

# Craig G. Weinschenk

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Chevy Chase, MD 20815  
Date of Birth: September 7, 1984  
Citizenship: United States

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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 Fire CARES project.

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. 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.
2. 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.
3. 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.
4. Zhang, C., Silva, J. G., Weinschenk, C., Kamikawa, D., and Hasemi, Y. (2016). Simulation methodology for coupled fire-structure analysis: modeling localized fire tests on a steel column. *Fire Technology*, 52(1), 239-262.
5. 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.
6. 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.
7. 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.
8. 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
9. 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.
10. 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.
11. 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.
12. 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
13. 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. International Structural Fire Conference, September 2016, Warsaw, Poland, *Fire Modeling with FDS, From Development to Application*
2. NFPA Smart Solutions Showcase on Big Data, NFPA Conference and Expo, June 2016, Las Vegas, NV
3. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2015, National Harbor, MD *Chicago, IL, In Memory of Capt. Herbie Johnson*
4. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2015, National Harbor, MD *Risk vs. Response: The FireCARES Project*
5. NIST Fire Fighting Research & Practice: From the Lab to the Street, August 2015, Gaithersburg, MD *Fire Dynamics Simulator for LODD/LODI Simulations*
6. NIST Fire Fighting Research & Practice: From the Lab to the Street, August 2015, Gaithersburg, MD *Heat Transfer through Personal Protective Equipment*
7. NFPA Conference and Expo, June 2015, Chicago, IL *Transient Thermal Response of Fire Fighter Clothing and Helmets in Heated Flow Path Conditions*
8. Fire Department Instructors Conference (FDIC), April 2014, UL-NIST *Live Fire Dynamics for Fire Officers - Hot Class*
9. Ontario Professional Fire Fighters Association Health and Safety Conference, February 2015, Broadcast from Washington, DC *Fire Dynamics for the Fire Service*
10. IAFF Affiliate Leadership Training Summit, January 2015, Anaheim, CA *NFPA 1710 and NIST Fireground Studies: Residential & High-Rise*
11. Fire and Evacuation Modeling Technical Conference August 2014, Gaithersburg, MD *A Partially-Stirred Batch Reactor Model for Under-Ventilated Fire Dynamics*
12. IAFF Affiliate Leadership Training Summit / N-FORS Stakeholder Meeting, January 2014, Orlando, FL *NIST Fireground Studies: Residential & High-Rise*

13. IAFF Redmond Symposium Occupational Health & Hazards of the Fire Service, August 2013, Denver, CO *NIST High-Rise Fireground Study*
14. Firehouse Expo, July 2013, Baltimore, MD *NIST High-Rise Fireground Study*
15. Metropolitan Fire Chiefs Annual Conference, April 2013, Phoenix, AZ *NIST High-Rise Fireground Study*
16. IAFF Affiliate Leadership Training Summit, January 2013, Phoenix, AZ *NIST High-Rise Fireground Study*
17. FM Global Open Source CFD Fire Modeling Workshop, May 2012, Boston, MA *A Lumped Species Approach to Modeling Simple Chemistry in Under-Ventilated Fires*

## Technical Committees

Principal on the NFPA Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment (FAE-SPF) (2015)

Alternate on the NFPA Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment (FAE-AAC) (2015)

## 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<sup>A</sup>T<sub>E</sub>X  
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