Kansas City Conference Product Titles

Extended Abstracts

KC-19-A001
Experimental Investigation of Two-Phase Flow Heat Transfer of R410A and ZnO Nanolubricant Mixture in a Smooth Tube
Pratik S. Deokar, Student Member ASHRAE; Lorenzo Cremaschi, PhD, Member ASHRAE

KC-19-A002
Heating of Supercritical Carbon Dioxide in Small Channels
Saad A. Jajja; Jessa M. Sequeira; Brian M. Fronk, PhD, PE, Associate Member ASHRAE

KC-19-A003
Permeability and Rate-of-Rise of Additively-Manufactured Wicking Structures
Jordan A. Morrow, Student Member ASHRAE; Nhicolas Aponte; Ryan A. Huber, Student Member ASHRAE; Partha P. Chakraborty; G.A. Riley; Melanie M. Derby, Member ASHRAE

KC-19-A004
Uncertainties on Cooling Energy Based on Computational Indoor Air Modeling in Sports Facilities
Samah Ben Ayed, PhD, Associate Member ASHRAE; Donghun Kim, PhD; Jeff Borggaard, PhD; Eugene Cliff, PhD

KC-19-A005
IEQ in High-Performance Urban Elementary Schools
Emily Oldham, Associate Member ASHRAE; Hyojin Kim, PhD, Member ASHRAE

KC-19-A006
Performance of Spiral and Plain Finned-Tube Evaporator Coils for Novel Defrost System in Commercial Freezers
Mostafa H. Sharqawy, PhD, PEng; Sameh M. I. Saad, PhD; Punnoose Abraham, Student Member ASHRAE; Kazi K. Ahmed

KC-19-A007
A Review of Adaptive Thermal Comfort Implementation in International Thermal Comfort Standards
Ongun B. Kazanci, PhD, Associate Member ASHRAE; Daniel Coakley, PhD, Associate Member ASHRAE; Bjarne W. Olesen, PhD, Presidential Member, Fellow Member ASHRAE

KC-19-A008 (Withdrawn)
Investigation of a Solid Oxide Fuel Cell in a Residential Furnace During Rapid Thermal Cycling
Ryan J. Milcarek, PhD, Member ASHRAE; Mengyuan Chu; Jeongmin Ahn, PhD, Member ASHRAE

Effect of Climate Change and Extreme Weather Events on the Thermal Conditions of Canadian Multi-unit Residential Buildings
Fuad Mutasim; Baba Hua Ge, PhD, PEng, Member ASHRAE

Modeling Urban Microclimates of Extreme Weathers by Integrating City Fast Fluid Dynamics and City Building Energy Model
Liangzhu (Leon) Wang, PhD, PEng, Member ASHRAE; Ali Katal, Student Member ASHRAE; Mohammad Mortezazadeh Dorostkar, Student Member ASHRAE

Dimensionless CFD Analysis of Reynolds Independence and Similarity in Urban and Built Environment Airflows
Liangzhu (Leon) Wang, PhD, PEng, Member ASHRAE; Chang Shu, Student Member ASHRAE

Effect of Inlet Duct Design on Fan Performance of Indoor Air Handling Unit
Md Yeam Hossain, Student Member ASHRAE; Christian Bach, PhD, Associate Member ASHRAE; Omer San, PhD, Ardiyansyah Yatim, PhD, Member ASHRAE

A Field Evaluation of the Airflow Performance of Fan-Coil Units
Dennis L. O’Neal, PhD, PE, Fellow Member ASHRAE; Peng Yin, PhD, Associate Member ASHRAE

Comparison of Hydronic Fan-Coil Unit Energy Consumption with Modulation and On-Off
Zahra Sardoueinassab, Student Member ASHRAE; Peng Yin, PhD, Associate Member ASHRAE; Dennis O’Neal, PhD, PE, Fellow Member ASHRAE

Empirical Modeling of Variable Air Variable Water Fan Coil Units in Cooling Mode for Building Energy Calculations
Peng Yin, PhD, Associate Member ASHRAE; Tanjebul Alam, Student Member ASHRAE; Dennis O’Neal, PhD, PE, Fellow Member ASHRAE

Air Leakage Analysis in Parallel Fan-Powered Terminal Units Using EnergyPlus
Zahra Sardoueinasab, Student Member ASHRAE; Peng Yin, PhD, Associate Member ASHRAE; Dennis O’Neal, PhD, PE

**KC-19-A018**
Automatic Fault Detection and Diagnosis of Air Handling Unit Using an Online Machine Learning Algorithm
Majid Karami, Student Member ASHRAE; Liping Wang, Member ASHRAE

**KC-19-A019**
Sensitivity Analysis of Optimal Energy in Buildings to Environment Parameters
Samah Ben Ayed, PhD, Associate Member ASHRAE; Jeff Borggaard, PhD; Eugene Cliff, PhD

**KC-19-A020**
Methodology to Evaluate Sensitive Levels of Inputs for US Commercial Building Models
Yunyang Ye, Student Member ASHRAE; Kathryn Hinkelman, Student Member ASHRAE; Wangda Zuo, PhD, Member ASHRAE; Gang Wang, PhD, PE, Member ASHRAE

**KC-19-A021**
Model-Based Home Envelope Performance Evaluation: A Use Case of Data from Connected Thermostats
Junke Wang, Student Member ASHRAE; Choon Yik Tang, PhD, Li Song, PhD, PE, Member ASHRAE

**KC-19-A022 (WITHDRAWN)**

**KC-19-A023**
Solubilities and Diffusivities of HFC and HFO Refrigerants in a Synthetic Polyol Ester Lubricant Oil
Ana Rita C. Morais, PhD; Luke D. Simoni, PhD; Aaron M. Scurto, PhD; Mark B. Shiflett, PhD, PE

**KC-19-A024**
Investigating the Thermodynamic and Transport Properties of Hydrofluorocarbon: Ionic Liquid Mixtures with Applications Towards Refrigerant Gas Separations
David L. Minnick, PhD; Ana Rita C. Morais, PhD; Mark B. Shiflett, PhD, PE

**KC-19-A025**
Thermodynamic and Kinetic Analysis of Ammonia in Ionic Liquids for Absorption Refrigeration
Tugba Turnaoglu; Mark B. Shiflett, PhD, PE

**KC-19-A026**
Two-Objective Genetic Algorithm Optimization of Chilled Water Plant Design
Nabil Nassif, PhD, PE, Member ASHRAE; Nihal AlRaees, Student Member ASHRAE; Fouad Al Rifaie, Student Member ASHRAE

**KC-19-A027**
Smart Integrated Optimization Technique for Large Chilled Water Systems
Mostafa Tahmasebi, Student Member ASHRAE; Nabil Nassif, PhD, PE, Kevin Eaton; Rand Talib, Student Member ASHRAE

KC-19-A028
An Approach for Motor Efficiency with Variable Frequency Drives

Gang Wang, PhD; Zufen Wang; Zhitao Han, PhD; Li Song, PhD

KC-19-A029
The Impacts of Variable Frequency Drives on Drive System Efficiency

Zhitao Han, PhD; Zufen Wang; Gang Wang, PhD, PE, Member ASHRAE

KC-19-A030
Algorithmically Generated Chiller Performance Curves for Building Energy Simulation

Jeremy Lerond, Affiliate Member ASHRAE

KC-19-A031
Barriers to Energy Controls Delivering Real Savings

Reid Hart, PE, Member ASHRAE; Michael Rosenberg, Fellow Member ASHRAE

KC-19-A032
Enhancing Traditional Building Energy Model Calibration with Physics-Based Inverse Models

Han Li, Associate Member ASHRAE; Tianzhen Hong, PhD, PE, Member ASHRAE; Marina Sofos, PhD

KC-19-A033
Influence of Source Location and Ventilation Rates on Contaminant Dispersion Pattern in an Aircraft Cabin

James Bennett, Member ASHRAE; Veronica Dos Santos Teixeira; Yanhui Zhang; Shamia Hoque, Associate Member ASHRAE

KC-19-A034
Particle and Chemical Emissions from 3D Printers and Their Potential Health Impacts

Qian Zhang, PhD; Aika Davis, PhD; Marilyn Black, PhD, Fellow Member ASHRAE; Rodney Weber, PhD

KC-19-A035
A Study of Chemical Exposure from Consumer Products Used in Residential Environments

Aika Davis, PhD, Member ASHRAE; Debra Harris, PhD; Marilyn Black, PhD, Fellow Member ASHRAE

KC-19-A036 (WITHDRAWN)

KC-19-A037
A Desiccant Wheel Application with Condenser Water Cooling and Low-Grade Geothermal Energy in Humid Climates

Jiajun Liao, Student Member ASHRAE; David E. Claridge, PhD, PE, Fellow/Life Member ASHRAE
Real-Time Optimization of Energy Efficiency for Cold Climate Heat Pumps with Extremum Seeking Control

Wenyi Wang; Yaoyu Li, Member ASHRAE

Identifying Models of HVAC Systems Using ARIMAX

Fan Feng, Student Member ASHRAE; Zheng O'Neill, PhD, PE, Member ASHRAE

Break-Point Statistical Formulations for Whole Building Heating Hot Water Consumption Modeling

Hongxiang Fu, Student Member ASHRAE; Juan-Carlos Baltazar, PhD, PE; David E. Claridge, PhD, PE, Fellow Member ASHRAE

Inferring Occupant Counts from Wi-Fi Data through Random Forest

Zhe Wang, PhD; Tianzhen Hong, Member ASHRAE

Experimental Test Chamber for Testing Innovative PCM Building Envelope Assemblies in Full Scale Applications

Sajith Wijesuriya, Student Member ASHRAE; Paulo Cesar Tabares-Velasco, PhD, Associate Member ASHRAE

Window Enhancements in Prototype Buildings

Chitra Nambiar, Associate Member ASHRAE; Supriya Goel, Associate Member ASHRAE; Michael Rosenberg, Fellow Member ASHRAE; Jian Zhang, PhD, Member ASHRAE

Conference Papers

Development of a New Prototype Energy Model for Data Centers

Kaiyu Sun, Member ASHRAE; Tianzhen Hong, PhD, PE, Member ASHRAE; Xuan Luo

Improving Data Center and Telecommunication System HVAC Design from Lessons Learned in Retro-Commissioning

Richard Pavlak, PE, Fellow ASHRAE; Nick Pavlak, Member ASHRAE

First Steps to Maintain a Large Fleet of Building Energy Models
Daniel L. Villa, PE, Member ASHRAE; Joshua R. New, PhD, Member ASHRAE; Mark Adams, Member ASHRAE; Aaron Garrett, PhD; Gerald R. Gallegos, PE, Member ASHRAE

KC-19-C004
Simulation based Fault Impact Analysis for the Secondary School in the U.S.
Yanfei Li, Student Member ASHRAE; Zheng O’Neill, PhD, PE, Member ASHRAE

KC-19-C005
Thermodynamic Analysis of a Vortex Tube Integrated Subcritical Vapour Compression Cycle
Akhilesh Arora, PhD

KC-19-C006
Three-Dimensional Computations for Forced Convection of Air in Offset-Strip Fin Channels: Effects of Fin Offset Length
D. Shi, Student Member ASHRAE; K.-T. Lin; M.A. Jog, PhD; R.M. Manglik, PhD, Fellow ASHRAE

KC-19-C007
Personalized Thermal Demand Prediction Algorithm Based on Wrist Temperature and Heart Beat
Linhao Li; Chenlu Zhang

KC-19-C008 (WITHDRAWN)

KC-19-C009
Air Conditioner Control Strategy Based on Thermal Comfort Improvement Model
Guan-Wen Chen; Hung-Wen Lin, PhD, Member ASHRAE; Chung-Inn Yong; Deqing Moo; Yin-Chun Tsai

KC-19-C010
Study of Heat Exchanger Inlet Air Velocity Distribution for Ducted Tests in a Psychrometric Chamber
Abraham J. Lee, Student Member ASHRAE; Christian K. Bach, PhD, Associate Member ASHRAE; Craig R. Bradshaw, PhD, Member ASHRAE

KC-19-C011
Potency of Cyclic Degradation Coefficient in Characterizing Dynamic Air Conditioner Operation
Rohit Dhumane, Student Member ASHRAE; Jiazhen Ling, PhD, Associate Member ASHRAE; Vikrant Aute, PhD, Member ASHRAE; Reinhard Radermacher, PhD, Fellow ASHRAE; Allen Chad Kirkwood, Member ASHRAE; Jack Esformes, Member ASHRAE

KC-19-C012
Improvement of Unitary Equipment and Heat Exchanger Testing Methods
Md Yeam Hossain, Student Member ASHRAE; Romit Maulik; Hyunjin Park, Student Member ASHRAE; Mansoor Ahmed; Christian K. Bach, PhD, Associate Member ASHRAE; Omer San, PhD

KC-19-C013

Integrated Sizing Methodology for a hybridGEOTABS Building
Mohsen Sharifi; Rana Mahmoud; Eline Himpe, PhD; Jelle Laverge, PhD

KC-19-C014

Radiant Ceiling Panels: An Analysis of Load Shifting, Energy Use, and Comfort in a Laboratory House Setting
James Haile, PE; David Springer, Member ASHRAE

KC-19-C015

Impact of Microclimate and Macroclimate on Building Energy Consumption
Carlo Bianchi, PhD, Student Member ASHRAE; Jermy Thomas, Student Member ASHRAE; Amanda D. Smith, PhD, Associate Member ASHRAE

KC-19-C016

City-Scale High-Resolution WRF-UCM Urban Weather Predictions Compared to a Dense Network of Ground-Based Weather Station Data for Assessment of Urban Building Energy Consumption
Elham Jahani, Student Member ASHRAE; Soham Vanage, Student Member ASHRAE; David Jahn, PhD; William Gallus, PhD; Kristen Cetin, PhD, PE, Member ASHRAE

KC-19-C017

The Influence of Role Models on the Sustainability of the Engineering Profession in the UK: A Case Study
Ina Colombo, PhD; Ollie Folayan, PhD; Nike Folayan, PhD; Reneth Mckenzie-Schoetz

KC-19-C018

Examination of a Novel R410A Replacement
Kenneth Schultz, PhD, Member ASHRAE; Steve Kujak, Member ASHRAE

KC-19-C019

Performance of Displacement Ventilation for Hospital Patient Rooms with Varying Cooling Loads
Kishor Khankari, PhD, Fellow Member ASHRAE

KC-19-C020

Designing Simplified Airborne Infection Isolation Rooms to Reduce Infection Rate in Future Pandemics
Merethe C. Lind; Hannu Koskela; Bård Venås, Anders Welde Vikan; Petri Kalliomäki; Trond Thorgeir Harsem

KC-19-C021
Infectious Passenger Isolation System for Aircraft
Ian Darrah; James S. Bennett, Member ASHRAE; Byron W. Jones, Fellow Member ASHRAE; Mohammad H. Hosni, Fellow Member ASHRAE

KC-19-C022
Codes, Standards, and OSHA Regulations Impacting Occupant Health and Safety in Buildings
Stephen W. Duda, PE, HFDP, HBDP, BEAP, Fellow Member ASHRAE

KC-19-C023
A Real-Time Platform for Assessment of Chiller-Side Demand Response Strategies
Fan Feng, Student Member ASHRAE; Zhengwei Li, PhD; Zheng O’Neill, PhD, PE, Member ASHRAE

KC-19-C024
Modelling Moisture Sources Due to Air Leakage with the HAMT Extension for EnergyPlus
Florian Antretter, Member ASHRAE; Simon Pallin, PhD, Member ASHRAE

KC-19-C025
Ventilation Design Considerations for Occupant Health in Aircraft Painting Facilities Under OSHA Requirements
James S. Bennett, PhD, Member ASHRAE

KC-19-C026
Development of a Semi-Empirical Model for Predicting the Pressure Drop of Nanofiber Air Filters
Ye Bian; Li Zhang, PhD; Chun Chen, PhD, Associate Member ASHRAE

KC-19-C027
Long-term Monitoring and Simulation of a Vertical Closed-Loop Ground Source Heat Pump System Used in the Cold Climate of the U.S.
Rui Miao, Student Member ASHRAE; Yao Yu, PhD, Associate Member ASHRAE; Xiaou Hu, Student Member ASHRAE; Todd Sirotiak, PhD, PE

KC-19-C028
Design and Construction of a Geothermal CO₂ Air Conditioner
Paul Kalinowski, Associate Member ASHRAE; Dennis Nasuta, Associate Member ASHRAE; Cara Martin, BEMP, Associate Member ASHRAE
KC-19-C029

Machine-Learning in a Model Predictive Controller for the Management of Domestic Hot Water Systems
Louis-Gabriel Maltais, Student Member ASHRAE; Louis Gosselin, PEng, PhD, Member ASHRAE
KC-19-C030

Bio-Sensing and Reinforcement Learning Approaches for Occupant-Centric Control
Chenlu Zhang; Zhiang Zhang; Vivian Loftness
KC-19-C031

Defining Typical Occupancy Schedules and Behaviors in Residential Buildings Using the American Time Use Survey
Debrudra Mitra, Student Member ASHRAE; Yiyi Chu, Student Member ASHRAE; Nicholas Steinmetz, Student Member ASHRAE; Kristen Cetin, PhD, PE, Member ASHRAE; Paul Kremer, Associate Member ASHRAE; Jayde Lovejoy, Student Member ASHRAE
KC-19-C032

Data-Driven Leakage Detection in Air-Handling Units on a University Campus
Megan K. McHugh, Student Member ASHRAE; Travis Isakson, PE; Zoltan Nagy, PhD, Member ASHRAE
KC-19-C033

An Interactive Building Control for the Integrative HVAC System Featuring Personalized Cooling in Office Buildings
Siliang Lu, PhD, Student Member ASHRAE; Erica Cochran Hameen, PhD; Yue Zou, PhD, Member ASHRAE
KC-19-C034

Using Text Analytics on Operator Logbooks for Performance Benchmarking: A Case Study
Saptak Dutta, Student Member ASHRAE; Burak Gunay, PhD, Member ASHRAE; Scott Bucking, PhD, Member ASHRAE
KC-19-C035

Model Predictive Control of Cool Thermal Energy Storage Under Different Electricity Rate Structures
Amy Van Asselt, PhD, Associate Member ASHRAE
Modeling and Analysis of Compact Evacuated Tube with PCM for a Tank-Less Solar Water Heating System

Mohamed Osman; Mohamed Abokersh; Omar Huzayyin, PhD, Member ASHRAE; Mohamed Elmorsi, PhD, Member ASHRAE


Niraj Kunwar, Student Member ASHRAE; Kristen S Cetin, PhD, PE, Member ASHRAE; Ulrike Passe, Associate Member ASHRAE

Occupant Window Usage and Cooling Energy Consumption: A Case Study

Jayson Bursill, Student Member ASHRAE; William O’Brien, PhD, Associate Member ASHRAE; Ian Beausoleil-Morrison, PhD, PEng, Member ASHRAE

Unmanned Aerial Vehicles Application in Building Envelope Thermal Energy Assessment in Saudi Arabia

Ayman Youssef, PE, Member ASHRAE; Ahmed Alawfi; Faisal Al Musa; Muhammad Elias

Uncertainty Analysis of a Numerical Performance Model for an Inflatable Fabric Evaporative Cooling Tower

S. Duong; R. Craven; S. Garner; S. Idem, PhD, Member ASHRAE

Achieving Health and Comfort in High-Rise Residential Buildings by Using a Dynamic-Hybrid Air Permeable Ceiling (DHAPC)

Mohd Firrdhaus Mohd Sahabuddin, Student Member ASHRAE; Cristina Gonzalez-Longo, PhD

Fire Hazard Analysis of Energy-Saving, High-Volume Low-Speed (HVLS) Fan Systems in Large Spaces

Xiaolei Chen, PhD; Frank Wang, PE
Analysis on Applicability and Feasibility of Popularizing the Naphthalene Sublimation Technique in Island-Reef Areas
Y.P. Cui; J.C. Xie, PhD; P. Xue, PhD; J.P. Wang

Load Forecasting and Equipment Sequencing in a Central Heating and Cooling Plant: A Case Study
H. Burak Gunay, PhD, Member ASHRAE; Araz Ashouri, PhD; Weiming Shen, PhD, PEng

A Preliminary Analysis on the Use of Low-Cost Data Streams for Occupant-Count Estimation
H. Burak Gunay, PhD, Member ASHRAE; Araz Ashouri, PhD; Weiming Shen, PhD, PEng; Guy Newsham, PhD; William O’Brien, PhD, PEng, Associate Member ASHRAE

Development of a Unified Tool for Analysis of Room Loads and Conditions
Charles S. Barnaby, BEMP, Fellow/Life Member ASHRAE; Peter Simmonds, PhD, Fellow Member ASHRAE

A New Algorithm to Measure the Convergence of PSO with an Application to Hydronic Design in Buildings
Ramiro H. Bravo PhD, PE, Member ASHRAE; Forrest W. Flocker, PhD, PE

Performance Evaluation of a Three-Fluid Liquid Desiccant Membrane Air-Conditioning System
Devin Storle, Associate Member ASHRAE; Mohamed R.H. Abdel-Salam, PhD, PEng, LEED GA, Member ASHRAE; Carey J. Simonson, PhD, PEng, Fellow Member ASHRAE

Geothermal Heat Pumps—Simply Efficient
Lisa Meline, PE, Member ASHRAE; Steve Kavanaugh, PhD, Fellow/Life Member ASHRAE

Chronological Variations in ASHRAE Handbook Refrigerant Thermodynamic and Transport Properties from 1981 to 2017
Paul H. Nagy, Student Member ASHRAE; Michael B. Pate, Life Member ASHRAE