

Curriculum Vitae

STEPHEN A. CIATTI, Ph. D.

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1. Academic Degrees

Ph. D. University of Wisconsin – Madison 2001 Mechanical Engineering
Dissertation Advisor – Professor David E. Foster
M. S. University of Wisconsin – Madison 1997 Mechanical Engineering
Thesis Advisor – Professor Jay K. Martin
B. M. E. University of Minnesota – Twin Cities 1993 Mechanical Engineering

2. Relevant Professional Experience

2013 – Present Principal Mechanical Engineer (Technical Lead) – Center for Transportation Research, Argonne National Laboratory

- Currently the principal investigator for investigating diesel and low temperature combustion (LTC) characteristics using endoscope in-cylinder imaging. Endoscope and fiber-optic imaging provides detailed information to evaluate combustion performance in both traditional diesel and LTC systems. Engine is a state-of-the-art 2009 GM-Europe 1.9 liter direct injection diesel. Engine is operating on low cetane fuels (such as gasoline and gasoline blends) with up to 500% NOx reduction while maintaining diesel-like efficiencies (40+% BTE).
- Working with Argonne's Vehicle Systems group using a transient dynamometer and model-based control to emulate vehicle/engine operation on drive cycles.
- Tasked with responsibility for technical quality of publications, proposals and patent applications for both engine research groups at Argonne; all group manuscripts, draft proposals and related documents are reviewed for technical quality.

2007 – 2013 Principal Mechanical Engineer – Center for Transportation Research, Argonne National Laboratory

- Generated Argonne internal project to utilize absorption spectroscopy and fiber-optics to develop a technique to measure combustion temperature under conditions that produce few emission-type photons. This approach utilizes a super-continuum laser to provide rapid scanning of the measurement control volume with minimal modification to the engine.

- Initiated Gasoline Compression Ignition project in LTC, collaborating with General Motors, Drivven Inc., and the University of Wisconsin-Madison

2001 – 2007 Staff Mechanical Engineer - Center for Transportation Research, Argonne National Laboratory

- Argonne/Ford Motor Company project to expand the operating conditions of hydrogen powered engines. Endoscope and fiber-optic imaging technology is used to perform UV spectroscopy for OH* chemiluminescence. Developed an emission spectroscopic technique to measure hydrogen combustion temperature using OH*. Project continues to explore advanced combustion strategies, such as direct injection (DI), multiple direct injection and turbocharging, are the focal points.
- Operating experiments on fuel sprays using x-rays generated by Argonne's Advanced Photon Source (APS). Assists in refining x-ray technique to quantify fuel spray mass distribution and to discover fuel spray shock waves created in ambient gas.
- Data acquisition and project management responsibilities in locomotive engine lab operated by Electro-motive Division (EMD) of General Motors. Assisted in the construction, calibration and operation of EMD 710 single cylinder 2-stroke engine. Current tests are geared toward emissions reduction and fuel efficiency improvement.
- Proposed, designed and developed a horizontally opposed, dual piston Rapid Compression Machine for x-ray spray studies. RCM provides a high pressure, high temperature environment for diesel spray studies that is compatible with the x-ray environment.
- Technical Program Manager - DOE's Multi-Year Plan for Locomotive and Rail Efficiency Improvement and Emissions Reduction.

2008 – 2010 Adjunct Associate Professor of Mechanical Engineering, University of Illinois at Chicago

- Responsibilities include advising and providing research funding for a graduate student, participating in M.S. and Ph. D. pre-defense and defense committees, writing proposals and publications with other UIC faculty.

1995-2001 Research Assistant - Engine Research Center; University of Wisconsin-Madison

- Dissertation title "Determination of Diesel Injector Nozzle Characteristics Using Two-Color Optical Pyrometry"

- Used two-color optical pyrometry and high-speed imaging to evaluate the effect of different injector tips on large-bore diesel engine emissions and fuel consumption. Different injector tips included mini-sac and VCO nozzles, and VCO nozzles made by different manufacturing techniques.
- Modified a 4 cylinder engine to operate using only 1 cylinder, while addressing torsional vibration issues and dynamometer control.
- Installed engine, dynamometer, and all supporting equipment from “pallet to experiment”.
- M.S. Thesis: "Spark Ignition Effects on Two-Stroke Cyclic Variability" investigated the location and timing effects of spark ignition on two-stroke outboard engine performance. Also developed a closed loop control scheme for combustion quality and misfire detection using ionization sensors

3. Associated Professional Experience

1993-1995 Locomotive Maintenance Supervisor - Burlington Northern Railroad

- Coordinated 35 scheduled employees in servicing locomotives and assigning locomotives to trains. Worked extensively with other portions of railroad, including trainmasters, yardmasters and train crews.
- Attended 8 different single-week training classes in locomotive maintenance at BN’s Technical Training Center in Overland Park, KS. Classes included mechanical, electrical, and air brake maintenance and troubleshooting for EMD and GE locomotives.
- Involved in union/management disputes, contracts, and disciplinary activities.

1990-1993 Intern Powerplant Engineer – Northwest Airlines

- Responsible for CFM56-5 (A320 aircraft) engine monitoring and repair. Coordinated inspections, evaluated in-flight engine data and initiated repairs as a result. Learned several NDT inspection techniques, including use of borescopes, fluorescent penetrant, magnaflux, and others.

4. Other Education Experience

2000-2001 Grader/Teaching Assistant – Mechanical Engineering Department, UW-Madison

- Responsible for grading homework and exams for undergraduate fluid mechanics and thermodynamics classes. Also provided tutoring assistance for undergraduates in these classes. Includes hosting problem solving sessions for students for free, on my own time.

5. Community Service and Consulting Experience

2001-2004 Technical Advisor - Team for High School/Junior High Technology Fair

- Provided technical assistance to high school and junior high student at Bergen County Academies (Bergen, NJ) for Internet Science and Technology Fair (ISTF) Competition. Projects focused upon transportation related problems and solutions.

6. Professional Affiliations

American Society of Mechanical Engineers (ASME)

*Chair of ASME Internal Combustion Engine Division (ICED) Executive Committee (2012-2013)

Technical Chairperson for ASME ICED Spring Technical Conference in Torino, Italy (May 2012)

Technical Chairperson for ASME ICED Fall Technical Conference in Lucerne, Switzerland (September 2009)

Technical Chairperson for ASME ICED Spring Technical Conference in Chicago, IL (April 2007)

Central States Section of the Combustion Institute (CSSCI)

*Member of "At-large Board of Advisors" for CSSCI (term 2007-2018)

Associate Editor (for IC Engine submissions) for ASME Journal of Energy Resources Technology (JERT)

Member of the Editorial Board for Journal of Automobile Engineering, Institution of Mechanical Engineers, Leicestershire, England – UK

Associate Editor – Frontiers in Mechanical Engineering Journal of Engine and Automotive Engineering, Lausanne, Switzerland

Society of Automotive Engineers (SAE)

Institute for Liquid Atomization and Spray Systems (ILASS)

7. Awards

Ciatti, S. A., ASME ICED "Best Presented Paper" Award (2005) for "Influence of EGR on Soot/NOx Production in a Light-Duty Diesel Engine", presented in Ottawa, Canada

Ciatti, S. A., ASME ICED “Best Presented Paper” Award (2004) for “Comparison of X-Ray Based Fuel Spray Measurements with Computer Simulation Using the CAB Model”, presented in Kyoto, Japan

Ciatti, S. A., Powell, C. F., Yue, Y., and Wang, J. (2002) - Department of Energy 2002 “National Laboratory Combustion and Emissions Control R&D Award” for developing and using x-rays to study diesel sprays.

8. Publications

Kolodziej, C. P., **Ciatti, S. A.**, (October 2014), ASME ICEF 2014-5632, "Effects of Injector Nozzle Inclusion Angle on Extending the Lower Load Limit of Gasoline Compression Ignition using 87 AKI Gasoline", ASME Fall Technical Conference, Columbus, IN

Kodavasal, J., Kolodziej, C. P., **Ciatti, S. A.**, Som, S., (October 2014), ASME 2014-5591, “CFD Simulation of Gasoline Compression Ignition”, ASME Fall Technical Conference, Columbus, IN

Kolodziej, C. P., Vuilleumier, D., **Ciatti, S. A.**, (April 2014), SAE 2014-01-1302, “Extension of the Lower Load Limit of Gasoline Compression Ignition with 87 AKI Gasoline by Injection Timing and Pressure”, SAE World Congress, Detroit, MI

Das Adhikary, B., Reitz, R. D., **Ciatti, S. A.**, Kolodziej, C. P., (April 2014), SAE 2014-01-1297, “Computational Investigation of Low Load Operation in a Light Duty Gasoline Direct Injection Compression Ignition [GDICI] Engine Using Single Injection Strategy”, SAE World Congress, Detroit, MI

Kavuri, C., Singh, S., Krishnan, S. R., Srinivasan, K. K., **Ciatti, S. A.**, (October 2013), ASME ICEF2013-19178, “Computational Analysis of Combustion of High and Low Cetane Fuels in a Compression Ignition Engine”, ASME Fall Technical Conference, Dearborn, MI

Ciatti, S. A., Johnson, M.V., Das Adhikary, B., Reitz, R., Knock, A., (April 2013), SAE 2013-01-0263, “Efficiency and Emissions Performance of Multizone Stratified Compression Ignition Using Different Octane Fuels”, SAE World Congress, Detroit, MI

Das Adhikary, B., Reitz, R. **Ciatti, S. A.**, (April 2013), SAE 2013-01-0900, “Study of In-Cylinder Combustion and Multi-Cylinder Light Duty Engine Performance Using Different RON Fuels at Light Load Conditions”, SAE World Congress, Detroit, MI

Ciatti, S. A., (September 2012), ASME Mechanical Engineering Magazine, “The Gasoline Diesel”, ASME, NY, NY

Knizley, A., Krishnan, S., Srinivasan, K., **Ciatti, S. A.**, (July 2012), EGY-D-11-01404, “Fuel and Diluent Effects on Entropy Generation in a Constant Internal Energy-Volume (UV) Combustion Process Energy”, Journal of Energy

Ciatti, S. A., Subramanian, S., Ferris, A., (May 2012), ASME ICES2012-81010, “Effect of EGR in a Gasoline Operated Diesel Engine in LTC Mode”, ASME Spring Technical Conference, Torino, Italy

Subramanian, S., and **Ciatti, S. A.** (Oct. 2011) – ASME ICEF2011-60014 – “Low Cetane Fuels in Compression Ignition Engines to Achieve LTC”, ASME Fall Technical Conference, Morgantown, WV

Ciatti, S. A. and Subramanian, S., (Sept. 2010) ASME GTP-10-1362 “An Experimental Investigation of Low Octane Gasoline in Diesel Engines”, ASME Journal of Engineering for Gas Turbines and Power Systems, New York, NY

Viele, M., Quillen, K., **Ciatti, S. A.**, (Sept. 2010) ASME ICEF2010-35119 “Next-Cycle and Same-Cycle Cylinder Pressure Based Control of Internal Combustion Engines”

Ciatti, S. A., (June 2010) – Textbook chapter “Light Emission from Flames”, Handbook of Combustion Vol. 1, Wiley VCH Publishing, Hoboken, NJ

Ciatti, S. A., et al. (March 2010) – Proceedings of the Central States Section of the Combustion Institute – “A Study of Low Cetane Kerosene Fuel in Diesel Engines”, Champaign-Urbana, IL

Ciatti, S. A., (2009) – Textbook chapter “Utilizing Combustion Imaging to Enable the Use of Alternative Fuels in Engines”, pp.101-112, Combustion Science and Technology – Recent Advances, Narosa Publishing, New Delhi, India

Ciatti, S. A., Bihari, B., and Wallner, T. (2007) JAUTO399 – “Establishing Combustion Temperature in a Hydrogen-Fuelled Engine Using Spectroscopic Measurements”, Proceedings of IMechE Vol. 221 Part D: Journal of Automobile Engineering

Wallner, T., **Ciatti, S. A.**, and Bihari, B. (2007) SAE 2007-01-1464 - “Investigation of Injection Parameters in a Hydrogen DI Engine Using an Endoscopic Access to the Combustion Chamber”, SAE World Congress, Detroit, MI

Ciatti, S. A., Wallner, T., Ng, H. K. (2006) ASME ICES 2006-1398 - “Study of Combustion Anomalies of H₂ICE with External Mixture Formation”, ASME 2006 Spring Technical Conference, Aachen, Germany

Miers, S. A., **Ciatti, S. A.**, (2006) SAE 2006-01-0200 - “Effect of Injector Nozzle Finish on Performance and Emissions in an HSDI, Light-Duty Diesel Engine”, SAE World Congress, Detroit, MI

Wallner, T., **Ciatti, S. A.**, Stockhausen, W. F., Boyer, B. A. (2006) - "Endoscopic Investigations in a Hydrogen Internal Combustion Engine", Technical University of Graz, Austria – 1st International Symposium on Hydrogen Internal Combustion Engines, Graz, Austria

Ciatti, S. A., Miers, S.A., and Ng, H. K. (2005) ASME ICEF 2005-1327 – "Influence of EGR on Soot/NOx tradeoff in a Light-Duty Diesel Engine", ASME ICED Fall Technical Conference, Ottawa, Canada

Ciatti, S. A., Hessler, J. P., Lee, K. O., Tentner, A., and Zhu, J. (2005) SAE 2005-01-0128 – "Investigation of Nano-Particulate Production from Low Temperature Combustion" SAE World Congress, Detroit, MI

Miers, S. A., **Ciatti, S. A.**, Ng, H. K. (2005) SAE 2005-01-3670 – "Emissions, Performance, and In-Cylinder Combustion Analysis in a Light-Duty Diesel Engine Operating on a Fischer-Tropsch, Biomass-to-Liquid Fuel", SAE Powertrain and Lubricants Conference, San Antonio, TX

Miers, S. A., Barna, G. L., Anderson, C. L., Blough, J. R., Inal, M. K., **Ciatti, S. A.** (2005) ASME GTP-06-1228 – "A Wireless Microwave Telemetry Data Transfer Technique for Reciprocating and Rotating Components" ASME Journal of Engineering for Gas Turbines and Power, New York, NY

Ciatti, S. A., Powell, C. F., Tanner, F. X. et al. (2004) ASME/CIMAC Paper 264 – "Comparison of X-Ray Based Fuel Spray Measurements with Computer Simulation Using the CAB Model", ASME/CIMAC conference, Kyoto, Japan

Powell, C. F., **Ciatti, S. A.**, et al. (2004) SAE 2004-01-2011 – "X-Ray Absorption Measurements of Diesel Sprays and the Effects of Nozzle Geometry"

Tanner, F. X., **Ciatti, S. A.**, Powell, C. F. et al. (2004) ILASS – "Analysis of X-ray Based Computer Simulations of Diesel Fuel Sprays" ILASS Americas meeting, Washington D. C.

Powell, C. F., **Ciatti, S. A.**, et. al. (2003) ILASS – "Effects of Ambient Pressure on Fuel Sprays as Measured Using X-Ray Absorption", ILASS Americas meeting, Monterey, CA

Lee, K. O., Zhu, J. and **Ciatti, S. A.** (2003) SAE 2003-01-3169 – "Sizes, Graphitic Structures and Fractal Geometry of Light-Duty Diesel Engine Particulates"

Ciatti, S. A., Blobaum, E. L., and Foster, D. E. (2002) – SAE 2002-01-0746 – "Determination of Diesel Injector Nozzle Characteristics Using Two-Color Optical Pyrometry" SAE World Congress, Detroit, MI

Blobaum, E. L., ***Ciatti, S. A.***, Foster, D. E. (2001) - ASME 2001-ICE-394, "Quantitative Investigation of Spray Characteristics of Unique Diesel Injector Tips" ASME Fall Technical Conference, Argonne, IL

9. Select Invited Presentations

SAE Powertrain, Fuels and Lubricants Conference, Special Event (October 2014) "SAE Outlook for Future Engines and Future Fuels Symposium", Birmingham, UK

King Abdullah University of Science and Technology (KAUST) (September 2013), "Gasoline Compression Ignition – A Promising Approach to High Efficiency, Low Emissions Vehicles", Thuwal, Kingdom of Saudi Arabia

Texas A&M University (July 2013), "Utilizing Argonne's Science and Engineering to Facilitate Advanced Vehicle Technology", College Station, TX

Presentation for President Obama's Visit to Argonne National Laboratory (March 2013), "Advanced Combustion to Enable 54.5 mpg in 2025", Argonne, IL
Ohio State University (Oct. 2011) – "Advanced Combustion – A Potential Pathway to Greener Transportation", Columbus, OH

Columbia University (Sept. 2011) - "Green Cars, Green Future – What does "Green" Transportation really mean?", New York City, NY

Texas A&M University (Nov. 2010) – "Combustion of Low Cetane Fuel in a Diesel Engine and 2nd Law Implications", College Station, TX

Indian Institute of Technology – Madras, Indian Institute of Science and Politechnic University of Torino (all July 2010) – "Combustion of Low Cetane Fuel in a Diesel Engine", Chennai - India, Bangalore – India and Turin – Italy.

University of Wisconsin-Madison (January 2010) – "Advanced Engine Technology and the Role of Science Tools in Creating 21st Century Transportation", Madison, WI
Mississippi State University ME Seminar Series (Oct. 2008) – "Using Combustion Imaging to Enable the Use of Alternative Fuels in Engines", Starkville, MS

Indian Institute of Technology – Kanpur International Combustion Workshop (Jan. 2008) – "Establishing Hydrogen Combustion Temperature in Engines Using Spectroscopic Methods" and "Using Combustion Imaging to Enable the Use of Alternative Fuels in Engines", (Entire trip to India paid for by host) Kanpur, India

Iowa State University ME Seminar Series (Sept. 2007) – "Differences between Biofuels and Petroleum Diesel in Combustion", Ames, IA

University of Illinois at Chicago ME Lecture Series (Apr. 2007) – “Combustion Imaging to Facilitate Advanced Low Temperature Combustion”, Chicago, IL

Sierra Club of Lake County, IL (Mar 2007) – “What is Green Transportation and How Can We Do Better?”, Mundelein, IL

Society of Hispanic Professional Engineers (SHPE) (Nov. 2006) at UIC – “Green Transportation – How do Engineers Shape the Technology?”

Marquette University Distinguished Lecture Series (Oct. 2006) – “Enabling the Use of Biofuels Through the Use of Combustion Imaging”, Milwaukee, WI