

**TC 9.9 Mission Critical Facilities, Data Centers, Technology Spaces, and Electronic Equipment
Conference Program Listing (Current as of December 2019)**

City	Date	Type	Paper Seq	Forum Seq	Seminar Seq	Program Title	Chair	Speakers	Paper Topic
Orlando	2/2/2020	CPS 8	4			Utilizing Waste Heat and Thermal Management	Gurunarayana Ravi	Alejandro Lavernia, Maryam Asghari, Jacob Brouwer	Absorption Cooling for Data Centers Powered by Solid Oxide Fuel Cell Waste Heat (OR-20-C024)
			5					Naoki Aizawa	Study on a Cooling System with Power Usage Effectiveness of 1.02x for Server Rooms (OR-20-C025)
	2/4/2020	Seminar 55			1	The Future of Data Center Infrastructure Management Tools	Nick Gangemi	Christian Pastrana	The State of Modern Data Center Infrastructure Management Tools
					2			Dustin Demetriou	ASHRAE DCIM Compliance for IT Equipment
					3			Mark Seymour	Getting DCIM to Talk through Metrics: Bursting the Data Bubble
	2/5/2020	Seminar 63			1	Ventilation Effectiveness Metrics, Part 2: Equipment	Malcolm Cook	Mark Seymour	Ventilation Effectiveness Is Inappropriate for Data Centers, True or False?
					2			James VanGilder	The Capture Index Cooling-Performance Metric for Data Centers
2/5/2020	Seminar 70			3	Leveraging Computational Models to Make Smart Controls	Duncan Phye	Mike Koupriyanov	Air Distribution and Cooling in a Battery Storage Facility	
				2			Mark Seymour	Data Center Controls Are Simple: Why Use Modeling?	
				3			Wangda Zuo	Applying Equation-Based Modeling for Energy Efficient Data Center Cooling Operation	
				4			James VanGilder	Using a Physics-Based Model to Control Cooling Airflow in Data Centers	
Kansas City	6/23/2019	CPS 2	1			Specialty Buildings: Data Centers and Sports Facilities	Gurunarayana Ravi	Tianzhen Hong	Development of a New Prototype Energy Model for Data Centers
			2					Richard Pavlak	Improving Data Center and Telecommunication System HVAC Design from Lessons Learned from Retro-Commissioning
	6/24/2019	Seminar 28			1	Balancing Energy and Effectiveness	Gang Tan	Mark Seymour	Energy Efficient or Effective Data Center Cooling: Is It Either/Or?
	6/25/2019	Seminar 47			2	Modeling Transient Events, Part 2: The Indoor Environment	Duncan Phye	James W. VanGilder	A Compact Cooling-Unit Model for Transient Data Center Simulations
6/25/2019	Seminar 52			5	Modeling Transient Events, Part 1: External Factors Which Affect the Indoor Environment	Duncan Phye	Wangda Zuo	Modeling the Transient Event of Data Center Cooling during the Power Outage	

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Atlanta	1/13/2019	CPS 5	1			Analysis of HVAC Systems for Specific Applications	Ratnesh Tiwari	Kazuhiro Matsuda, Morito Matsuoka, and Ying-Feng Hsu	Power Consumption Simulator of Data Center by using Computational Fluid Dynamics and Machine Learning
	1/13/2019	Seminar 16			1	The Best of Engineer's Notebook 3rd Edition	Kelley Cramm	Daniel H Nall	Data Centers, Cooling Towers and Thermal Storage
	1/14/2019	Seminar 24			1 2 3	ASHRAE Thermal Guidelines Driving Data Center Performance & Innovation	Joseph Gangemi	Dustin Demetriou Paul Finch Mark Seymour	The Real Opportunity of the Thermal Guidelines and their Impact on IT Equipment Design Data Center Site Selection, Business Decisions and Thermal Guidelines that Facilitate the Bold Decision to Enter the Wholesale Market and Adopt a Free Cooling Strategy Validating the Design Concept for a Data Center Without Mechanical Cooling in the Southern UK
	1/15/2019	Seminar 59			1 2 3	Transient Temperature Changes in the Data Center: Should We Be Worried?	Joseph Gangemi	James W. VanGilder Kourosh Nemati Mark Seymour	Data Center Temperature Rise following the Loss of Primary Power The Impact of Airside and Waterside Failure on Data Center Lab Cooling Performance Modeling Transient Behavior in a Data Center: When is it Needed?
	1/15/2019	CPS 17	1 2 3			Numerical Techniques for HVAC Design	Ratnesh Tiwari	Rehan Khalid and Aaron Wemhoff Kosuke Sasakura, Takeshi Aoki and Takeshi Watanabe Naoki Aizawa	Comparison of Approaches for Calculating Annualized Data Center Energy Metrics Study on the Prediction Models of Temperature and Energy by using DCIM and Machine Learning to Support Optimal Management of Data Center Cooling System with Low Power Usage Effectiveness Below 1.02x for Server Rooms
	1/16/2019	Debate 4				Intelligent, Efficient and Resilient Data Centers: What is Needed? Rules of Thumb, Science or Just Technology?	Bahgat Sammakia	Roger Schmidt, Kanad Ghose, Dereje Agonafer, Mark Seymour	
	6/25/2018	Seminar 23			1	Faster, Cheaper, More Accessible: The Latest Research in Airflow and Thermal Modeling of Indoor Environments	James VanGilder	Dustin Demetriou	Use of Proper Orthogonal Decomposition to Study Data Center Thermally: Aware, Energy-Based Load Placement
6/27/2018	CPS 15	2			Not Just Blowing in the Wind	Chris Laughman	Essam E. E. Khalil	Transient Air Flow Regimes in a Large Scale High Density Data Centers	
Chicago	1/22/2018	Seminar 25			1 2 3	Modeling and Metrics for Data Center Performance	Nick Gangemi	Mark Seymour Christian Pastrana Kourosh Nemati	The Performance Indicator: A Data Center Cooling Performance View Using Modeling and Metrics to Improve the Citigroup Flextech Upgrade Quantifying Data Center Cooling Performance
	1/23/2018	Seminar 46			1	CFD Modeling throughout the Building Lifecycle	Jinchao Yuan	Mark Seymour	Is a Reactive Approach to Data Center Overheating Sufficient?

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Chicago	1/23/2018	CPS 14	1			Cooling Mission Critical Facilities	Nick Gangemi	M. Matsuoka, Kazuhiro Matsuda, and Hideo Kubo	Effective Cooling of Server Boards in Data Centers By Liquid Immersion Based on Natural Convection Demonstrating PUE below 1.04 (CH-18-C052)
			2					Kazuhiro Matsuda, Morito Matsuoka, and Yuichiro Miyake	Proposal of Cooling System for High Performance Computing by Drip-Feeding Cooling (CH-18-C053)
		3			Naoki Aizawa			Cooling System with Nearly Zero Cooling Power for Server Rooms (CH-18-C054)	
		4			Sophia Flucker, Robert Tozer, Beth Whitehead, Deborah Andrews, and Jon Summers			Data Center Sustainability Index (CH-18-C055)	
		5			Micah Sweeney, Mukesh Khattar, and Ron Domitrovic			Efficient Cooling and Heat Recovery with VRF Systems in Embedded Data Centers (CH-18-C056)	
	1/24/2018	Seminar 56			1	Using Optimization for Airflow Management in Data Centers and Operating Rooms	James W. VanGilder	Cheng-Xian (Charlie) Lin	Optimization Study of Stanchion Layout and Flow Partitioning to Achieve Uniform Airflow through Perforated Tiles in Data Centers
					2			Ramin Rezaei	Optimizing Supply Airflow Location in Data Centers Using CFD
					3			James W. VanGilder	Improving Data Center Efficiency with Active Airflow Control
Long Beach	6/25/2017	Debate 1				Cumbersome and Correct vs. Half-Baked and High-Speed	Nick Gangemi	Mark Seymour , James W. VanGilder, Nick Gangemi	
	6/27/2017	Seminar 40			1	Delivering a Successful Critical Facility/Data Center Project by Fostering a Healthy Relationship between the Owner, Engineer and Commissioning Agent	Nick Gangemi	Vali Sorell	The EOR's Perspective on Delivering a Successful Critical Facility/Data Center Project By Fostering a Healthy Relationship with the Owner and Commissioning Agent
					2			Terry Rodgers	The CxA's Perspective on Delivering a Successful Critical Facility/ Data Center Project by Fostering a Healthy Relationship with the Owner and Engineer
	6/28/2017	Seminar 60			1	Power Trends Update: Aligning Future Facility Capability and ITE Power	Nick Gangemi	Matt Archibald	Datacom Equipment Workloads, Configurations and Applications
					2			Susan Smith	Datacom Equipment Power Trends
				3	Jerrod Buterbaugh			Data Center Solutions and Examples	
6/28/2017	CPS 20	4			District and Central Plant Efficiency	Steven Taylor	Amir Radmehr, John Fitzpatrick, and Kanchan Kelkar	Evaluating and Improving the Chilled Water System of a Data Center Using Flow Network Modeling (LB-17-C071)	
6/28/2017	Seminar 59				3	Don't Be Scared: CFD for Everyday Design	James W. VanGilder	Mark Seymour	Garbage In, Garbage Out: Is Conceptual Data Center CFD Design Any Use?
Las Vegas	1/29/2017	CPS 2	1			Modern Optimization Techniques for Hydronic Systems in Data Centers		Sophia Flucker, Beth Whitehead, Robert Tozer, and Deborah Andrews	Energy and Water Environmental Trade-Offs of Data Center Cooling Technologies (LV-17-C004)
			2		Thomas Carter, David Sickinger, Zan Liu, Kevin Regimbal and David Martinez			Thermosyphon Cooler Hybrid System for Water Savings in an Energy-Efficient HPC Data Center: Modeling and Installation (LV-17-C005)	
			3		Christian Pastrana			Case Study: Using Simulation Techniques to Optimize Migrations in an Existing Mission Critical Data Center (LV-17-C006)	

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Las Vegas	1/29/2017	Seminar 14			2	Data Driven Energy Auditing, Measurement and Verification		Wenli Yu, and Liangcai Tan	A Smart Data Center Energy Expert System for Automatic Measurement, Energy Audit and Energy Efficiency Improvement
	1/31/2017	Seminar 42			1	Power and Cooling Considerations for Back of Rack Ecosystems within the Data Center		Jon Fitch	Rack Level Power Solutions and Its Associated Challenges and Deployment Best Practices
					2			Dave Moss	Top of Rack Networking Solutions and Its Associated Challenges and Deployment Best Practices
					3			Dustin Demetriou	IT Equipment Exhaust-Side Deployment Challenges and Considerations
	1/31/2017	Seminar 54			2	Cutting-Edge Japanese Technologies SHASE Annual Award for HVAC System and Equipment in 2016		Yosuke Mino	Implementation of Environment-Friendly Office Building with High-Efficiency Data Center
1/31/2017	Seminar 59			1	Recent Research in Data Center Cooling		Mark Seymour	Does Designing and Operating an Efficient Data Center Guarantee Performance?	
				2			H. Ezzat Khalifa	Computer Room Air-Handler Bypass: A Novel Approach for Reducing the Cooling Infrastructure Power Consumption in Air- Cooled Data Centers	
				3			Cheng-Xian (Charlie) Lin	Evaluation of Strategies for Uniform Airflow through Perforated Tiles in Data Centers	
				4			James VanGilder	Thermal Design of Modular Mission Critical Systems	
St. Louis	6/26/2016	CPS 2	3		Airflow Requirements and Modeling Approaches	Joy Altwies	Cheng-Xian Lin, Long Phan, and Bin Liu	A Hybrid Turbulence Model Coupling Strategy for CFD Simulation of a Data Center Model (ST-16-C005)	
	6/28/2016	Seminar 41			1	Fellows Debate: Productivity is the Measure of Indoor Air Quality	Larry Spielvogel	William Bahnfleth, Bjarne Wilkens Olesen, Don Beaty, Richard Rooley, Derrick A. Denis and Donald Weekes	
	6/29/2016	Seminar 58			1	Improved Modeling Characteristics of a Data Center without Compromising Physics or Breaking The Bank	Nick Gangemi	Mark Seymour	Improving Model Calculation Time without Sacrificing Physics
2					Zachary Pardey			The Compact Modeling of Raised-Floor Stanchions	
				3			Cheng-Xian Lin	Data Center Modeling Using Response Surface Methodology	
Orlando	1/24/2016	Seminar 11			2	New CFD Techniques for Design of Air Distribution Systems	Atila Novoselac	Cheng-Xian Lin	Reduced Order Modeling of Airflow and Thermal Fields in a Data Center
					3			James VanGilder	Faster and Simpler CFD for Data Center Applications
	1/25/2016	TPS 3			1	Data Center Energy Performance Metrics	Chuck Curlin	James VanGilder	Measurement of Perforated Tile Airflow in Data Centers (OR-16-007)
					2			Sophia Flucker, CEng and Robert Tozer,	The Business Case for Sustainability in Data Centers (OR-16-008)
	1/25/2016	CPS 11			1	Achieving Net-Zero Energy Use in Data Centers	Calina Ferraro	John C. Peterson, Tahir Cader, and Roy Dragseth,	Data Center Water Energy Recovery (OR-16-C036)
					2			Dan Comperchio and Sameer Behere	Data Center Great Debate: Competing Ideas for Maximizing Design Efficiencies (OR-16-C037)

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Orlando	1/27/2016	Seminar 64			1			Husam Alissa	A Holistic Approach to Characterizing Mission Critical Facility Cooling Performance
					2	Pursuing Energy Efficiency May Put Your Data Center IT At Risk	Nick Gangemi	Kourosh Nemati	Analysis of Cooling Performance of an Enclosed Hybrid-Cooled Server Cabinet
					3			Mark Seymour	Filling the Engineering Gap: Balancing Data Center Availability, Capacity and Efficiency
Atlanta	6/29/2015	Seminar 28			1	Optimization for Data Center and ITE Integration	Robin Steinbrecher	Robin Steinbrecher	IT Equipment: New Components and Usage Impacting Power Trends
					2			Nishi Ahuja	Real Time Monitoring and Availability of Platform Telemetry for Efficient Data Center Cooling
	6/29/2015	CPS 9	1			Fault Diagnosis and Commissioning Existing Buildings	Alan Neely	Zhiguang He and Zhen Li	A Fault Diagnosis Warning System of Refrigeration Systems Based on Fault Direction Space Method for Data Centers (AT-15-C031)
Atlanta	7/1/2015	Seminar 53			1			H. Ezzat Khalifa	Importance of Tile Momentum Correction in CFD Simulation of Data Center Temperature Field
					2	Calibrating Operational CFD Models for Real Data Centers	Nick Gangemi	James VanGilder	Developing a Calibrated CFD Model of a 7,400 Ft ² Raised- Floor Data Center
					3			Mark Seymour	Critical CFD Decisions to be Able to Calibrate a Model for Effective Operational Data Center Cooling Performance Management
Chicago	1/25/2015	TPS 2	1			Data Center Initiatives	Joy Altwies	Robert Topper and Kenneth Kessler	Energy Saving Potential of Flash Heat Transfer (CH-15-004)
			2					Atieh Talebzadeh, Mahdi Moradian, Yunan Han, Abhishek Patnaik, David Swenson and David Pommerenke	Dependence of ESD Charge Voltage on Humidity in Data Centers: Test Methods (CH-15-007)
			3					Atieh Talebzadeh, Abhishek Patnaik, Xu Gao, Mahdi Moradian, Yunan Han, David Swenson and David Pommerenke	Dependence of ESD Charge Voltage on Humidity in Data Centers: Data Analysis Inequality (CH-15-005)
			4				Xu Gao , Atieh Talebzadeh , Mahdi Moradian, Yunan Han , David Swenson and David Pommerenke	Dependence of ESD Charge Voltage on Humidity in Data Centers: Estimation of ESD Related Risk in Data Centers Using Voltage Level Extrapolation and Chebyshev's Inequality (CH-15-006)	
Chicago	1/25/2015	Seminar 7			1	Controlling a Minimum Impact Data Center	Joseph Kilcoyne	Alex Mathers	Using Automation to Minimize the Risk of Downtime and Equipment Failures in Economizing Data Centers
					2				Jeff Stein
Chicago	1/25/2015	CPS 3	1			Modern Data Center Design	Charles E. Henck	Anirudh Deodhar, Harshad Bhagwat, Amarendra K Singh, Anand Sivasubramaniam, Umesh Singh and Sankaranarayanan Dharmarajan	Fast Prediction of Control Insights in Air-Cooled Data Centers Using Proper Orthogonal Decomposition (CH-15-C008)
			2					Mark Seymour	How Do I Choose from a Myriad of Options to Upgrade My Data Center and Improve Cooling Efficiency? (CH-15-C009)
			3					Christian Pastrana and Mark Seymour	Aisle Containment: Just How Important Is It to Worry about By-Pass and Leakage Paths? (CH-15-C010)
			4					Matthew F Renner and Mark Seymour	Are Simulation Models of the Air Delivery for Operating Data Centers Accurate Enough to be Useful? (CH-15-C011)

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New York	1/19/2014	TPS 1	1			Hydraulic Modeling as a Tool to Enable Design Resiliency and Quantify Pump Energy Savings for Data Center Chilled Water Systems	Nick Gangemi	Michelle Contri and Thomas A. Davidson Thomas A. Davidson and Michelle Contri	Hydraulic Modeling as a Tool to Enable Design Resiliency for Data Center Chilled Water Systems (NY-14-001) Hydraulic Modeling as a Tool to Quantify Pump Energy Savings in Data Center Chilled Water Systems (NY-14-002)
	1/19/2014	Seminar 4			1 2 3	CFD for Data Center Applications Part 1 – Modeling Advancements	Nick Gangemi	John Zhai, Knud Hermansen and Saleh Al-Saadi James VanGilder, Xuanhang (Simon) Zhang and Christopher M. Healey H. Ezzat Khalifa	Experimental Validation Of Data Center Rack Models An Enhanced Potential Flow Model For Data Center Applications A Hybrid CFD/Lumped-Capacitance Model For Simulating Data Center Transients
	1/21/2014	Seminar 36			1 2	CFD for Data Center Applications, Part 2 – Applications	James VanGilder	Mark Seymour Reza Ghias	Prediction Is Better Than Cure: CFD Simulation for Data Center Operation Practical Use of CFD to Address the Design Challenges and Failure Scenarios in Data Centers
	1/22/2014	Seminar 47			1 2 3	A Look at DCIM Solutions and Their Integration Challenges in Today's Data Centers and a Look at What Tomorrow Offers		David Quirk Don Beaty Jack Glass	Integration Challenges and End User Expectations Challenges with Multi-industry Protocols and Future Considerations Case Study of a Major Control Change within an Operating Data Center in a High Rise Building
	1/22/2014	CPS 26	2 3			Data Center Control and Fire Safety in Tall Buildings	Bill Dietrich	Kishor Khankari Daniel S. Hallett	Analysis of Air Leakage From Hot Aisle Containment Systems and Cooling Efficiency of Data Centers (NY-14-C093) Control Strategies for Data Centers: Trends Around the Globe (NY-14-C094)