea, Republic of (South Korea)

ID: 2152
Effect Of Operational Parameters On Heat and Mass Transfer In Generator of R134a/DMF Absorption Refrigeration System
Mani Annamalai, Balamurugan Pasupathy
Indian Institute of Technology Madras, India

ID: 2166
Experimental Investigations On Falling-Film Absorbers With Horizontal Tubes – A Review
Cord Tomforde, Andrea Luke
University of Kassel - Institute of Technical Thermodynamics, Germany

ID: 2477
Two-Phase Ammonia-Water Absorption in Mini-Channel Annulus
Dennis Marijn van de Bor, Catalina Vasilescu, Carlos Infante Ferreira
TU Delft, The Netherlands

ID: 2518
Performance of a Compact Absorption Heat Pump Containing Microchannel Absorber Components
Ward E TeGrotenhuis, Dustin D Caldwell, Paul H Humble, Dale A King, Shankar Krishnan, Jair A Lizarazo-Adarme
Pacific Northwest National Laboratory, United States of America

ID: 2543
Investigation on a Novel Adiabatic Absorber
Hiroaki Okamoto, Chaobin Dang, Eiji Hihara
The University of Tokyo, Japan

R-23: Automotive AC
Room 214A&B Wednesday, July 18, 2012: 1:00pm - 3:00pm

ID: 2334
Energy Consumption Of Battery Cooling In Hybrid Electric Vehicles
Imke Lisa Krüger¹, Dirk Limperich², Gerhard Schmitz³
¹TU Hamburg-Harburg, Germany; ²Daimler GmbH Sindelfingen, Germany

ID: 2393
Secondary Loop System for Automotiv HVAC Units Under Different Climatic Conditions
Nicholas Carsten Lemke, Julia Laura Lemke, Juergen Koehler
Technische Universität Braunschweig, Institut für Thermodynamik, Germany

ID: 2442
Studies on an Energy-Efficient Air Conditioning of Hybrid and Electric Vehicles
Joerg Aurich, Rico Baumgart, Christoph Danzer
Chemnitz University of Technology, Germany

ID: 2440
New Energy-Efficient Electromagnetic Clutch for Automotive Air Conditioning Compressors
Rico Baumgart, Frank van der Seylberg, Joerg Aurich, Thomas von Unwerth
Chemnitz University of Technology, Germany

ID: 2551
Experimental Investigation on a Reversible Heat Pump for a Passenger Car
Vincent Lemort¹, Cristian Cuevas¹, Sébastien Declaye¹
¹University of Liege Thermodynamics Laboratory, Belgium; ²Facultad de Ingeniería Mecánica, Universidad de Concepción, Chile

R-24: Domestic Refrigeration I
Room 218A&B Wednesday, July 18, 2012 3:20pm - 5:20pm

ID: 2101
Alternative Energy Test Method for Frost-Free Refrigerators and Freezers
Christian Hermes¹, Claudio Melo², Fernando Testoni Knabben²
¹Federal University of Parana, Brazil; ²Federal University of Santa Catarina, Brazil
ID: 2146
A Capillary Tube-Refrigerant Charge Design Methodology for Household Refrigerators-Part II: Equivalent Diameter and Test Procedure
Joel Boeng, Claudio Melo
Federal University of Santa Catarina, Brazil

ID: 2241
Experimental Performance of R-1234yf as a Drop-in Replacement for R-134a in Domestic Refrigerators
Kyle M. Karber1, Omar Abdelaziz2, Edward A. Vineyard2
1Oak Ridge Associated Universities; 2Oak Ridge National Laboratory

ID: 2321
Dynamic Performance Simulation of a Household Refrigerator with a Quasi-Steady Approach
Santiago Martinez-Ballestero1, Begoña León-Moya1, Martin Vesson2, José González-Maciá1, José M. Corberán1
1Universidad Politecnica de Valencia, Spain; 2Institut National des Sciences Appliquées, Lyon, France

ID: 2353
Performance Characteristics and Optimization of a Dual-Loop Cycle for a Domestic Refrigerator-Freezer
Won Jae Yoon, Hyun Joon Chung, Yongchan Kim
Korea University, Korea, Republic of (South Korea)

R-25: HX Performance and Enhancement
Room 214C&D  Wednesday, July 18, 2012: 3:20pm - 5:20pm

ID: 2223
Principle of Designing Fin-and-Tube Heat Exchanger With Smaller Tube for Air Condition
Wei Wu1, Guoliang Ding1, Yongxin Zheng2, Yifeng Gao2, Ji Song3
1Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, Shanghai 200240, China; 2International Copper Association Shanghai Office, Shanghai 200020, China

ID: 2464
Simulation-Based Comparison of Optimized AC Coils Using Small Diameter Copper and Aluminum Micro-Channel Tubes
John C. Hipchen1, Robert D. Weed2, Ming Zhang2, Dennis Nasuta3
1Exel Consulting Group, United States of America; 2Copper Development Association; 3Optimized Thermal Systems; 4Optimized Thermal Systems

ID: 2539
Evaluation of Fin Efficiency and Heat Transfer Coefficient for Fined Tube Heat Exchange
Hiechan Kang
Kunsan National University, Korea, Republic of (South Korea)

ID: 2458
Dual-Mode Wicking Structures for Enhanced Evaporative Heat Transfer
Shankar Krishnan, Ward E TeGrotenhuis
Pacific Northwest National Laboratory, United States of America

ID: 2506
Measurement of Mist to Annular Flow Development in the Discharge of a Compressor
Scott S. Wujek1, Predrag S. Hrnjak2
1Creative Thermal Solutions, Urbana, Illinois, United States of America; 2University of Illinois at Urbana-Champaign, United States of America

ID: 2507
Modeling Mist to Annular Flow Development in the Discharge of a Compressor
Scott S. Wujek1, Predrag S. Hrnjak2
1Creative Thermal Solutions, United States of America; 2Creative Thermal Solutions & University of Illinois at Urbana-Champaign, United States of America
ID: 2508
Oil Retention and Pressure Drop of R134a, R1234yf and R410A with POE 100 in Suction Lines
Aravind Ramakrishnan1, Predrag S. Hrnjak1,2
1University of Illinois, USA; 2CTS - Creative Thermal Solutions, USA

ID: 2401
Developing Mist-Annular Flow of R134a/PAG 46 Oil on Inclined Tubes at Compressor Discharge
Augusto Jose Pereira Zimmermann1, Predrag S. Hrnjak1,2, Scott S. Wujek2
1University of Illinois at Urbana-Champaign, USA; 2Creative Thermal Solutions, Urbana-IL, USA

ID: 2540
Numerical Simulation of Two-Phase Flow Pattern of Supercritical Carbon Dioxide With PAG-Type Lubricating Oil in Gas Cooler
Chaobin Dang, Shintaro Arai, Eiji Hihara
The University of Tokyo, Japan

THURSDAY — JULY 19, 2012 SESSIONS

R-27: Heat Pumps II
Room 218A&B  Thursday, July 19, 2012  9:30am - 12:00pm

ID: 2139
Domestic Heat Pump System With Solar Thermal Collectors as Heat Source and Annual Ice Storage
Andreas Gschwend, Stefan S. Bertsch
Interstate University of Applied Sciences of Technology, Switzerland

ID: 2116
Energy Optimization for Transcritical CO2 Heat Pumps for Combined Heating and Cooling and Thermal Storage Applications
Carolina Carmo1, Morten Blarke1, Kazuaki Yazawa2, Ali Shakouri2
1Aalborg university, Denmark; 2UC Santa Cruz, USA

ID: 2167
Heat Pump With a Condenser Including Solid-Liquid Phase Change Material
Samer Maaraoui1, Denis Clodic1, Pascal Dalicieux2
1 Mines ParisTech center for energy and processes, France; 2EDF R&D, France

ID: 2545
Energy Efficiency in a Ground Source Heat Pump With Variable Speed Drives
Davide Del Col1, Giacomo Benassi2, Mauro Mantovan2, Marco Azzolin1
1University of Padova, Italy; 2Hiref SpA, Italy

ID: 2135
Domestic Hot Water Supply for Multiple Family Dwellings using Heat Pumps
Bernhard Vetsch, Andreas Gschwend, Stefan S. Bertsch
NTB Interstate University of Applied Sciences of Technology, Switzerland

ID: 2168
Development of High Efficiency Carbon Dioxide Commercial Heat Pump Water Heater
Chad D. Bowers1, Stefan Elbel1,2, Michael Petersen1, Predrag S. Hrnjak1,2
1Creative Thermal Solutions, Urbana, Illinois; 2University of Illinois, Urbana, Illinois

R-28: Heat Driven Cycles II
Room 214C&D  Thursday, July 19, 2012  9:30am - 12:00pm

ID: 2412
Ejector Performance of a Pump-less Ejector Refrigeration System Driven by Solar Thermal Energy
Zhengshu Dai, Yijian He, Yunzhou Huang, Liming Tang, Guangming Chen
Zhejiang University, People's Republic of China

ID: 2366
Solar Cooling System Using Solar-Driven Hybrid Chiller
Akira Hirai
Kawasaki Thermal Engineering Co., Ltd., Japan

ID: 2363
Steam Driven Triple Effect Absorption Solar Cooling System
Hajime Yabase, Kazuyuki Makita
Kawasaki Thermal Engineering, Japan

ID: 2372
Geothermal- And Solar Assisted Air Conditioning System
Jan Wrobel¹, Gerhard Schmitz²
¹Hamburg University of Technology, Germany; ²Hamburg University of Technology, Germany

Exergy Analysis of a Desiccant Cooling Cycle Recovering Heat from Hot Exhaust
Chantal Maatouk¹, Ali Ezzedine², Assaad Zoughaib³
¹Mines ParisTech, Paris, France; ²Doctoral School for Science and Technology, Lebanese University, Beirut, Lebanon

Cooling Performance Improvement of the Heat Driven Type Metal Hydride Refrigerator-Heat Transfer Enhancement Influence of Metal Hydride Sheet Loading Into a Metal Hydride Particle Bed
Sangchul Bae¹, Masafumi Katsuta², Ikuto Homma³, Eiji Morta⁴
¹Waseda University Environmental Research Institute, Japan; ²Waseda University Department of Modern Mechanical Engineering, Japan

R-29: System Improvement II
Room 214A&B Thursday, July 19, 2012 9:30am - 12:00pm

ID: 2183
COP Improvement Of A CO2 Refrigeration System With An Expander-Compressor-Unit (ECU) In Subcritical And Transcritical Operation
Mario Wenzel, Hesse Ullrich
BITZER Chair of Refrigeration, Cryo and Compressor Technology / TU Dresden, Germany

ID: 2158
CFD Simulation and Experimental Study on Single Phase Dual Temperature Ejector
Yingwen Wu, Xiangfei Liang, Bo Zheng, Rong Zhuang
Chinese National Engineering Research Center of Green Refrigeration Equipment, People's Republic of China

ID: 2218
Characteristics Of R718 Thermocompression Refrigerating / Heat Pump Systems With Two-Phase Ejectors
Vasko Nikola Sarevski, Milan Nikola Sarevski
Faculty of Mechanical Engineering, University Sv. Kiril i Metodij, Republic of Macedonia

ID: 2217
Preliminary Study of a Novel Compact R718 Water Chiller With Integration of a Single Stage Centrifugal Compressor and Two-Phase Ejectors
Milan Nikola Sarevski, Vasko Nikola Sarevski
Faculty of Mechanical Engineering, University Sv. Kiril i Metodij, Republic of Macedonia

R-30: System Improvement III
Room: Room 218A&B Thursday, July 19, 2012 1:00pm - 3:00pm

ID: 2502
Flash Gas Bypass Method for Improving Performance of an A/C System With a Microchannel Evaporator
Hanfei Tuo¹, Predrag S. Hrnjak²
¹University of Illinois, USA; ²Creative Thermal Solutions, Inc.

ID: 2325
Design of Divided Condensers for Desiccant Wheel-Assisted Separate Sensible and Latent Cooling AC Systems
Yunho Hwang, Jiazhen Ling, Reinhard Radermacher
University of Maryland, United States of America

R-31: Low GWP Refrigerants II
Room 214C&D Thursday, July 19, 2012 1:00pm - 3:00pm

ID: 2176
Heat Pump Efficiency Improvement by Discharge Superheated Control
Wasan Tanawittayakorn, Paisarn Phrajunpanich, Supot Siwapornphaisam
Siam Compressor Industry, Thailand
A Reduced GWP Replacement for HFC-134a in Centrifugal Chillers: XP10 Measured Performance and Projected Climate Impact
Konstantinos Kontomaris¹, Justin P. Kauffman², Satheesh Kulankara³
¹DuPont Fluorochemicals R&D, United States of America; ²Johnson Controls, Building Efficiency, United States of America;

Latest Developments of Low Global Warming Refrigerants for Chillers
Mark W Spatz, Ankit Sethi, Samuel F Yana Motta
Honeywell, United States of America

Low Global Warming Refrigerants For Commercial Refrigeration Systems
Samuel F Yana Motta, Elizabeth Vera Becerra, Mark W Spatz
Honeywell, United States of America

The Circulation Composition Characteristic of the Zeotropic Mixture R1234ze(E)/R32 in a Heat Pump Cycle
Sho Fukuda¹, Nobuo Takata¹, Shigeru Koyama²
¹Interdisciplinary Graduate School of Engineering Sciences, Kyusyu University, Japan; ²Faculty of Engineering Sciences, Kyusyu University, Japan

Development of Refrigeration Oil for Use With R32
Takeshi Okido, Katsuya Takigawa, Masanori Saito
JX Nippon Oil & Energy Corporation, Japan

Investigation Of Low GWP Refrigerant Interaction With Various Lubricant Candidates
Roger J. Beattie, Joseph A. Karnaz
Lubrizol / CPI Engineering;

R-32: Properties
Room 214A&B Thursday, July 19, 2012 1:00pm - 3:00pm

Vapor Pressure of Hydrofluoroolefins: Critical Review of Experimental Data and Models
J. Steven Brown¹, Fabio Polonara², Giovanni Di Nicola², Laura Fedele², Sergio Bobbo², Claudio Zilio³
¹The Catholic University of America, United States of America; ²‘Universita’ Politecnica delle Marche; ³Consiglio Nazionale delle Ricerche; ³Universita’ di Padova

A Risk Assessment for Leakages of Flammable Refrigerants into a Closed Space
Ryuichi Nagaosa, Vikrant Aute, Reinhard Radermacher
Center for Environmental Energy Engineering, University of Maryland, United States of America

Thermophysical Properties of Lithium Bromide + 1, 2-Propanediol Aqueous Solutions—Solubility, Density and Viscosity
Kai Wang, Omar Abdelaziz, Edward A. Vineyard
Oak Ridge National Laboratory, United States of America

Investigation of Cubic EOS Models for HFO-1234yf Refrigerant Used In Automotive application
Anant Agrawal¹, Avi Anthony Cornelio², Dirk Limperich³
¹Birla Institute of Technology & Science, Goa, India; ²Mercedes Benz Research & Development India, Bangalore, India; ³Daimler AG, Sindelfingen, Germany

Fast Refrigerant Property Calculations Using Interpolation-Based Methods
Christopher Laughman, Yiming Zhao, Daniel Nikovski
MERL, United States of America;

Experimental Study of Explosion Limits of Refrigerants and Lubricants’ Mixture
Y.Q Shi, Guangming Chen, Q Chen
Zhejiang University, People’s Republic of China

R-33: Domestic Refrigeration II
Room 218A&B Thursday, July 19, 2012 3:20pm - 5:20pm

An Experimental Study on Defrosted Heaters Applied to Household Refrigerators
Claudio Melo, Fernando Testoni Knabbern, Paula do Valle Pereira
Federal University of Santa Catarina, Brazil
ID: 2452
1D heat Exchanger Simulation to Capture the Cycling Transients of Domestic Refrigeration Appliances Working With R600a
Erwin Berger, Martin Heimel, Raimund Almbauer, Wolfgang Lang
Graz University of Technology, Austria

ID: 2102
Simulation-Based Design and Optimization of Frost-Free Refrigerators: A Thermoeconomic Approach
Rodrigo Mitishita¹, Eduardo Barreira¹, Cezar Negrao¹, Christian Hermes³
¹Federal University of Parana, Brazil; ³Federal University of Parana

ID: 2313
Dynamic Characterization of Materials from a Refrigerator Compartment
Bringhenti Ilka¹, Jesus Alberto Ortiz Martinez¹, Arcanjo Lenzi¹, Claudio Pellegrini²
¹Federal University of Santa Catarina, Brazil; ²Embraco, Brazil

ID: 2147
Popping Noise in Household Refrigerators: Fundamentals and Practical Solutions
Daniel Hartmann, Claudio Melo
Federal University of Santa Catarina, Brazil

R-34: Absorption & Adsorption Systems
Room 214C&D   Thursday, July 19, 2012   3:20pm - 5:20pm

ID: 2493
Diesel Engine Waste-Heat Driven Ammonia-Water Absorption System for Space-Conditioning Applications
Christopher M. Keinath², Jared C. Delahanty¹, Srinivas Garimella¹, Michael A. Garrabrant²
¹Georgia Institute of Technology, United States of America; ²Stone Mountain Technologies, Inc.

ID: 235
Study on a Novel Absorption Refrigeration System at Low Cooling Temperatures
Yijian He, Zuwen Zhu, Xu Gao, Guangming Chen
Institute of Refrigeration &Cryogenics, Zhejiang University, People's Republic of China

ID: 2335
Dynamic Model for Small-Scale Ammonia-Water Absorption Chiller
Vinodh K. Viswanathan, Alexander S. Rattner, Matthew D. Determan, Srinivas Garimella
Georgia Institute of Technology, United States of America

ID: 2235
Exergy Analysis of an Absorption Refrigeration System Using an Iconic Liquid as a Working Fluid in the Chemical Compressor
Yoon Jo Kim¹, Sarah Kim², Yogendra K. Joshi³, Andrei G. Fedorov³, Paul A. Kohl²
¹Department of Mechanical Engineering, Washington State University Vancouver, United States of America; ²School of Chemical and Biomolecular Engineering, Georgia Institute of Technology; ³G.W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology

ID: 2456
Compact High Efficiency Adsorption Heat Pump
Ward E TeGrotenhuis¹, Paul H Humble¹, Josh B Sweeney²
¹Pacific Northwest National Laboratory, Richland, WA 99352, USA; ²ATMI, 7 Commerce Drive, Danbury, CT 06810, USA;

R-35: Two-Phase Fluid Flow
Room 214A&B   Thursday, July 19, 2012   3:20pm - 5:20pm

ID: 2255
A Homogeneous Capillary Tube Model - Comprehensive Parameter Studies Using Isobutane As Refrigerant
Martin Heimel, Wolfgang Lang, Erwin Berger, Raimund Almbauer
Technical University Graz, Austria

ID: 2409
A Review on Direct Two-Phase, Phase Change Flow Simulation Methods and their Applications
Moon Soo Lee, Vikrant Aute, Amir Riaz, Reinhard Rademacher
University of Maryland, CEEE, United States of America;

ID: 2320
Pressure Drop of Two
Nurdil Eskin, Emrah Deniz
Istanbul Technical University, Turkey
ID: 2319
Experimental and Numerical Investigation of Two-Phase Flow through Enlarging Singularity
Emrah Deniz, Nurdil Eskin
İstanbul Technical University, Turkey

ID: 2333
Characteristics of CO2 Transcritical Expansion Process
Mitsuhiro Fukuta, Yuki Nakamura, Tadashi Yanagisawa
Shizuoka University, Japan

ID: 2525
CFD Prediction of Stratification in Isothermal Ice Slurry Pipe Flow
Landa C. Onokoko, Nicolas Galanis
Université de Sherbrooke/Canada, Québec, United States of America
All sessions will be in Stewart Center unless otherwise noted

Chair — Thanos Tzempelikos, Assistant Professor of Civil Engineering, Purdue University

Paper Presenter, Session Chairpersons & Vice Chairpersons Breakfast
If you are the Presenter of a paper, a Session Chairperson or a Vice Chairperson, please attend the complimentary breakfast or brunch on the day of your presentation(s). Presentations will be loaded onto laptops at this time. Final instructions will be given concerning how the session will be conducted and you will meet the other Presenters and Chairperson in your session. If you are the Presenter in more than one session on the same day, please contact both Session Chairpersons.

Presentations at the Conference
Each Presenter will have fifteen minutes for presentation and five minutes for discussion. If time permits, the Session Chairperson may extend the discussion period. No Videotaping, Pictures or Picture Phones are allowed without the Author’s Permission.

MONDAY — JULY 16, 2012 SESSIONS

B-1: Building Simulation and Energy Modeling I
Room 218C&D Monday, July 16, 2012 12:30pm - 3:00pm

ID: 3591
Rapid Assessment of Deep Retrofit System Solutions to Improve Energy Efficiency in DoD Installations and Buildings
Amit Surana¹, Russell D Taylor², Satish Narayanan³, Kevin Otto³ ¹United Technologies Research Center, United States of America; ²Robust Systems and Strategies, United States of America

ID: 3483
Global Sensitivity Analysis applied to Total Energy Use in Buildings
Roberto Ruiz, Stéphane Bertagnolio, Vincent Lemort, University of Liege, Belgium

ID: 3526
Building Energy Benchmarking for Retrofit: An Application of Normative Building Modeling
Nicolas Robert Johnson, Huafen Hu, Portland State University, United States of America

ID: 3441
Research on the Simulation Framework in Building Information Modeling
Nan Liang¹,², Hongping Xu¹, Qiong Yu¹ ¹Green Building Research Department, Beijing Institute of Architectural Design; ²Department of Building Science, School of Architecture, Tsinghua University, Peoples Republic of China

ID: 3556
Extensive Comparative Analysis Of Two Building Energy Simulation Codes For Southern Europe Climates: Heating And Cooling Energy Needs and Peak Loads Calculation In TRNSYS And EnergyPlus
Andrea Gasparella¹, Giovanni Pernigotto² ¹Free University of Bozen/Bolzano; ²University of Padova, Italy

B-2: Selected Student Research Papers
Room 218C&D Monday, July 16, 2012 3:20pm - 5:20pm

ID: 3588
CaseStudy of Net Zero Energy Apartment in Shanghai
Shuai Deng, Wang Ruzhu, Dai Yanjun
Shanghai Jiao Tong University, United States of America

ID: 3404
Model-Based Predictive Control for Buildings with Decoupling and Reduced-Order Modeling
Donghun Kim, James E. Braun
Purdue University, United States of America
A Hybrid Ray-Racing and Radiosity Method for Calculating Radiation Transport and Illuminance Distribution in Spaces With Venetian Blinds
Ying-Chieh Chan, Athanasios Tzempelikos
Purdue University, United States of America

A Distributed Approach to Efficient Model Predictive Control of Building HVAC Systems
Vamsi Putta1, Guangwei Zhu1, Donghun Kim1, Jianghai Hu1, James E. Braun2
1School of Electrical and Computer Engineering, Purdue University, West Lafayette, United States of America; 2School of Mechanical Engineering, Purdue University, West Lafayette, United States of America

Modeling and Predictive Control Strategies in Buildings with Mixed-Mode Cooling
Jianjun Hu, Panagiota Karava
School of Civil Engineering, Purdue University, United States of America

Self-Optimizing Control of Cooling Tower for Efficient Operation of Chilled Water Systems
Xiao Li1, Yaoyu Li1, John E. Seem1, Pengfei Li1
1University of Wisconsin Milwaukee, United States of America; 2University of Texas at Dallas, United States of America; 3Building Efficiency Research Group, Johnson Controls, Inc., United States of America; 4United Technologies Research Center, United States of America

B-3: Net Zero Buildings and Controls
Room 218C&D  Tuesday, July 17, 2012   9:30am - 12:00pm

Sensitivity Studies of a Low Temperature Low Approach Direct Cooling Tower for Building Radiant Cooling Systems
Mehdi Nasrabadi1, Donal Finn1, Ben Costelloe2
1University College Dublin, Ireland; 2Dublin Institute of Technology

An Examination of Control Strategies in a HyGSHP System
Amanda Jo Pertzborn
UW-Madison, United States of America

Gregory J. Marsicek, Sanford A. Klein, Gregory F. Nellis
University Of Wisconsin - Madison: Solar Energy Lab, United States of America

Performance Evaluation of a Building-Integrated Photovoltaic/Thermal System
James Bambara1, Andreas Athienitis1, Panagiota Karava2
1Concordia University, Canada; 2Purdue University, United States of America

Renovation of “Earth Port” for Net-Zero Energy Building
Takehito Imanari1, Satoshi Ogawa1, Tatsuo Nobe2, Shin-Ichi Tanabe3
1Tokyo Gas Co., Ltd., Japan; 2Kogakuin University; 3Waseda University

B-4: HVAC Systems and Building Modeling
Room 218C&D  Tuesday, July 17, 2012   1:40pm - 3:40pm

Air and Water Flowrate Optimisation for a Fan Coil Unit in Heat Pump Systems
Edwards Kilian, Donal P. Finn
School of Mechanical and Materials Engineering, University College Dublin, Dublin, Ireland

Extensive Utilization Of Dynamic Simulation For Sensitivity Analysis And Optimization Design Of Refurbishment Measures
Giovanni Pernigotto1, Paola Penna2, Francesca Cappelletti3, Andrea Gasparella2
1University of Padova, Italy; 2Free University of Bozen/Bolzano, Italy; 3University IUAV of Venice, Italy
B-5: Solar Houses and Solar Decathlon
Room 218C&D  Tuesday, July 17, 2012  4:00pm - 6:00pm

ID: 3104
High Performance Buildings - The Smart Façade
Edgar Stach, Bill Miller, James Rose
The University of Tennessee, College of Architecture and Design, United States of America

ID: 3251
Mallory Leigh Schaus, W. Travis Horton
Purdue University, United States of America

ID: 3350
Can Plants Save Money: A Look At The Biowall
Kevin L. Rodgers, William Hutzel, Mike Dana, Rod Handy
Purdue University, United States of America

B-6: Airflow Modeling and Ventilation
Room 218C&D  Wednesday, July 18, 2012  9:30am - 12:00pm

ID: 3379
Parallelization of the coupling between CFD models for airflow and building energy simulation with an object-oriented infrastructure
Rashmin Damle1, Oriol Lehmkuhl1,2, Joan López2, Joaquim Rigola2, Assensi Oliva2
1Termo Fluids S.L., Spain; 2CTTC-UPC

ID: 3496
Fast Estimation of Leakage Area in a Multizone Test Facility
Lingjun Meng1, Kashif Nawaz1, Jing He1, Anthony M. Jacob1, Andrew J. Nelson2, Mark D. Ginsberg2
1University of Illinois at Urbana-Champaign, United States of America; 2Construction Engineering Research Laboratory, United States of America

ID: 3544
Evaluation of a Demand Controlled Ventilation Strategy for a Multizone Campus Building
Holly Brink, J. Lau, Xingbin Lin
University of Nebraska - Omaha, United States of America
ID: 3500
Energy Transfer Based Test Method Development and Evaluation of Horizontal Air Flow Re-Circulatory Air Curtain Efficiencies
Andrew Musser¹, Daniel Rhyner², Graham Miller-Gaines¹, Predrag S. Hrnjak¹
¹Creative Thermal Solutions, Inc., United States of America; ²HCR, Inc., United States of America

ID: 3237
Dynamical Modeling of Stochastic Wind Flow in Street Canyons
Parham Ahranjani Mirzaei¹,², Jan Carmeliet¹,²
¹Empa, Switzerland; ²ETH University, Switzerland

B-7: Building Envelopes and Facades
Room 218C&D  Wednesday, July 18, 2012  1:00pm - 3:00pm

ID: 3558
Energy Performance And Long-Term Evaluation Of Internal Thermal Comfort Of An Office Building With Different Kinds Of Glazing Systems And Window Sizes
Francesca Cappelletti¹, Andrea Gasparella², Giovanni Pernigotto³, Piercarlo Romagnoni¹
¹University IUAV of Venice, Italy; ²Free University of Bozen/Bolzano, Italy; ³University of Padova, Italy

ID: 3282
Modeling the Air Temperature Profiles in the Cavity of a Double-skin Façade
Offenburg University of Applied Sciences, Germany; Steinbeis Transfer Center Offenburg, Germany

ID: 3205
Designing of a New External Building Insulation System Regarding its Hygrothermal Behavior
Laure Wirbel¹,², Zoubeir Lafhaj¹, Alexandre Garcia²
¹Ecole Centrale de Lille, France; ²Norpac

ID: 3177
An Assessment in the Heat Gain and Loss Through Opaque Elements in Commercial Buildings in Brazil
Ana Paula Melo¹, Roberto Lamberts²
¹Federal University of Santa Catarina, Brazil; ²Federal University of Santa Catarina, Brazil

ID: 3378
Combined heat and moisture transfer in buildings systems
Rashmin Damle¹, Oriol Lehmkuhl¹,², Joaquim Rigola¹, Assensi Oliva²
¹Termo Fluids S.L., Spain; ²CTTC-UPC

B-8: EEB I (DOE Hub for Energy-Efficient Buildings)
Room 218C&D  Wednesday, July 18, 2012  3:20pm - 5:20pm

ID: 3466
An Optimal Control Approach to Sensor / Actuator Placement for Optimal Control of High Performance Buildings
John Allen Burns, J. Borggaard, Eugene Cliff, L. Zietsman
Virginia Tech, United States of America

ID: 3592
Uncertainty Quantification in Energy Efficient Building Performance Simulations
Slaven Peles, Sunil Ahuja, Satish Narayanan
UTC, United States of America

ID: 3589
Building Monitoring System and Preliminary Results for a Retrofitted Office Building
Arindam Dasgupta¹, Hugh Henderson², Rich Sweetser³, Tim Wagner¹
¹United Technologies Research Center, United States of America; ²CDH Energy; ³Greater Philadelphia Innovation Cluster, USA

ID: 3468
Assessing the Retrofit Potential of Building Control Systems
Stephen J. Treado, Yan Chen
Penn State Univ., United States of America

ID: 3238
Sensitivity Analysis On Daylighting And Energy Performance of Perimeter Office Spaces
Hui Shen¹, Athanasios Tzempelkos²
¹Purdue University, United States of America; ²Purdue University, United States of America
B-9: EEB II (DOE Hub for Energy-Efficient Buildings)
Room 218C&D  Thursday, July 19, 2012  9:30am - 12:00pm

ID: 3598
A Simulation-Based Study of Model Predictive Control in a Medium-Sized Commercial Building
Pengfei Li, Miroslav Baric, Satish Narayanan, Shui Yuan
United Technologies Research Center, United States of America

ID: 3457
Coupled CFD/Building Envelope Model for the Purdue Living Lab
Eugene Cliff¹, J. Borggaard¹, James E. Braun², Serkan Gugercin³, Donghun Kim²
¹Virginia Polytechnic Institute & State University, United States of America; ²Purdue University

ID: 3590
Deep Retrofit System Solution Assessment for Philadelphia Navy Yard Office Buildings
Niranjan A Desai, Russell D Taylor, Satish Narayanan, Tim Wagner
United Technologies Research Center, United States of America

ID: 3600
Efficient and Robust Training Methodology for Inverse Building Modeling and Its Application to a Multi-zone Case Study
Jie Cai, James E. Braun
Purdue University, United States of America

B-10: Building Simulation and Energy Modeling II
Room  218C&D Thursday, July 19, 2012  1:00pm - 3:00pm

ID: 3114
Use of Phase Change Material in a Building Wall Assembly: A Case Study of Technical Potential in Two Climates
Kenneth W. Childs, Therese K. Stovall
Oak Ridge National Laboratory, United States of America

ID: 3172
Moisture Accumulation and Its Impact on the Thermal Performance of Pipe Insulation for Chilled Water Pipes in High Performance Buildings
Shanshan Cai, Lorenzo Cremaschi, Afshin J. Ghajar
Oklahoma State University, United States of America

ID: 3280
Green Roofs Impact on Buildings Cooling Load
Karim Besbes¹, Assaad Zoughaib¹, Remi Bouchie², Salem Farkh²
¹MINES ParisTech, Paris, France; ²CSTB, Paris, France

ID: 3554
Comparison Of Quasi-Steady State And Dynamic Simulation Approaches For The Calculation Of Building Energy Needs: Thermal Losses
Andrea Gasparella¹, Giovanni Pernigotto³
¹Free University of Bozen/Bolzano, Italy; ³University of Padova

ID: 3586
Modelling Of The Thermal Behavior Of Walls And Floors In Contact With The Ground
Giovanni Pernigotto¹, Alessandro Prada⁵, Marco Baratieri¹, Paolo Baggio¹, Andrea Gasparella¹
¹Free University of Bolzano, Italy; ⁵University of Padova, Italy; ³University of Trento, Italy

B-11: Building Materials and Non-Thermal Systems
Room 218C&D Thursday, July 19, 2012: 3:20pm - 5:20pm

ID: 3552
Development And Evaluation Of A Simplified Modeling Approach For Hydraulic Systems
Yuebin Yu¹, Vivian Loftness¹, Daihong Yu¹, Yan Lu¹, Volker Hartkopf¹
¹Carnegie Mellon University, United States of America; ²University of Nebraska-Lincoln, United States of America; ³Corporate Research of Siemens Corporation;

ID: 3244
Fire Safety Aspect of Large Station Interchanges with Several Railway Lines
C.Y. Ku, N.K. Fong, W.K. Chow
The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)
ID: 3107
Example Case Studies on Evacuation for Tall Commercial Buildings
N. Cai, W.K. Chow, W.K. Lee
The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)

ID: 3106
Application of Scale Models in Designing Smoke Control Systems in Big Buildings
W.K. Chow, H.K. Chan, C.Y. Tso
The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)

ID: 3358
LCA of Reference Buildings: Benchmarking and Site LCA
Rangasayee Sapthasayee, Ming Qu, Fu Zhao
Purdue University, United States of America