

Craig G. Weinschenk

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Date of Birth: September 7, 1984
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Education

Ph.D. Mechanical Engineering, The University of Texas at Austin, 2011

Dissertation: Experimental and Computational Characterization of Strong Vent Flow Enclosure Fires

M.S. Mechanical Engineering, The University of Texas at Austin, 2007

Thesis: A Study of Firefighter Compliance to Ventilation Standard Operating Guidelines and Development of a Computational Model of a Ventilation Fan

B.S. Mechanical Engineering, Rowan University, 2006

Professional Experience

Research Engineer
UL FSRI

October 2016 - Present
Columbia, MD

Full-scale fire testing for improving firefighter safety, fire modeling to improve knowledge on fire development and thermal conditions for firefighters, community risk and fire department performance modeling for FireCARES and NFORS projects.

Research Engineer
Jensen Hughes

February 2016 - October 2016
Rockville, MD

Community risk and fire department performance modeling for Fire CARES project. Coupled FDS and Abaqus modeling for structural fire analysis. Development of network based fire model coupled to structural failure model.

Research Fire Protection Engineer
National Institute of Standards and Technology

August 2011 - February 2016
Gaithersburg, MD

A principal developer of NIST's Fire Dynamics Simulator (FDS). Implemented, verified, and validated a partially stirred batch reactor combustion model into FDS designed to improve under-ventilated combustion modeling. Conducted fire modeling studies to provide insight on the fire development and thermal conditions during firefighter fatality and injury incidents. Conducted full-scale field experiments aimed at improving firefighter safety and tactics.

Graduate Research Assistant
The University of Texas at Austin

August 2006 - July 2011
Austin, TX

Constructed fire-hardened, single-compartment scale experimental facility and developed data acquisition/instrumentation infrastructure. Conducted research analyzing the impact of forced and natural ventilation in compartment fires: experimental and numerical studies. Participated in full-scale wildland fire experiments.

Publications

1. Madrzykowski, D., and Weinschenk, C. Understanding and Fighting Basement Fires. Technical Report, Underwriters Laboratories Firefighter Safety Research Institute, Columbia, MD, April 2018.
2. Weinschenk, C., Stakes, K., and Zevotek, R. Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupant Survival: Air Entrainment. Technical Report, Underwriters Laboratories Firefighter Safety Research Institute, Columbia, MD, December 2017.
3. Weinschenk, C., Stakes, K., and Zevotek, R. Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupant Survival: Water Mapping. Technical Report, Underwriters Laboratories Firefighter Safety Research Institute, Columbia, MD, December 2017.
4. Weinschenk, C., Madrzykowski, D., Stakes, K., and Willi, J. Examination of Compressed Air Foam (CAF) for Interior Firefighting. NIST Technical Note 1927, US Department of Commerce, National Institute of Standards and Technology, January 2017.
5. Willi, J.M, Madrzykowski, D., and Weinschenk, C. Impact of Hose Streams on Air Flows inside a Structure, NIST Technical Note 1938, National Institute of Standards and Technology, Gaithersburg, MD, October 2016.
6. Weinschenk, C.G., Overholt, K.J., and Madrzykowski, D. Simulation of an Attic Fire in a Wood Frame Residential Structure, Chicago, IL. *Fire Technology* 52(6) (2016): 1629-1658.
7. Zhang, C., Silva, J. G., Weinschenk, C., Kamikawa, D., and Hasemi, Y. Simulation methodology for coupled fire-structure analysis: modeling localized fire tests on a steel column. *Fire Technology*, 52(1) (2016): 239-262.
8. Weinschenk, C.G., Overholt, K.J., and Madrzykowski, D., Simulation of a Residential Wind Driven Basement Fire - Riverdale Heights, MD, NIST Technical Note 1870, National Institute of Standards and Technology, Gaithersburg, MD, February 2015.
9. Overholt, K.J., Weinschenk, C.G., and Madrzykowski, D., Simulation of a Fire in a Hillside Residential Structure - San Francisco, CA, NIST Technical Note 1856, National Institute of Standards and Technology, Gaithersburg, MD, December 2014.
10. Weinschenk, C.G., Overholt, K.J., and Madrzykowski, D., Simulation of the Dynamics of an Attic Fire in a Wood Frame Residential Structure - Chicago, IL, NIST Technical Note 1838, National Institute of Standards and Technology, Gaithersburg, MD, August 2014.
11. Weinschenk, C. and Ezekoye, O.A., Characterization of a CFD Thermocouple Model Subjected to Stochastic Environmental Forcing using Moment Based Analysis, *ASME Journal of Thermal Science and Engineering Applications* 5 (4), 10, 2013
12. McGrattan, K., Hostikka, S., McDermott, R., Floyd, J., Weinschenk, C., and Overholt, K., *Fire Dynamics Simulator, Technical Reference Guide*, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, and VTT Technical Research Centre of Finland, Espoo, Finland, Sixth edition, September 2013. Vol. 1: Mathematical Model; Vol. 2: Verification Guide; Vol. 3: Validation Guide; Vol. 4: Configuration Management Plan.
13. McGrattan, K., Hostikka, S., McDermott, R., Floyd, J., Weinschenk, C., and Overholt, K., *Fire Dynamics Simulator, User's Guide*, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, and VTT Technical Research Centre of Finland, Espoo, Finland, Sixth edition, September 2013.
14. Averill, J., Moore-Merrell, L., Ranellone, R., Weinschenk, C., Taylor, N., Goldstein, R., Santos, R., Wissoker, D., and Notarianni, K., Report on High-Rise Fireground Field Experiments, Technical Note 1797. National Institute of Standards and Technology Gaithersburg, Maryland. April 2013.

15. Weinschenk, C., Beal, C., and Ezekoye, O.A., Insights Into Modeling of a Fan Driven Firefighting Tactic Using Nonreacting Flow Data, Journal Society of Fire Protection Engineering. January 2011 Vol. 21
16. Weinschenk, C., Ezekoye, O.A. and Nicks, R., Analysis of Fireground Standard Operating Guidelines/Procedures Compliance for Austin Fire Department, Fire Technology, 1572-8099, October 04, 2007.

Conference Proceedings

1. McDermott, R., and Weinschenk, C., A Partially-Stirred Batch Reactor Model for Under-Ventilated Fire Dynamics, Bulletin of the American Physical Society 58, November 2013
2. Weinschenk, C. , Forney, G., Averill, J., and Ranellone, R. A Method to Evaluate Alternative Fire Safety Strategies, 13th International Conference and Exhibition on Fire Science and Engineering, Interflam 2013, East Windsor, UK. June 23-26 2013.
3. Floyd, J., Weinschenk, C., and McDermott, R. A Generic Combustion Modeling and Species Transport Framework for Fire Dynamics Simulator, 13th International Conference and Exhibition on Fire Science and Engineering, Interflam 2013, East Windsor, UK. June 23-26 2013.
4. Weinschenk, C., Upadhyay, R., and Ezekoye, O.A., Comparison of a Partially Stirred Reactor Model and a Perfectly Stirred Reactor Model for Large Vent Flow Fires, U.S. Joint National Combustion Meeting, Atlanta, GA March 2011.
5. Weinschenk, C. and Ezekoye, O.A., Analysis of Thermocouple Response to Turbulent Radiating Environments, ASME/JSME 2011 8th Thermal Engineering Joint Conference, March 13-17, 2011.
6. Kokel, P., Weinschenk, C., and Ezekoye, O.A., Evaluation of Directional Flame Thermometer for Real-time Inversion of Heat Flux, International Heat Transfer Conference 14. August 8-13 2010.

Conference Talks

1. Firehouse High-Rise Fire and Life Safety Summit, August 2017, Minneapolis, MN, *NIST Fireground Study: High-Rise and FireCARES*
2. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2017, Vancouver, BC *The FireCARES and NFORS Big Data Projects*
3. International Structural Fire Conference, September 2016, Warsaw, Poland, *Fire Modeling with FDS, From Development to Application*
4. NFPA Smart Solutions Showcase on Big Data, NFPA Conference and Expo, June 2016, Las Vegas, NV
5. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2015, National Harbor, MD *Chicago, IL, In Memory of Capt. Herbie Johnson*
6. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2015, National Harbor, MD *Risk vs. Response: The FireCARES Project*
7. NIST Fire Fighting Research & Practice: From the Lab to the Street, August 2015, Gaithersburg, MD *Fire Dynamics Simulator for LODD/LODI Simulations*
8. NIST Fire Fighting Research & Practice: From the Lab to the Street, August 2015, Gaithersburg, MD *Heat Transfer through Personal Protective Equipment*

9. NFPA Conference and Expo, June 2015, Chicago, IL *Transient Thermal Response of Fire Fighter Clothing and Helmets in Heated Flow Path Conditions*
10. Fire Department Instructors Conference (FDIC), April 2014, UL-NIST *Live Fire Dynamics for Fire Officers - Hot Class*
11. Ontario Professional Fire Fighters Association Health and Safety Conference, February 2015, Broadcast from Washington, DC *Fire Dynamics for the Fire Service*
12. IAFF Affiliate Leadership Training Summit, January 2015, Anaheim, CA *NFPA 1710 and NIST Fireground Studies: Residential & High-Rise*
13. Fire and Evacuation Modeling Technical Conference August 2014, Gaithersburg, MD *A Partially-Stirred Batch Reactor Model for Under-Ventilated Fire Dynamics*
14. IAFF Affiliate Leadership Training Summit / N-FORS Stakeholder Meeting, January 2014, Orlando, FL *NIST Fireground Studies: Residential & High-Rise*
15. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2013, Denver, CO *NIST High-Rise Fireground Study*
16. Firehouse Expo, July 2013, Baltimore, MD *NIST High-Rise Fireground Study*
17. Metropolitan Fire Chiefs Annual Conference, April 2013, Phoenix, AZ *NIST High-Rise Fireground Study*
18. IAFF Affiliate Leadership Training Summit, January 2013, Phoenix, AZ *NIST High-Rise Fireground Study*
19. FM Global Open Source CFD Fire Modeling Workshop, May 2012, Boston, MA *A Lumped Species Approach to Modeling Simple Chemistry in Under-Ventilated Fires*

Skills

NIST Fire Dynamics Simulator (FDS)
CFAST Zone Model
Small-Scale and Large-Scale Fire Experiments
Fire Instrumentation and Data Collection
Python / NumPy / matplotlib / Pandas / Bokeh / plotly
Fortran / C++ / Matlab
LabVIEW
L^AT_EX
Subversion / Git

Honors, Awards, & Fellowships

Department of Commerce Silver Medal, 2016
NRC Postdoctoral Fellow, NIST, 2011-2013
Continuing Bruton Fellowship, The University of Texas at Austin, 2010
Thrust 200 Graduate Fellowship in Engineering, The University of Texas at Austin, 2006-2010
University Preemptive Fellowship, The University of Texas at Austin, 2006
Mechanical Engineering Medallion, Rowan University, 2006
Outstanding Scholar Fellowship, Rowan University, 2002-2006
Eagle Scout - BSA Troop 83, 2001

Research Interests

Fire modeling/simulation and fire dynamics
Turbulent numerical combustion
Verification and validation of fire models
Firefighter hose stream and ventilation tactics
Community risk scale modeling related to the fire service
Scientific and high performance computing, data analytics
PDF evolution using moment methods