Bryan W. Weber

Contact Information

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Research Interests

Combustion Engineering: Alternative biofuels including alcohols and biodiesel; design of novel experimental methods for combustion analysis; computational analysis of reaction mechanisms for combustion

Education

University of Connecticut, Storrs, CT, USA

Ph.D., Mechanical Engineering, Planned 2014

Working Dissertation Title: *High Pressure Ignition Chemistry of Alternative Fuels*
Advisor: Professor Chih-Jen (Jackie) Sung

M.S., Mechanical Engineering, August 2010

Thesis Title: *Autoignition of n-Butanol at Low to Intermediate Temperature and Elevated Pressure*
Advisor: Professor Chih-Jen (Jackie) Sung

Case Western Reserve University, Cleveland, OH, USA

B.S.E., *Cum Laude* Aerospace Engineering, May 2009

Senior Project Title: *Analysis of Heavy Hydrocarbon Fuels using Gas Chromatography with Mass Spectrometry*
Advisor: Professor Chih-Jen (Jackie) Sung

Journal Publications

B.W. Weber, W.J. Pitz, M. Mehl, A.C. Davis, E.J. Silke, and C.J. Sung. *Experiments and Modeling of the Autoignition of Methylcyclohexane at High Pressure.* Combustion and Flame, 2014. doi:10.1016/j.combustflame.2014.01.018

S.M. Sarathy, S. Park, **B.W. Weber**, W. Wang, P.S. Veloo, A.C. Davis, C. Togbé, C.K. Westbrook, O. Park, G. Dayma, Z. Luo, M.A. Oehlschlaeger, F.N. Egolfopoulos, T. Lu, W.J. Pitz, C.J. Sung, and P. Dagaut. *A Comprehensive Experimental and Modeling Study of iso-Pentanol Combustion.* Combustion and Flame, vol. 160, no. 12, pp. 2712-2728, Dec. 2013. doi:10.1016/j.combustflame.2013.06.022

B.W. Weber and C.J. Sung. *Comparative Autoignition Trends in Butanol Isomers at Elevated Pressure.* Energy and Fuels, vol. 27, no. 3, pp. 1688-1698, Feb. 2013. doi:10.1021/ef302195c

T. Tsujimura, W.J. Pitz, F. Gillespie, H.J. Curran, **B.W. Weber**, Y. Zhang, and C.J. Sung. *Development of Isopentanol Reaction Mechanism Reproducing Autoignition Character at High and Low Temperatures.* Energy and Fuels, vol. 26, no. 8, pp. 4871-4886, Aug. 2012. doi:10.1021/ef300879k

B.W. Weber, K. Kumar, Y. Zhang, and C.J. Sung. *Autoignition of n-butanol at elevated pressure and low-to-intermediate temperature.* Combustion and Flame, vol. 158, no. 5, pp. 809-819, Mar. 2011. doi:10.1016/j.combustflame.2011.02.005

Conference Publications and Presentations

S.S. Merchant (Presenting), W.H. Green, K.M. Van Geem, N. Hansen, **B.W. Weber**, and C.J. Sung. *Combustion of the Butanol Isomers: Reaction Pathways from High to Low Temperature.* 8th International Conference on Chemical Kinetics, University Seville, Seville, Spain, July 2013.

B.W. Weber, W.J. Pitz, C.J. Sung, M. Mehl, E.J. Silke, and A.C. Davis. *Experiments and Modeling of the Autoignition of Methyl-Cyclohexane at High Pressure.* Paper 3A02, 8th US National Technical Meeting of the Combustion Institute, Park City, UT, May 2013.

B.W. Weber, S.S. Merchant, C.J. Sung, and W.H. Green. *An Autoignition Study of iso-Butanol: Experiments and Modeling.* Paper 3A01, 8th US National Technical Meeting of the Combustion Institute, Park City, UT, May 2013.

S.M. Sarathy, S. Park, W. Wang, P. Veloo, A.C. Davis, C. Togbé, **B.W. Weber**, C.K. Westbrook, O. Park, G. Dayma, Z. Luo, M.A. Oehlschlaeger, F. Egolfopoulos, T. Lu, W.J. Pitz, C.J. Sung, and P. Dagaut. *A Comprehensive Experimental and Modeling Study of iso-Pentanol Combustion.* Paper 2A12, 8th US National Technical Meeting of the Combustion Institute, Park City, UT, May 2013.

B.W. Weber and C.J. Sung. *Comparative Investigation of the High Pressure Autoignition of the Butanol Isomers.* Paper A-01, Fall Technical Meeting of the Eastern States Section of the Combustion Institute, Storrs, CT, October 2011.

M.R. Harper, W.H. Green (Presenting), K.M. Van Geem, **B.W. Weber**, C.J. Sung, I. Stranic, D.F. Davidson, and R.K. Hanson. *Combustion of the butanol isomers: Reaction pathways at elevated pressures from low-to-high temperatures.* Paper #84, 7th International Conference on Chemical Kinetics, Massachusetts Institute of Technology, Cambridge, MA, July 2011.

B.W. Weber and C.J. Sung. *A Rapid Compression Study of the Butanol Isomers at Elevated Pressure.* Paper 1B13, 7th US National Technical Meeting of the Combustion Institute, Georgia Institute of Technology, Atlanta, GA, March 2011.

B.W. Weber, K. Kumar, and C.J. Sung. *Autoignition of Butanol Isomers at Low to Intermediate Temperature and Elevated Pressure.* Paper AIAA-2011-0316, 49th Annual Aerospace Sciences Meeting, Orlando, FL, January 2011.

Conference Posters

B.W. Weber and C.J. Sung. *Validation of Kinetic Models of the Butanol Isomers At High Pressure using a Rapid Compression Machine.* Poster T40, 7th International Conference on Chemical Kinetics, Massachusetts Institute of Technology, Cambridge, MA, July 2011.

B.W. Weber. *Autoignition of n-Butanol at Elevated Pressure and Low to Intermediate Temperature.* 1st Combustion Energy Frontier Research Center Annual Meeting, Princeton University, Princeton, NJ, September 2010.

B.W. Weber, K. Kumar, and C.J. Sung. *An Investigation of Hydrocarbon Flames using Probe Sampling and Gas Chromatography/Mass Spectrometry.* Support of Undergraduate Research and Creative Endeavors Symposium and Poster Session, Case Western Reserve University, Cleveland, OH, April 2009.

Other Presentations

B.W. Weber and C.J. Sung. *Analysis of Hydrocarbon Fuels using Gas Chromatography/Mass Spectrometry.* Summer Undergraduate Research in Energy Sciences Program, Dominion Energy East Ohio Branch, Cleveland, OH, August 2008.

Research Experience

Combustion Diagnostics Laboratory — 2007-Present

University of Connecticut, Storrs, CT, USA
Case Western Reserve University, Cleveland, OH, USA

Projects:

- Experimentally and computationally studying the ignition properties of the four butanol isomers, iso-pentanol, methylcyclohexane, and propene over a wide range of pressure, temperature, and fuel-loading conditions
- Designing a species sampling apparatus for time-resolved species measurements in the rapid compression machine
- Characterizing the components of heavy hydrocarbon fuels, including conventional and synthetic jet fuels, using gas chromatography/mass spectrometry

Teaching Experience

University of Connecticut, Storrs, CT, USA — Fall 2012 – Spring 2013

Spring 2013 – Instructor for ENGR 1166: Introduction to Mechanical Engineering
Supervisor: Prof. Kevin Murphy
Lecture notes and sample homework problems are available on request

- Prepared and delivered lectures covering fundamental topics in Mechanical Engineering, including: Vector Math and Calculus, Statics, Dynamics, Solid Mechanics, Thermodynamics, Fluid Mechanics, and Heat Transfer
- Prepared and graded weekly homework assignments for 60 2nd semester engineering students
- Held weekly office hour sessions

Fall 2012 – Teaching Assistant for ME 3239: Combustion for Energy Conversion
Supervisor: Prof. Chih-Jen Sung
Sample project assignments are available on request

- Assisted the preparation and delivery of lecture material covering: Thermochemistry and Equilibrium, Chemical Kinetics, Fuels and Emissions, and Reacting Flows
- Developed and presented lectures covering the fundamentals and operation of combustion modeling software
- Designed in-depth projects to explore combustion modeling using the CHEMKIN–Pro software

Professional Experience

Lead Chair, Junior Associates Committee — 2012-Present
Combustion Energy Frontier Research Center

- Coordinate monthly teleconferences for graduate students and post-doctoral researchers in the CEFRC
- Attend PI teleconferences on behalf of the junior members of the CEFRC

EFRC Newsletter Editorial Board Member — 2013-Present
U.S. Department of Energy

- Contributed articles to the newsletter describing recent scientific advances resulting from EFRC research, including:
  "Burning Butanol in a Better Engine"
  "The Advantage of Renewable Fuels in High-Efficiency Engines"
- Edited articles written by other board members for factual and grammatical correctness

Journal Referee — 2013-Present

- Energy & Fuels
- Proceedings of the Combustion Institute

Awards and Fellowships

Doctoral Dissertation Fellowship 2014
University of Connecticut
Competitively awarded to Ph.D. candidates who have completed their dissertation proposal.

Graduate Predoctoral Fellowship Award 2013
University of Connecticut, Department of Mechanical Engineering
First Place, awarded for the best research presentation and poster at the 2013 Mechanical Engineering Graduate Research Competition

Graduate Assistantship in Areas of National Need 2010
University of Connecticut
Awarded in the area of Sustainable Energy Technologies

Fred H. Vose Prize, Department of Mechanical and Aerospace Engineering 2009
Case Western Reserve University
Awarded to the senior showing the most promise for future leadership

Summer Undergraduate Research in Energy Sciences Grant 2008
Case Western Reserve University
Awarded for research to analyze the composition of traditional petroleum-based hydrocarbon fuels using GC/MS

Professional Memberships

AIAA - Student Member
ASME - Student Member
The Combustion Institute - Student Member
ACS - Student Member

Skills

Programming/Scripting Languages:

- Python, MATLAB, FORTRAN 77, UNIX shell scripting (bash), LabView

Software Packages:

- CHEMKIN-II and associated programs (SENKIN, etc.)
- CHEMKIN-Pro
- Cantera
- Microsoft Office, TEX (XELATEX, LATEX, BIBTEX), Google Docs
- Solidworks 3D Modeling

Operating Systems:

- Microsoft Windows (XP, Vista, 7, 8), Linux (Ubuntu)