

**AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND
 AIR CONDITIONING ENGINEERS, INC.**

1791Tullie Circle, NE / Atlanta, GA30329
 (404) 636-8400

TC/TG/TRG MINUTES COVER SHEET

(Minutes of all TC/TG/TRG Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/TRG NO.:	4.10		TC/TG/TRG TITLE:	INDOOR ENVIRONMENTAL MODELING			
DATE OF MEETING:	June 25, 2012		LOCATION:	San Antonio, TX			
DATE ISSUED:	September 3, 2012		RECORDED BY:	Atila Novoselac			
VOTING MEMBERS	TERM		PRESENT	OFFICERS		TERM	
	On	Off				On	Off
VanGilder, Jim	11	14	✓	Chair	VanGilder, James	11	13
Chen, Qingyan (Yan)	09	13	✓	Vice Chair	Bennett, Jamie	11	13
Kato, Shinsuke (Intl.)	09	13	X	Secretary	Novoselac, Atila	11	13
Bennett, Jamie	11	15	✓	Programs	Julian Rimmer	12	N/A
Lin, Chengxian (Charlie)	08	12	✓	Research	Srebric, Jelena	06	N/A
Musser, Amy	09	13	✓	Handbook	Banks, David	05	N/A
Dols, Stuart	11	15	X	Membership	Wang, Liangzhu (Leon)	11	N/A
Horstman, Ray	11	15	✓	Standards	Ensor, David	05	N/A
Srebric, Jelena	09	13	X	Web Page	Dols, William (Stuart)	07	N/A
Sanchez, Greg	11	15	X	Honors and Awards	Horstman, Ray	05	N/A
Zhang, Yuanhui	08	12	X	ALI	Zhai, John	04	N/A
Wang, Liangzhu (Leon)	11	15	X				
Banks, David	11	15	X				

Technical Committee 4.10 – Indoor Environmental Modeling
 These minutes are a **DRAFT** until voted upon by the committee.

MEMBERS	PRESENT	MEMBERS	PRESENT
Adams, Eric		Hernandez, Mark	
Al-Alusi, Thamir		Hirnikel, Daniel	
Anderson, Ren		Horstman, Raymond	✓
Arens, Edward		Hosni, Mohammad	
Armstrong, Peter		Int-Hout, Daniel	
Axley, James		Jeffers, Gregory	
Baker, A		Jin, Mingang	
Banks, David		Jones, Gordon	
Barakat, Sherif		Jones, Robert	
Barles, Pierre		Kang, Kai	
Beausoleil-Morrison, Ian		Karava, Panagiota	✓
Becker, Bryan		Kato, Shinsuke	
Bennett, James	✓	Kelso, Richard	
Berkoe, Jonathan		Kerr, Carolyn	
Blackmore, Byron		Khalifa, Ezzat	✓
Chai, John		Kim, Man-Hoe	
Chakroun, Walid		Kirkpatrick, Allan	
Chen, Chun		Knappmiller, Kevin	
Chen, Qingyan(Yan)	✓	Knight, Kelly	
Christianson, Leslie		Kolesnikov, Alexy	
Clark, Daniel		Koupriyanov, Mikhail	✓
Colliver, Donald		Krafthefer, Brian	✓
Cook, Malcolm		Lavedrine, Isabelle	
Cui, Jie		Lebbin, Paul	
Culp, Charles		Levin, Hal	
DeGraw, Jason		Lin, Chao-Hsin	✓
Djunaedy, Ery		Lin, Cheng-Xian	✓
Dobbs, Gregory		Macdonald, Iain	
Dols, William		Manning, Andy	
Emmerich, Steven	✓	McNeill, James	✓
Englert, Brian		Melikov, Arsen	
Ensor, David		Meng, Lingjun	
Gadgil, Ashok		Murakami, Shuzo	
Ghia, Urmila		Musser, Amy	✓
Gordon, Elliott		Nawrocki, Tracey	
Grimsrud, David		Nielsen, Peter Vilhelm	
Grot, Richard		Novoselac , Atila	✓
Guan, Yanzheng		Offermann Francis	
Haghighat, Fariborz		Olesen, Bjarne Wilkens	
Hall, John		Pei, Hsien-Sheng	
Hensen, Jan		Petersen, Ronald	

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Peterson, Janice		Tzempelikos, Athanasios	
Phillips, Duncan		VanderMeulen, Paul	
Rahai, Hamid		VanGilder, James	✓
Rimmer, Julian		Von Kempski, Diotima	
Rivers, Richard		Walton, George	
Rogers, Lisa		Wang, Liangzhu	
Sanchez, Greg		Wang, Xinlei	
Sawachi, Takao		Waring, Michael	
Schwarz, Walter		Wark, Christopher	
Seppanen, Olli		Willman, Alexander	
Sestak, George		Yang, Xudong	✓
Shaw, Chia-Yu		Yoshizawa, Susumu	
Sinclair, Ray		Zhai, Zhiqiang	
Sleiti, Ahmad	✓	Zhang, Dexian	
Sohn, Chang		Zhang, Jianshun	
Srebric, Jelena		Zhang, Tengfei (Tim)	✓
Tan, Liangcai		Zhang, Wei	
Teichman, Kevin		Zhang, XuanHang (Simon)	✓
Tompkins, Dean		Zhang, Yuanhui	
Topp, Claus		Zhang, Zhao	
Tronville, Paolo		Zuo, Wangda	✓
Tully, Bradley			

ADDITIONAL ATTENDANCE

Escobar, Luis	Habensus, Mladen	Nirlo, Elena	Zaatari, Marwa

Society Liaisons, etc.		PRESENT	
LeViseur, Suzanne	TAC Section Head		
Meredith, David	Prof. Devt. Committee		
Henderson, Hugh	Research Liaison		
Reeves, George	Standards Liaison		
Hosni, Mo	Program Liaison		
Bahnfleth, William	TAC Chairman		
Ferguson, Kimball	Special Publications Liaison		
Ramspeck, Claire	Staff Liaison (Standards)		
Gulledge, Charles E.	TEGA Liaison		
Vaughn, Michael	Staff Liaison (Research)		
Aswegan, James	Handbook Liason	✓	
Bilderbeck, Mike	TAC Section 4 Head	✓	

Call to order - Chairman: (Jim Van Gilder) at 2:20 p.m.

Welcome and Introductions

Roll call (Atila Novoselac in name of Leon Wang) – voting members

VanGilder, Jim	yes	Horstman, Ray	yes
Chen, Qingyan (Yan)	yes	Srebric, Jelena	no
Kato, Shinsuke (Intl.)	no	Sanchez, Greg	no
Bennett, Jamie	yes	Zhang, Yuanhui	no
Lin, Chengxian (Charlie)	yes	Wang, Liangzhu (Leon)	no
Musser, Amy	yes	Banks, David	no
Dols, Stuart	no		

6//12: Six out of twelve non-international voting members.
Chair, Jim VanGilder, counted for quorum. **Quorum NOT achieved!**
Voting will be conducted by emails after the ASHRAE meeting.
Non-voting officers present: Atila Novoselac (Secretary)

Discussion and comments on minutes from the last ASHRAE meeting in Chicago

Pointed out several typos related to the dates in the document.

Voting will be conducted by emails after the conference.

Announcements (Jim VanGilder)

- New rosters were sent to TC's this week. After the meeting, we will check if the changes we requested in January were properly processed.
- Hightower Award nominations for outstanding technical leadership and contributions to a TC/TG/TRG should be submitted to section Head by September 1, 2012.

From the meeting at chairs' breakfast (Jim VanGilder):

1. CEC has asked that a list of volunteers for Technical Chairs and reviewers of session papers be provided to the section head.
2. Technical program changes
 - a. Speaker registration fee will be \$95
 - b. There is a new focus on research at each Annual Meeting starting in Denver. Up to 25% of programs will be dedicated to this. ASHRAE research is encouraged but other research is included.
3. ASHRAE has a new logo and new tag line "Shaping tomorrow's buildings today". We need to support effort by updating our section web site and other materials. There are guidelines for including your ASHRAE status on your business card. Ask me for more information if you are interested.
4. ASHRAE president Ronald Jarnagin has offered to send thank you letters to employers. Please contact Jim if you are interested.
5. Information for Dallas and Denver meetings has been posted on the web site.
 - a. Dallas Seminar and Forum proposals due: August 13, 2012
 - b. Denver Conference Paper Abstracts/Full Technical Papers due: September 24, 2012

- c. Denver Seminar and Forum proposals due: February 11, 2013
6. CEC seeks ideas for Tracks for upcoming conferences. We can submit ideas with a form (to Section Head) or via the website: <http://www.ashrae.org/events/2537>
 7. A TC Master Calendar is now available through Google. You need a Google account: [Add a Friend's Calendar/techservices1791@gmail.com/Add]
 8. New ASHRAE Terminology Wiki has been launched. It contains over 6,000 definitions of terms found in ASHRAE publications.
 9. CEC is working on allowing a % of membership to attend electronically. This should start officially in Dallas and may alleviate some of our quorum concerns.
 10. Program statistics were provided for Chicago Meeting. Less than half of Seminars and Forums submitted were accepted.
 11. Twenty-five speakers who scored lower than 3.5 in the Speaker Ratings were sent letters. After three letters, the speaker must provide proof of having received some speaker training before being allowed to speak again.
 12. There was much discussion at the Chair's Breakfast about CEC acceptance of programs. Concerns were raised about programs not being properly matched to TCs and some obvious "slam dunks" not being approved. Wade Conlan, Overall Program Chair for Dallas provided received TC comments and responded to our concerns.
 13. TC Members submitting a program are encouraged to contact the Track Chair before submitting to get assistance.

Comments / discussion / additional announcements

- Follow-up discussion related to future Speakers Fee. Several TC 4.10 members disapprove this action.
- Discussion on new focus on research (certain % of future ASHRAE programs will be curved towards presenting ASHRAE funded research projects).

Membership (Jim VanGilder in name of Leon Wang)

- Changes in voting membership since Summer 2011 Meeting:
 - Rolled of: Ez Khalifa, Julian Rimmer, Walt Schwarz, Don Yang
 - Rolled on: Leon Wang, Greg Dobbs, Greg Sanchez, Dave Banks, Jim Van Gilder, Stuart Dolls, Ray Horstman, Jamie Bennett
- Changes in officers since Summer 2011 Meeting:
 - Roiled off Chair Chao-Hsin Lin
 - Vice Chair Jim VanGilder become Chair
 - Secretary Jamie Bennett become Vice Chair
 - Membership Chair Atila Novoselac become Secretary
 - Leon Wang become Membership Chair

Research (Jamie Bennett in name of Jelena Srebric)

The research subcommittee met on Sunday (06/24) at 5:00-6:00 pm. There were _21 attendees in the meeting. Revolving submission deadlines: May 15th, August 15th, and December 15th.

- Current RP reports
 - PMS of RP 1512 (CFD resources for particle modeling) meet on Sunday from 1:00-2:30. The PMS chair Jamie Bennett reported on the project progress. Project is back on schedule. Researchers finished most of modeling and experimental work. The most of remaining work relates to the report. The PMS thanks to Jelena Srebric for allowing more time for the project presentation and discussion during the PMS meeting. The completion date is January 31 2013, and there will be no presentation for PMS at the ASHRAE meeting in Dallas.

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- PS of RP 1458-TRP (Modeling Person-to-Person Contaminant Transport in a Mechanically Ventilated Room) meet on Sunday from 2:30-3:30. PMS members Chao-Hsin Lin and Xudong Yang reported on the project. Project is on the schedule, first phase related to literature review and validation data collection is finished, and the researchers started the modeling work related to the model validation.
- Work Statements:
 - None at this time.
- Current RTAR:
 - 1562-RTAR (Development of Boundary Models for Particulate Matters Deposition at Solid Surfaces of Indoor Environment). ASHRAE requested minor revision and Wangda Zuo will coordinate further work for submission on December 15th deadline.
- New RTARs:
 - Guidelines for the Accurate Use of CFD for Modeling Naturally Ventilated Indoor Spaces” Malcolm Cook and Panagiota Karava continue their work on RTAR for Decemover 15th deadline.
 - Need to follow up with Michael Waring who volunteered to prepare an RTAR on Modeling Surface Sorption.
 - Jim Van Gilder to prepare an RTAR on data center mock-up for experiments and validation benchmarks.
 - Ray Horstman to prpapre initial version of RTAR related to “ CFD Prediction of Sparse Particle Distributions”
- Co-sponsored projects:
 - none

Current Status of TC 4.10 RTARs, WSs, and Projects.

Projects	PMS	Title	Status
1512-RP	Jamie Bennett PMS Chair	CFD Resource Decisions in Particle Transport Modeling, PI: Atila Novoselac The project officially started on August 1, 2010 Project end date is January 31, 2013	PI has made the presentation
1458-RP	Julian Rimmer PMS Chair	Modeling Person-to-Person Contaminant Transport in a Mechanically Ventilated Room, PI: Yan Chen Project end date is December 31, 2013	PI has made the presentation
Bidding	PMS	Title	Status
WSs	Author(s)	Title	Status
RTARs	Author(s)	Title	Status
1675-RTAR	Jim Van Gilder	Experimental Benchmark Data for Data Center Numerical Modeling	RTAR returned to TC 4.10 for a revision
1562-RTAR	Wangda Zuo	Development of Boundary Models for Particulate Matters Deposition at Solid Surfaces of Indoor Environment	Revision in preparations for Dec. 15 th deadline
New	Malcolm Cook	Guidelines for the Accurate Use of CFD for	RTAR in

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	(Panagiota Karava, and James Lo)	Modeling Naturally Ventilated Indoor Spaces	preparations for Dec. 15 th deadline
New	Michael Waring	Modeling Particulate Surface Sorption	RTAR in preparations for Dec. 15 th deadline
New	Ray Horstman	CFD Prediction of Sparse Particle Distributions	RTAR in preparations for Dec. 15 th deadline
Co-Sponsor TC Title Status			

List of recently finished projects by TC 4.10

- 1487-RP "Developing Rack Boundary Conditions for CFD Modeling," PI: John Zhai, January 2012
- 1321-RP "Modeling VOC Sorption of Building Materials and Its Impact on Indoor Air Quality - Phase II (second phase of RP-1097)," PI: Xudong Yang, April 2010
- 1271-RP "Modeling Low Velocity Large Scale Fluctuating Flows in Ventilated Spaces at Transitional Reynolds Numbers;" PI: Yan Chen, July 2009

Handbook (Jim VanGilder in name of David Banks)

- The Program Subcommittee met briefly on Sunday (06/24), from 4:30-5:00pm and summarized the subcommittee activities:
 - At the meeting in Chicago: voted to continue with the current handbook Chapter. This was approved and Jim will submit form indicating TC4.10 intention.
 - TC4.10 would like to consider an applications Chapter for 2015. If so, TC needs to apply to have a chapter created.
- During the main meeting James Aswegan provided an update on handbooks.
 - Several suggestions related to a CFD section in the Application Handbook. Provided suggestion that each CFD related RP deliver a summary suitable for inclusion in the Application Handbook. Pointed out problems with providing summary for already finished project.

Program (Mike Koupriyanov in name of Julian Rimmer)

The Program Subcommittee met on Sunday (06/24), from 3:30-4:30p.

Deadlines:

Conference	Type	Seminar	Paper Abstract	Full Technical Paper	Final Conference Paper
Dallas 2013	Winter	Aug. 13, 2012	Mar. 19, 2012	Mar. 19, 2012	Jul. 9, 2012
Denver 2013	Summer	Feb. 11, 2012	Sept. 24, 2012	Sept 24, 2012	Jan. 14, 2013

- San Antonio Program (conference in progress)
 - TC 4.10 Sponsored program for the San Antonio conference
 - Seminar 59: The Effect of the Outdoor Environment on Indoor Environment Modeling on Wednesday, June 27

Current Status of TC 4.10 Program

ASHRAE San-Antonio, Summer 2012			
Session Type	Session Title	Session Chair	Contributing Authors
Seminar	The Effect of the Outdoor Environment on Indoor Environment Modeling	Jim VanGilder	Yan Chen Leon Wang Dave Banks Atila Novoselac

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ASHRAE Dallas, Winter 2013			
Session Type	Session Title	Session Chair	Contributing Authors
Seminar	Boundary Conditions for Indoor Environmental Modeling	Mike Koupriyanov	John Zhai Mike Koupriyanov Yan Chen Atila Novoselac
Seminar	Natural Ventilation	Wangda Zuo	Shaun Fitzgerald Malcolm Cook David Banks Atila Novoselac
Seminar	Modeling Transient Airflows	Amy Musser	Simon Zhang Mike Koupriyanov Atila Novoselac
Seminar	Modeling of particle transportation, deposition and re-suspension in indoor environment	Wangda Zuo	Atila Novoselac Yan Chen Ezzat Khalifa

ASHRAE Denver, Summer 2013			
Session Type	Session Title	Session Chair	Contributing Authors
Conference Paper	Modeling Industrial Spaces	Chao-Hsin Lin	Yan Chen Mike Koupriyanov Jamie Bennet
Conference Paper	Modeling Thermal Comfort in the Indoor Environment	Mike Koupriyanov	Ray Horstman James McNeil Malcolm Cook
Conference Paper	Reduced Order Modeling	Jim VanGilder	Mingang Jin Jim VanGilder Xudong Yang

To be scheduled			
Session Type	Session Title	Session Chair	Contributing Authors
Seminar	Airflow Modeling on the Cheap (Open Source etc)	Jim VanGilder	Isabelle Lavedrine James McNeil Leon Wang
Seminar	Airflow Modeling for LEED/Sustainable Design of Theatres, Stadiums, Arenas or Airports	Simon Zhang	Mike Koupriyanov Julian Rimmer Isabelle Lavedrine Greg Sanchez Ray Sinclair
Seminar	Data Centers	Jim VanGilder	Shaun Fitzgerald Malcolm Cook David Banks Atila Novoselac John Zhai Ezzat Khalifa
Conference Paper	CFD in Healthcare	Isabelle Lavedrine	Julian Rimmer Isabelle Lavedrine John Zhai
Conference Paper	Air/Contaminant Flow in Personal Microenvironment and PV Systems	Ezzat Khalifa	Ezzat Khalifa Shinsuke Kato Ed Arens (CBE)

Dallas 2013 - Tracks

- Track 1: HVAC&R Systems & Equipment
- Track 2: HVAC Fundamentals and Applications
- Track 3: Standards, Guidelines and Codes

Track 4: Energy Conservation
Track 5: Refrigeration
Track 6: Large Building Design
Track 7: Facility Management; Operations, Technology and Energy Improvements
Track 8: Industrial & Transportation Ventilation

Denver 2013 - Tracks

Track 1: Research- "Above & Beyond"
Track 2: Integrated Project Delivery (mini-conference)
Track 3: Building Energy Modeling vs. Measurement & Verification- Closing the Gap
Track 4: Mile-High Efficiency & Equipment
Track 5: Renewable & Alternative Energy Sources
Track 6: HVAC&R Systems & Equipment
Track 7: HVAC&R Fundamentals & Applications

Standards/Guidelines (Stuart Dols absent).

No discussion.

Web site activity (Stuart Dols absent):

No discussion.

Report of relevant activities in other TCs

TC1.2 *Instruments and Measurements* - Arsen Melikov
TC2.1 *Physiology and Human Environment* - Diotima Von Kempski
TC2.3 *Gaseous Air Contaminants/Removal Equipment* - Gemma Kerr
TC2.4 *Particulate Air Contaminants/Removal Equipment* - Dave Ensor
TC4.3 *Ventilation Requirements and Infiltration* – Leon Wang
TC4.7
TC5.3 *Room Air Distribution* - John Jenssen
TC5.6 *Control of Fire and Smoke* – Kai Kang
TC5.8 *Industrial Ventilation* –Jamie Bennett
TC9.3 *Transportation* - Ray Horstman
TC9.6 *Healthcare Facilities* – James Mcneil
TC9.9 *Mission Critical Facilities* – Jim VanGilder
Since the Montreal meeting, TC9.9 has released 4 new publications: Updated Power Trends book, a White Paper on liquid cooling, and a revision to a White Paper on contamination, and the latest update to Thermal Guidelines which defines the temperature-RH operating window for IT equipment

Honors and Awards (Ray Horstman)

Discussion to establish a CFD vendor award.

New Business

None.

Agenda Suggestions for Next Meeting

Same.

APPENDIX A: DESCRIPTION OF TC'S SCOPE (FROM WEBSITE)

TC 4.10 is concerned with developing, evaluating and recommending procedures for predicting indoor environmental conditions including thermal, acoustical, illumination, and air quality for new or existing buildings.