

# Michael Wayne Renfro

Department of Mechanical Engineering

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## **Experience**

### **University of Connecticut**, Storrs, CT

Director of Graduate Studies, 2006-Present

Assistant Professor of Mechanical Engineering, 2002-Present

### **Purdue University**, West Lafayette, IN

Visiting Assistant Professor of Mechanical Engineering, 2000-2002

Research Assistant, 1995-2000

Teaching Assistant, 1995-1996, 2000

### **Maremont Corporation**, Loudon, TN

Cooperative Engineering Student, 1992-1993

## **Education**

**Ph.D.**, Purdue University, West Lafayette, Indiana, 2000

**M.S. Mechanical Engineering**, Purdue University, West Lafayette, Indiana, 1997

**B.S. Mechanical Engineering**, University of Tennessee, Knoxville, Tennessee, 1995

## **Honors and Awards**

### **Faculty Awards**

- Teaching Excellence Award, Mechanical Engineering Department, University of Connecticut, September 2007
- Outstanding Junior Faculty Award, School of Engineering, University of Connecticut, October 2004
- CAREER Award, National Science Foundation, January 2003

### **Graduate Student Awards**

- Link Foundation Energy Fellowship, June 1999
- Department of Defense - National Defense Science and Engineering Graduate Fellowship, April 1996
- National Science Foundation Fellowship (declined in favor of DoD Fellowship), April 1996

### **Undergraduate Student Awards**

- Joel F. Bailey Award for Outstanding Scholastic Achievement, May 1995
- Chancellor's Citation for Academic Excellence, May 1995
- WATtec Past Chairman's Scholarship, February 1994
- John W. and Clara L. Hobby Scholarship, August 1993
- Outstanding Sophomore Engineering Student, Phi Kappa Phi Honor Society, May 1993
- Finner Family Memorial Scholarship, January 1993
- Tennessee Student of Distinction Scholarship, August 1991

## **Sponsored Research**

### **Externally Funded Projects, Total = \$2,821,241 (M.W. Renfro's share = \$1,280,650)**

15. "PLIF and diode laser measurements in ultra-compact combustor," Spectral Energies, LLC, 1/1/08-9/30/08, \$49,464.
14. "Innovative optical diagnostic tools for fuel cell development and operation control," Connecticut Innovations and United Technologies Corp. Power, 7/1/07-6/30/09, with B. M. Cetegen, T. Molter, and M. Perry, \$264,000 (\$88,000).
13. "GOALI: Development of temperature sensing doped particles for plasma deposition diagnostics," National Science Foundation, 9/15/06-8/31/09, with E. H. Jordan, \$349,850 (\$174,925).
12. "GOALI: Experimental and computational study of bluff-body flame stabilization with non-homogeneous upstream mixing," National Science Foundation, 5/1/06-4/30/08, with B. M. Cetegen, \$206,000 (\$103,000).
11. "Evaluation of evanescent wave diagnostics in coated sapphire fibers for harsh environments," Department of Energy, 1/1/06-12/31/06, with E. H. Jordan, \$50,000 (\$25,000).
10. "Study of combustor acoustics using time-series and instantaneous flame-structure measurements," Air Force Office of Scientific Research, 12/1/05-11/30/08, with G. B. King and N. M. Laurendeau, \$450,000 (\$94,897).
9. "Installation of a high-pressure combustion research rig," Pratt & Whitney, 6/15/05-6/14/06, with B. M. Cetegen, \$25,000 (\$12,500).
8. "Bluff-body flame holding under partially-premixed conditions," Pratt & Whitney, 1/1/05-12/31/07, \$34,000.
7. "In-situ optical diagnostics for measurements of water vapor concentration and temperature in PEM fuel cells – Phase III," U.S. Army, 11/1/04-6/30/05, with B. M. Cetegen, \$14,700 (\$7,350).
6. "Acoustic energy anti-ice concept," Pratt & Whitney, 5/15/04-12/31/04, with T. L. Bergman, \$50,000 (\$25,000).
5. "CAREER: Characterization of propagating and receding flame edges in composition and velocity gradients," National Science Foundation, 2/1/03-1/31/09, \$417,999.
4. "In-situ optical diagnostics for measurements of water vapor concentration and temperature in PEM fuel cells – Phase II," U.S. Army, 1/22/03-5/22/04, with B. M. Cetegen, \$145,659 (\$72,830).
3. "Statistical interpretation of scalar time-series measurements in turbulent partially premixed flames," Air Force Office of Scientific Research, 12/15/02-12/14/05, with N. M. Laurendeau and G. B. King, \$472,568 (\$72,982).
2. "Characterization of scalar correlations in turbulent counterflow nonpremixed flames," National Science Foundation, 9/15/01-9/14/05, with N. M. Laurendeau, \$272,002 (\$82,703).
1. "Nitric oxide time-series measurements in turbulent jet flames," Link Foundation, 6/01/99-5/31/00, \$20,000.

### **University Funded Projects, Total = \$26,229 (\$19,632)**

2. "Targeted recruitment of minority students for graduate studies in mechanical engineering," University of Connecticut, 1/15/06-2/28/08, with K. D. Murphy and R. Pitchumani, \$9895 (\$3298).
1. "Study on the structure of nonpremixed flames with high stoichiometric mixture fractions," University of Connecticut Research Foundation, 1/1/03-2/28/04, \$16,334.

### **Senior Design Projects, Total = \$28,000 (\$25,500)**

5. "Diesel engine brake design automation using Pro/E and Mathcad," Jacobs Vehicle System, 8/23/07-5/22/08, \$6000.
4. "Bleeder brake / exhaust brake modeling and calibration," Jacobs Vehicle System, 8/23/06-5/22/07, \$6000.

3. "Cooling fin erosion due to high velocity and high temperature," Hamilton Sundstrand, 8/23/05-5/22/06, \$6000.
2. "Deaeration of coolant in fuel cell stacks," United Technology Fuel Cells, 8/23/04-5/22/05, \$5000.
1. "Frozen PEM electrolysis and fuel cell systems," Proton Energy Systems, 8/22/02-5/22/03, with T. L. Bergman, \$5000 (\$2500).

### **Patents**

1. "Fiber optics based in-situ diagnostics for PEM fuel cells," Cetegen, B. M., Renfro, M. W., and Basu, S., Patent pending, application serial number 60/809,422.

### **Technical Service**

#### **Reviewer**

- *AIAA Journal*
- American Chemical Society
- *Applied Optics*
- *ASME International Gas Turbine Symposium*
- *ASME Journal of Engineering for Gas Turbines and Power*
- *ASME Journal of Fuel Cell Science and Technology*
- *ASME Journal of Heat Transfer*
- California Energy Commission
- *Combustion and Flame*
- *Combustion Science and Technology*
- Department of Energy
- *Experiments in Fluids*
- *Journal of Power Sources*
- National Science Foundation
- *Optics Express*
- *Proceedings of the Combustion Institute*

#### **Committee Member**

4. Eastern States Section, Combustion Institute, Executive Board, 2007-9.
3. University Turbine Systems Research (UTSR) Academic Advisory Board, 2006-8.
2. 5th International ASME Conference on Fuel Cell Science, Engineering and Technology, 2006-7, Program Committee.
1. Proceedings of the Combustion Institute, Vol. 28, 2000, Editorial Committee.

#### **Session Chair/Moderator**

9. "Turbulent Flames I," Fall Technical Meeting of the Eastern States Section of The Combustion Institute, Charlottesville, VA, October 2007.
8. "Engineering Analysis, Virtual Engineering and Manufacturing I," 5th International ASME Conference on Fuel Cell Science, Engineering and Technology, Brooklyn, NY, June 2007.
7. "Diagnostics," Thirty-First International Symposium on Combustion, Heidelberg, Germany, August 2006.
6. "Transformative Hydrogen Combustion Research," NSF Hydrogen Workshop, Arlington, VA, March 2006.
5. "Laminar Flames and Edge Flames," Fall Technical Meeting of the Eastern States Section of The Combustion Institute, Orlando, FL, November 2005.
4. "Turbulent Flames II," Fourth Joint U.S. Section Meeting of The Combustion Institute, Philadelphia, PA, March 2005.

3. "Flame Stabilization and Near-Limit Combustion," 2004 Spring Technical Meeting of the Central States Section of The Combustion Institute, Austin, TX, March 2004.
2. "Diagnostics," Fall Technical Meeting of the Eastern States Section of The Combustion Institute, University Park, PA, October 2003.
1. "Turbulent Combustion," Second Joint U.S. Section Meeting of The Combustion Institute, Oakland, CA, March 2001.

### **Professional Memberships**

- The Combustion Institute
- The American Institute of Aeronautics and Astronautics (AIAA)

### **Course Instruction**

#### **Undergraduate**

- Thermodynamic Principles (ME 233): Spring 2003, also as Introductory Thermodynamics (ME 200, Purdue University): Spring 2000, Fall 2000, Fall 2001
- Applied Thermodynamics (ME 234): Spring 2007, also as Thermodynamics II (ME 300, Purdue University): Spring 2001, Spring 2002
- Fluid Dynamics I (ME 250): Spring 2006, Fall 2006

#### **Graduate**

- Statistical Thermodynamics (ME 311): Fall 2003, Fall 2004
- Advanced Thermodynamics (ME 320): Fall 2005, Fall 2007
- Laminar Viscous Flow (ME 312): Fall 2002
- Turbulent Transport (ME 320): Spring 2005, Spring 2008
- Convection Heat Transfer (ME 323): Spring 2004

### **Academic Service**

#### **University**

- Laser Safety Committee, 2005-8

#### **School of Engineering**

- Graduate Education and Research Committee, 2007-9
- Computing Advisory Committee, 2005-6

#### **Mechanical Engineering Department**

- Chair, Ph.D. Qualifying Examining Committee, 2007-8
- Thermal Fluids Faculty Search Committee, 2007-8
- Pratt & Whitney Chair Search Committee, 2007-8
- Chair, Graduate Admissions Committee, 2006-8
- Chair, Student Recruitment and Student Awards Committee, 2006-8
- Academic Advisor, Undergraduate Honors Students, 2006-8
- MENG Program Committee, 2006-8
- ABET Objectives and Outcomes Committee, 2005-8
- Laboratory Committee, 2002-3, 2006-8
- Ph.D. Qualifying Examiner, 2002-7
- Faculty Teaching Load and Merit Raise Committee, 2006, 2007
- Chair, Ph.D. Exam Review Committee, 2006

- Computing Resources Committee, 2005-6
- Student Recruitment and Student Awards Committee, 2003-6
- ME Head Search Committee, 2006
- Departmental Staff Position Search Committee, 2004-5
- Graduate Admissions Committee, 2002-5
- Graduate Student Issues Committee, 2002-3

### **Outreach Activities**

- Laboratory Research Demonstrations: UConn Open House, Spring 2004, Fall 2004, Spring 2005, Fall 2005, Spring 2006, Fall 2006; Galileo Program, Spring 2004
- Graduate Student Fellowship Workshop: Fall 2004, Fall 2006, Fall 2007
- Graduate Student Recruitment: UConn, Fall 2003, Fall 2004, Fall 2006, Fall 2007; Swarthmore, Fall 2004; Villanova, Fall 2004; Bucknell, Fall 2004; Lafayette, Fall 2004; Alabama-Birmingham, Spring 2005; Tuskegee, Spring 2005; Auburn, Spring 2005; Milwaukee School of Engineering, Fall 2005, Fall 2006, Fall 2007; Rose-Hulman, Fall 2005, Fall 2006; Smith College, Fall 2005; Harvey-Mudd, Fall 2006; Cal-State Pomona, Fall 2006; Pi Tau Sigma Conference, Spring 2007, Tau Beta Pi Conference, Fall 2007

### **Student Advisees**

#### **Ph.D. Major Advisees**

5. Stanislav Kostka (Ph.D. expected 2010)  
Thesis Research: Flame propagation in mixture and velocity gradients  
♦ Graduate Predoctoral Fellowship Award, Mechanical Engineering Department, 2007  
♦ Connecticut Space Consortium NASA Graduate Fellowship, 2005-2006
4. Mark Majewski, (Ph.D. expected 2009)  
Thesis Research: Development of phosphor-based temperature measurements for plasma and combustion systems
3. Kristin Kopp Vaughan, (Ph.D. expected 2011)  
Thesis Research: Measurement of scalar and velocity fields during oscillations of a bluff-body flame
2. Steven Tuttle, (Ph.D. expected 2010)  
Thesis Research: Effects of mixture homogeneity on flame holding in high-speed flows

#### **Graduates**

1. William Carnell Jr., "Experimental and numerical study of extinction in negative edge laminar flames," Ph.D. Thesis (2006)  
Current Position: Assistant Professor, Milwaukee School of Engineering  
♦ Summer Graduate Fellowship Award, Graduate School, 2006  
♦ Graduate Predoctoral Fellowship Award, Mechanical Engineering Department, 2006  
♦ Graduate Predoctoral Fellowship Award, Mechanical Engineering Department, 2004

#### **M.S. Major Advisees (thesis option)**

5. Thomas Boucher, (M.S. expected 2009)  
Thesis Research: Development of evanescent-wave diagnostics for application to in-situ fuel cell measurements
4. Naison Mastrocola, (M.S. expected 2009)  
Thesis Research: Study of reignition in locally extinguished non-premixed flames

#### **Graduates**

3. Yonghong Wang, "Application of higher-order statistics to the analysis of scalar time series in turbulent non-premixed jet flames," M.S. Thesis (2006).

2. Amit Wason, "Velocity and scalar measurements in neighboring lifted edge flames," M.S. Thesis (2005).
1. Hang Xu, "In-situ optical diagnostics for measurements of water vapor concentration and temperature in PEM fuel cells," M.S. Thesis (2004).

### **M.S. Major Advisees (non-thesis option)**

#### Graduates

2. Danielle Archangel, (M.S., 2007)  
Project: Optimal area ratio C-D nozzle design for low fan pressure ratios
1. Andrew Milliken, (M.S., 2006)  
Project: A computational fluid dynamics study of two-dimensional axi-symmetric swirl flow in a drum cavity

### **Undergraduate Research Advisees**

12. Kathryn Gosselin, B.S. (expect 2009), Fall 2007-Present  
Project: Simulation of propagating flame edges
11. John Dibenedetto, B.S. (expected 2009), Fall 2007-Present  
Project: Flame holding studies in an augmentor simulator
10. Paul McCullough, B.S. (2007), Spring 2007  
Project: Construction of an augmentor simulator for bluff-body flame holding experiments
9. Aakash Puntambekar, B.S. (2007), Summer 2006  
Project: Measurement of extinction behavior as a function of Peclet and Dahmkohler number
8. Simon Wong, B.S. (expected 2008, Cornell University), Summer 2005  
Project: Parametric evaluation of flame stability for forward and negative edge flames
7. Nathan Hemming, B.S. (2005), Fall 2004-Spring 2005  
Project: Design and implementation of contoured counterflow and co-flowing burner nozzles
6. Stanislav Kostka, B.S. (2004), Summer-Fall 2004  
Project: Measurement of acoustic field effects on supercooled liquid droplets
5. Timothy Russell, B.S. (2005), Summer 2003  
Project: Implementation of an alumina powder seeder for gas-phase particle-imaging velocimetry
4. Robert Abel, B.S. (2005), Summer 2003  
Project: PIV measurements of velocity structure in turbulent jets
3. Meghan Quinn, B.S. (2004), Spring 2003-Spring 2004  
Project: Simulation of two-dimensional flames with composition gradients
2. Nicholas Kattamis, B.S. (2005), Fall 2002-Spring 2004  
Project: Simulation of partially-premixed CO/H<sub>2</sub> counterflow flames
1. Bradley Gold, B.S. (2002, Purdue University), Summer 2002  
Project: Implementation of a mass flow control system for turbulent combustion research

### **Thesis and Examining Committees**

#### Ph.D.

8. Swetaprovo Chaudhuri, Ph.D. (expected 2011), Advisor: B.M. Cetegen
7. Balaji Krishnakumar, Ph.D. (expected 2008), Advisor: J.J. Helble
6. Brian Holley, Ph.D. (expected 2008), Advisor: L.S. Langston
5. Saptarshi Basu, Ph.D. (2007), Advisor: B.M. Cetegen
4. Srinath Chakravarthy, Ph.D. (2007), Advisor: W.K.S. Chiu
3. Krishna Venkatesan, Ph.D. (2007), Advisor: N.M. Laurendeau (Purdue University)
2. Richard Johnson, Ph.D. (2007), Advisor: R. Pitchumani
1. King Hong Kwok, Ph.D. (2005), Advisor: W.K.S. Chiu

M.S. – Thesis Option

6. Bhavana Bommarajpeta, M.S. (2006), Advisor: K.L. Reifsnider
5. Christopher Jensen, M.S. (2005), Advisor: W.K.S. Chiu
4. Andres Chaparro, M.S. (2004), Advisor: B.M. Cetegen
3. Saptarshi Basu, M.S. (2004), Advisor: B.M. Cetegen
2. Krishna Venkatesan, M.S. (2003), Advisor: N.M. Laurendeau (Purdue University)
1. Alper Ata, M.S. (2003), Advisor: B.M. Cetegen

M.S. – Non Thesis Option

6. Niko Lockiby, M.S. (2008), Advisor: T.J. Barber
5. Daniel Gallimore, M.S. (2006), Advisor: T.J. Barber
4. Jeffrey Levine, M.S. (2006), Advisor: T.J. Barber
3. Robert McGurgen, M.S. (2004), Advisor: B.M. Cetegen
2. David Hiatt, M.S. (2004), Advisor: T.J. Barber
1. Steven Fastenberg, M.S. (2004), Advisor: T.J. Barber

University Scholars (undergraduate honors projects)

1. Boris Vaisman, B.S. (2006), Advisor: T.J. Barber

## **Publications and Presentations**

### **Refereed Articles**

33. Kostka Jr., S., Carnell Jr., W. F., and Renfro, M. W. (2008). Propagating edge flame response to multiple stoichiometry gradients. *Combustion and Flame*, in press.
32. Venkatesan, K. K., Zhang, J., King, G. B., Laurendeau, N. M., and Renfro, M. W. (2007). Space-time correlation measurements in partially premixed turbulent opposed-jet flames. *Applied Physics B*, v. 89, 129-140.
31. Zhang, J., King, G. B., Laurendeau, N. M., and Renfro, M. W. (2007). Two-point time-series measurements of hydroxyl concentration in a turbulent nonpremixed flame. *Applied Optics*, v. 46, 5742-5754.
30. Venkatesan, K., King, G. B., Laurendeau, N. M., and Renfro, M. W. (2007). Hydroxyl time-scale correlations in turbulent counterflow nonpremixed flames. *Combustion Science and Technology*, v. 179, 787-811.
29. Carnell Jr., W. F. and Renfro, M. W. (2007). Raman scattering measurements during extinction of a diffusion flame. *International Journal of Alternative Propulsion*, v. 1, 135-153.
28. Böhm, B., Geyer, D., Dreizler, A., Venkatesan, K. K., Laurendeau, N. M., Renfro, M. W. (2007). Simultaneous PIV/PTV/OH PLIF imaging: Conditional flow field statistics in partially-premixed turbulent opposed jet flames. *Proceedings of the Combustion Institute*, v. 31, 709-717.
27. Basu, S., Renfro, M. W., and Cetegen, B. M. (2006). Spatially-resolved optical measurements of water partial pressure and temperature in a PEM fuel cell under cyclic operating conditions. *Journal of Power Sources*, v. 162, 286-293.
26. Carnell Jr., W. F., and Renfro, M. W. (2006). Influence of advective heat flux on extinction scalar dissipation rate and velocity in negative edge flames. *Combustion Theory and Modelling*, v. 10, 815-830.
25. Guttenfelder, W. A., Renfro, M. W., Laurendeau, N. M., Ji, J., King, G. B., and Gore, J. P. (2006). Hydroxyl time-series and recirculation in turbulent non-premixed swirling flames. *Combustion and Flame*, v. 147, 11-21.
24. Venkatesan, K. K., Laurendeau, N. M., Renfro, M. W., Geyer, D., and Dreizler, A. (2006). Time-resolved measurements of hydroxyl in stable and extinguishing partially premixed turbulent opposed-jet flames. *Flow, Turbulence and Combustion*, v. 76, 257-278.
23. Basu, S., Renfro, M. W., Gorgun, H., and Cetegen, B. M. (2006). In-situ simultaneous measurements of temperature and water partial pressure in a PEM fuel cell under steady state and dynamic cycling. *Journal of Power Sources*, v. 159, 987-994.
22. Wason, A., Carnell Jr., W. F., and Renfro, M. W. (2006). Velocity and scalar measurements in neighboring lifted edge flames. *Combustion Science and Technology*, v. 178, 789-811.
21. Basu, S., Xu, H., Renfro, M. W., and Cetegen, B. M. (2006). In-situ optical diagnostics for measurements of water vapor partial pressure in a PEM fuel cell. *ASME Journal of Fuel Cell Science and Technology*, v. 3, 1-7.
20. Zhang, J., Venkatesan, K. K., King, G. B., Laurendeau, N. M., and Renfro, M. W. (2005). Two-point time-series measurements of minor-species concentrations in a turbulent nonpremixed flame. *Optics Letters*, v. 30, 3144-3146.
19. Carnell Jr., W. F., and Renfro, M. W. (2005). Stable negative edge flame formation in a counterflow burner. *Combustion and Flame*, v. 141, 350-359.
18. Renfro, M. W., Chaturvedy, A., King, G. B., Laurendeau, N. M., Kempf, A., Dreizler, A., and Janicka, J. (2004). Comparison of OH time-series measurements and large-eddy simulations in hydrogen jet flames. *Combustion and Flame*, v. 139, 142-151.
17. Guttenfelder, W. A., King, G. B., Gore, J. P., Laurendeau, N. M., and Renfro, M. W. (2003). Hydroxyl time-series measurements and simulations for turbulent premixed jet flames in thickened preheat regime. *Combustion and Flame*, v. 135, 381-403.

16. Renfro, M. W., Venkatesan, K. K., and Laurendeau, N. M. (2002). Cross-sections for quenching of  $\text{CH A } ^2\Delta, v'=0$  by  $\text{N}_2$  and  $\text{H}_2\text{O}$  from 1740 to 2160 K. *Proceedings of the Combustion Institute*, v. 29, 2695-2702.
15. Renfro, M. W., Gore, J. P., and Laurendeau, N. M. (2002). Scalar time-series simulations using flamelet state relationships for turbulent non-premixed flames. *Combustion and Flame*, v. 129, 120-135.
14. Renfro, M. W. (2002). Fluorescence lifetime measurements in atmospheric-pressure flames using nanosecond-pulsed lasers. *Applied Physics B*, v. 74, 167-174.
13. Renfro, M. W., Chaturvedy, A., and Laurendeau, N. M. (2001). Semi-quantitative measurements of CH concentration in atmospheric-pressure counterflow diffusion flames using picosecond laser-induced fluorescence. *Combustion Science and Technology*, v. 169, 25-43.
12. Lakshmanarao, A., Renfro, M. W., King, G. B., and Laurendeau, N. M. (2001). Acetone as a tracer for mixture fraction time-series measurements in turbulent non-reacting jets. *Experiments in Fluids*, v. 30, 595-596.
11. Renfro, M. W., Guttenfelder, W. A., King, G. B., and Laurendeau, N. M. (2000). Scalar time-series measurements in turbulent  $\text{CH}_4/\text{H}_2/\text{N}_2$  nonpremixed flames: OH. *Combustion and Flame*, v. 123, 389-401.
10. Renfro, M. W., Gore, J. P., King, G. B., and Laurendeau, N. M. (2000). Self-similarity of hydroxyl-concentration temporal statistics in turbulent nonpremixed jet flames. *AIAA Journal*, v. 38, 1230-1236.
9. Renfro, M. W., King, G. B., and Laurendeau, N. M. (2000). Scalar time-series measurements in turbulent  $\text{CH}_4/\text{H}_2/\text{N}_2$  nonpremixed flames: CH. *Combustion and Flame*, v. 122, 139-150.
8. Blevins, L. G., Renfro, M. W., Lyle, K. H., Laurendeau, N. M., and Gore, J. P. (1999). Experimental study of temperature and CH radical location in partially-premixed  $\text{CH}_4/\text{air}$  coflow flames. *Combustion and Flame*, v. 118, 684-696.
7. Renfro, M. W., King, G. B., and Laurendeau, N. M. (1999). Quantitative hydroxyl concentration time-series measurements in turbulent nonpremixed flames. *Applied Optics*, v. 38, 4596-4608.
6. Renfro, M. W., Pack, S. D., King, G. B., and Laurendeau, N. M. (1999). A pulse-pileup correction procedure for rapid measurements of hydroxyl concentrations using picosecond time-resolved laser-induced fluorescence. *Applied Physics B*, v. 69, 137-146.
5. Pack, S. D., Renfro, M. W., King, G. B., and Laurendeau, N. M. (1998). Laser-induced fluorescence triple-integration method applied to hydroxyl concentration and fluorescence lifetime measurements. *Combustion Science and Technology*, v. 140, 405-425.
4. Renfro, M. W., Sivathanu, Y. R., Gore, J. P., King, G. B., and Laurendeau, N. M. (1998). Time-series analysis and measurements of intermediate species concentration spectra in turbulent nonpremixed flames. *Proceedings of the Combustion Institute*, v. 27, 1015-1022.
3. Renfro, M. W., Pack, S. D., King, G. B., and Laurendeau, N. M. (1998). Hydroxyl time-series measurements in laminar and moderately turbulent methane/air diffusion flames. *Combustion and Flame*, v. 115, 443-455.
2. Pack, S. D., Renfro, M. W., King, G. B., and Laurendeau, N. M. (1998). Photon-counting technique for rapid fluorescence decay measurements. *Optics Letters*, v. 23, 1215-1217.
1. Renfro, M. W., Klassen, M. S., King, G. B., and Laurendeau, N. M. (1997). Time-series measurements of CH concentration in turbulent  $\text{CH}_4/\text{air}$  flames by use of picosecond time-resolved laser-induced fluorescence. *Optics Letters*, v. 22, 175-177.

### Book Chapters and Theses

3. Renfro, M. W. (2001). Nitric oxide measurements in jet flames with a Ti:Sapphire laser, in *Energy, Simulation-Training, Ocean Engineering and Instrumentation: Research Reports of the Link Energy Fellows*, v. 1 (ed. B. J. Thompson), The University of Rochester Press, Rochester, NY, pp. 3-20.

2. Renfro, M. W. (2000). Quantitative time series for minor-species concentrations: measurements and modeling in turbulent nonpremixed flames. Ph.D. Dissertation, Purdue University, West Lafayette, IN.
1. Renfro, M. W. (1997). Time-series measurements of laser-induced OH and CH fluorescence in laminar and turbulent flames. M.S. Thesis, Purdue University, West Lafayette, IN.

### **Invited Presentations**

12. "Local extinction in diffusion flame sheets," Department of Mechanical and Aerospace Engineering, The State University of New York at Buffalo, NY, November 29, 2007.
11. "High-bandwidth ps-LIF measurements in turbulent nonpremixed flames," Fachgebiet Energie- und Kraftwerkstechnik, Technische Universität Darmstadt, Germany, January 26, 2005.
10. "Applications of laser-induced fluorescence for combustion diagnostics," Department of Mechanical, Industrial and Manufacturing Engineering, Northeastern University, Boston, MA, November 7, 2003.
9. "Concentration and velocity measurements in combustion and fuel cell systems," Alstom Power Plant Laboratories, Windsor, CT, September 3, 2003.
8. "Applications of picosecond time-resolved laser-induced fluorescence in laminar and turbulent flames," Department of Mechanical Engineering, Yale University, New Haven, CT, September 11, 2002.
7. "Applications of picosecond time-resolved laser-induced fluorescence in laminar and turbulent flames," Air Force Research Laboratories, Dayton, OH, May 23, 2002.
6. "Applications of picosecond and nanosecond laser-induced fluorescence for combustion diagnostics," School of Mechanical Engineering, Purdue University, West Lafayette, IN, February 27, 2002.
5. "Applications of laser-induced fluorescence to laminar and turbulent flame measurements of CH and OH," Department of Mechanical Engineering, University of Connecticut, Storrs, CT, January 22, 2002.
4. "Applications of picosecond laser-induced fluorescence to laminar and turbulent flame measurements," Department of Mechanical Engineering, Washington University, St. Louis, MO, July 11, 2001.
3. "Measurements and modeling of scalar power spectra in turbulent jet flames," School of Mechanical Engineering, Purdue University, West Lafayette, IN, November 9, 1999.
2. "Hydroxyl time-series measurements in turbulent diffusion flames," School of Mechanical Engineering, Purdue University, West Lafayette, IN, November 4, 1997.
1. "Time-series measurements of CH concentration by picosecond time-resolved laser-induced fluorescence," School of Mechanical Engineering, Purdue University, West Lafayette, IN, October 15, 1996.

### **Conference Proceedings and Abstracts**

53. Majewski, M., Jordan, E. H., and Renfro, M. W. (2008). Rare earth element doped ceramics and their lifetime characteristics with varying temperature. Paper No. AIAA-2008-266, 46<sup>th</sup> AIAA Aerospace Sciences Meeting, Reno, NV.
52. Carnell Jr., W. F. and Renfro, M. W. (2007). Study of reaction rates through a local extinction point in nonpremixed flames. Proceedings of the 2007 Technical Meeting of the Eastern States Section, The Combustion Institute, Charlottesville, VA.
51. King, G. B., Renfro, M. W., and Laurendeau, N. M. (2007). Two-point scalar time-series measurements and simulations in turbulent partially premixed flames. AFOSR/ARO Meeting on Chemical Propulsion, Boulder, CO.

50. Basu, S., Renfro, M. W. and Cetegen, B. M. (2007). Spatially resolved measurements and modeling of water vapor and temperature in PEM fuel cells. ASME 5<sup>th</sup> International Fuel Cell Science, Engineering and Technology Conference, New York, NY.
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