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## ACADEMIC SUMMARY

Doctor of Philosophy in Mechanical Engineering, Missouri University of Science & Technology, 1999
Thesis title: "Identification and Characterization of Complex Dynamic Structure in Spark Ignition Engines"
GPA 4.0/4.0

Master of Science in Mechanical Engineering, Missouri University of Science & Technology, 1995
Thesis title: "The Impact of Fuel Spray Behavior on Combustion Stability in Spark Ignition Engines"
GPA 4.0/4.0

Bachelor of Science in Mechanical Engineering, Missouri University of Science & Technology, 1993
Honor Thesis title: "Cogeneration by Steam Injection to Gas Turbine Engines"
GPA 4.0/4.0 Distinction at Graduation

## PROFESSIONAL EXPERIENCE

**Oak Ridge National Laboratory**
Energy and Transportation Science Division

Group Leader — October 2012 – Present
Fuels and Engines Research Group
Supervisor: Dr. Johney B. Green, Jr.

• Manage the performance and development of approximately 20 technical research staff. • Coordinate fuels and engine research with other research areas and unique science resources of ORNL. • Recent examples include alignment and expansion of fuels and engines research portfolio to make use of world-class leadership in high performance computing, neutron sciences, advanced manufacturing, and material sciences.

Center Director — April 2010 – Present
Fuels, Engines, and Emissions Research Center
Supervisor: Dr. Johney B. Green, Jr.

• Provide technical vision, direction and leadership in coordination with FEERC group leaders to a diverse research portfolio for addressing evolving efficiency/emissions challenges in the transportation sector. • Coordinate, develop, and manage diverse research portfolio exceeding $14M/year and spanning multiple Department of Energy offices as well as more than 20 industry funded activities. • Coordinate and develop strategic internal and external collaborations to better support the mission of the DOE Office of Vehicle Technologies. • Represent FEERC to internal laboratory leadership and to DOE and industry sponsors. • Member of government/industry technical teams to provide guidance to DOE in establishing and meeting near-term and long-term efficiency/emissions goals.

Distinguished Research Staff — January 2009 – Present
Fuels, Engines, and Emissions Research Center
Supervisor: Dr. Johney B. Green, Jr.

• Technical lead and coordinator of engine combustion and efficiency research at ORNL. • Participant in several government/industry technical teams and university working groups focused on high efficiency clean engines and vehicles. • Program manager and/or principal investigator on numerous DOE and industry funded activities related to combustion, engine controls, emission controls, thermodynamics, and thermal energy

recovery for gasoline, diesel, and alternative fuel applications. This includes interdisciplinary coordination with ORNL resources for high performance computing, neutron imaging, and materials characterization. • Responsibility for numerous high level DOE milestones including the technical lead for demonstrating DOE 2010 light-duty engine efficiency and emissions milestones which are recorded in the DOE budget narrative. • Frequent invited speaker on the topics of high efficiency combustion, engine instabilities, adaptive controls, and the long-term outlook of high efficiency transportation technologies.

Senior Research Staff — January 2004 – December 2008
Fuels, Engines, and Emissions Research Group
Supervisor: Mr. Timothy Theiss

• Principal investigator of numerous government-industry collaborations as well as funds-in Work For Other (WFO) agreements focused on advanced combustion processes, controls, and alternative fuels. • Principal investigator on several DOE supported activities focused on multi-cylinder applications of diesel and advanced combustion concepts. Additional activities include the application of high efficiency engine concepts including thermal energy recovery and thermodynamics to light-duty engines. • ORNL representative to the Advanced Engine Combustion (AEC) and HCCI University working groups.

Research Staff — January 2000 – December 2003
Fuels, Engines, and Emissions Research Group
Supervisor: Dr. Johney B. Green, Jr.

• Performed various tasks related to identifying, characterizing, and controlling nonlinear behavior in spark ignition and compression ignition engines. • Principal investigator of a program focused on developing an ultra-lean burn natural gas engine for stationary applications. • Principal investigator of a program focused on low emissions combustion regimes in diesel engines. • Involved in many additional projects including control of nonlinear behavior in spark ignition and compression ignition engines, evaluation of exhaust after-treatment systems, hydrogen fuel reformers, combustion model development, and the development of novel engine related instrumentation.

Post-Doctoral Research Associate — June 1999 – January 2000
Fuels, Engines, and Emissions Research Group
Supervisor: Dr. Ron L. Graves

• Participant in several activities including emission performance evaluation of biodiesel fuels, extending diesel EGR dynamic limits, hydrogen fuel reforming, and cold start controls for spark ignition direct injection engines. • Performed numerous experiments on compression and spark ignition production engines and analyzed resulting data.

Summer Technical — June 1998 – August 1998
Chaos Applications and Theory Group
Supervisor: Dr. C. Stuart Daw

• Investigated repeating complex dynamic patterns in data from several spark ignition engines. • Investigated extending the lean dynamic limits in spark ignition engines using nonlinear analysis and control techniques. • Modified existing dynamic spark ignition engine model to include inert residual gas effects.

Summer Technical — May 1996 – August 1996
Chaos Applications and Theory Group
Supervisor: Dr. C. Stuart Daw

• Designed system capable of real-time control of a spark ignition engine for evaluating chaos-based control algorithms. • Investigated various nonlinear control algorithms on a dynamic spark ignition engine model. • Modified and upgraded high speed data acquisition systems in the engine-dynamometer facility.

Summer Technical — June 1992 – August 1992
Chaos Applications and Theory Group
Supervisor: Dr. C. Stuart Daw

• Developed controller to minimize chaotic cycle-to-cycle variations around the dynamical fixed point in a simple spark ignition engine model. • Developed interactive spark ignition engine computer simulation to be used as a demonstration tool for illustrating control of chaotic systems.

**University of Tennessee at Knoxville**
Bredesen Center for Interdisciplinary Research and Graduate Education

Professor — September 2013 – Present
Director: Dr. Lee Riedinger

• Support the Bredesen Center in identifying, reviewing, and interviewing high quality student candidates. • Serve on graduate student committees. • Established new thrust area on Transportation Science. • Serve on faculty credentials committee which reviews and makes recommendations on faculty applications to the Bredesen Center.

**University of Tennessee at Knoxville**
Department of Mechanical, Aerospace and Biomedical Engineering

Adjunct Assistant Research Professor — July 2004 – Present
Department Head: Dr. Matthew Mench

• Collaborate with UT faculty on proposal writing and developing programs related to advanced combustion engines. • Working toward strengthening the relationship between UT and ORNL. • Provide research guidance and direction to graduate and undergraduate students.

**University of Missouri-Rolla**
Department of Mechanical and Aerospace Engineering and Engineering Mechanics

Graduate Research Assistant — May 1993 – May 1999
Advisor: Dr. James A. Drallmeier

• Initiated project and secured funding to investigate nonlinear cycle dynamics in spark ignition engines for control purposes. • Developed single-cylinder research facility and performed experiments to understand the effect of fuel spray characteristics on engine performance, emissions and stability. • Developed methods and code for analyzing combustion data as well as fuel spray characteristics based on in engine visualization and phase/Doppler interferometer measurements.

Lecturer — January 1999 – May 1999
Supervisor: Dr. James A. Drallmeier

• Responsible for teaching and testing junior-level mechanical engineering students in a second course in thermodynamics. • Received Outstanding Teaching Commendation based on student evaluations.

Honor Research Assistant — January 1992 – May 1993
Advisor: Dr. Shen C. Lee

• Developed thermodynamic computer model of gas turbine system known as a Cheng cycle. • Optimized Cheng cycle for cogeneration applications by steam injection to gas turbine engines.

**Ford Motor Company**
Advanced Powertrain Division

Graduate Research Intern — April 1995 – June 1995
Supervisor: Mr. William Clemens

• Analyzed laser diffraction measurements of high pressure fuel sprays for the Direct Injection Group at Ford Scientific Research Laboratory. • Analyzed phase/Doppler particle analyzer measurements of various automotive fuel sprays for the USCAR consortium. • Performed flow visualization on high pressure fuel sprays.

## HONORS and AWARDS

### External Recognition

- **Fellow of the ASME** – *"Recognized for innovative research in advanced combustion concepts, unstable combustion phenomena, and the scaling and harmonization of high-efficiency combustion concepts to application."* (2016)
- Author of featured cover article for **ASME Mechanical Engineering Magazine** on the future of engines, December 2015 issue (2015)
- **ASME Internal Combustion Engine Award** for distinguished contribution over a substantial period of time (2014)
- **SAE International Leadership Citation** for outstanding accomplishments which have led to the success of the SAE's global initiatives (2014)
- Invited attendee of the **2013 NAE Global Grand Challenges Summit** sponsored by the National Academy of Engineering, China Academy of Engineering, and the Royal Academy of Engineering in London, England (2013)
- **Fellow of the SAE** – "*Recognized for distinctive contributions in the area of combustion stability fundamentals and the application of low temperature combustion to multi-cylinder engines"* (2012)
- Invited attendee of **2011 NAE China-America Frontiers of Engineering Symposium** sponsored by the National Academy of Engineering (2011)
- **SAE Forest R. McFarland Award** for outstanding contributions toward the work of the SAE Engineering Meetings Board (2010)

### Internal Recognition

- ORNL Awards Night **Research Leadership at the Group Level Award** (2014)
- ORNL Awards Night **Outstanding Accomplishment in Science & Technology Award** for Early Career Engineering Accomplishment (2003)
- **ORNL Significant Event Awards** (2015, 2015, 2011, 2004, 2003, 2002)

### Other Recognition

- Member of Phi Kappa Phi (General Honor Society)
- Member of Tau Beta Pi (Engineering Honor Society)
- Member of Pi Tau Sigma (Mechanical Engineering Honor Society)
- EPA Science to Achieve Results **Graduate Research Fellowship** (1996-1999)
- **Outstanding Teaching Commendation**, University of Missouri-Rolla (1999)
- President of the Council of Graduate Students, University of Missouri-Rolla (1997-1998)
- **Honor Scholar in Engineering**, Bachelor of Science, University of Missouri-Rolla (1993)
- **4.0 G.P.A. Distinction at Graduation**, Bachelor of Science, University of Missouri-Rolla (1993)

## U.S. DOE ACTIVITIES

### Leadership

- Founding member of the four-person Leadership Team and the steering committee of the DOE multi-laboratory initiative on "Co-optimization of Fuels and Engines" with a FY16 funding level of $27M/year and involvement from nine U.S. DOE National Laboratories (2014-Present)
- ORNL lead for International Energy Agency Task Leaders on Energy Conservation and Emissions Reduction in Combustion (2013-Present)
- ORNL technical and programmatic lead for DOE Vehicle Technologies Office sub-programs on Advanced Combustion Engine R&D and Fuel and Lubricant Technologies R&D (2010-Present)

- Member of Industry Advisory Board governing DOE U.S.-China Clean Energy Research Center on Clean Vehicles (2010-Present)
- Member of DOE/industry Advanced Combustion and Emissions Control Tech Team (2009-present)

**Workshop Development**

- Key organizer of the first annual meeting of the DOE multi-laboratory initiative on "Co-optimization of Fuels and Engines" which included the participation of 110+ researchers from nine laboratories and the DOE program leads from the Vehicle Technologies Office and the Bioenergy Technologies Office (2016)
- Key organizer of DOE Vehicle Technologies Office stakeholder meeting on the "Virtual Vehicle Initiative" to judge industry interest in the development of a vehicle simulation framework for petascale and beyond advanced computing architectures (2015)
- Key organizer of DOE Vehicle Technologies Office workshop on "Defining the Future Role of the Vehicle Technologies Office in Supporting Development of Computational Fluid Dynamics Simulation Capabilities for Internal Combustion Engine Development" (2014)
- Key organizer of "Vehicle Data Jam" in collaboration with the White House, DOT, and DOE (2013)
- Key organizer of DOE Vehicle Technologies Program Technical Strategy Colloquium on Engine Efficiency Research & Development (2010)

## EXTERNAL ACTIVITIES

**Editorial Boards**

- Guest editor of *International Journal of Engine Research* special issue on "Cyclic Dispersion in Engine Combustion" (2014-2015)
- Associate Editor of *Frontiers in Engines and Automotive Engineering* leading subtopic on "Engine and Vehicle Systems" (2014-present)
- Member of Editorial Board of the *Journal of Emission Control Science and Technology* (2014-present)
- Member of Editorial Board for the *International Journal of Engine Research* (2010-present)
- Associate Editor of the *SAE International Journal of Engines* (2012-2015)

**Symposium, Workshop, and Conference Organization**

- Organizer of SAE International symposium on range extenders for electric vehicles (2016)
- Organizer of SAE International symposiums on high efficiency engine technologies, "High Efficiency Internal Combustion Engines Symposium" (2016, 2015, 2014, 2013, 2012, 2011)
- Organizer and chairman SAE Energy Saving and Emission Reduction Forum in Shanghai China (2015, 2014)
- Technical Program Chair for two ASME Internal Combustion Engine Division Fall Conference (2015, 2014)
- Organizer of SAE Panel Session on "Opportunities, Barriers and Strategies to Larger-Scale Introduction of Natural Gas for Light-Duty Applications" at SAE World Congress (2014)
- Lead organizer and chairman SAE 2013 Vehicle Electronics and Powertrain Technologies Forum in Shanghai, China (2013)
- Organizer of SAE International symposium on natural gas vehicles, "SAE International Natural Gas Symposium" (2013)
- Organizer of SAE International symposiums on heavy-duty vehicle efficiency, "SAE Heavy Duty Vehicles Symposium - Technologies for High Efficiency & Fuel Economy" (2014, 2013, 2013, 2011)
- Chairman and lead organizer of four-day SAE technology week in Tianjin China, "SAE 2012 International Technology Week" (2012)
- Organizer and chairperson for SAE for technical sessions related to engine modeling, high efficiency engine technologies, and advanced combustion processes (2003-present)

**External Professional Leadership and Membership**

- Member of the Bredesen Center Credentials Committee which reviews the credentials of University of Tennessee and ORNL for consideration as faculty of the Bredesen Center (2015-Present)
- Member of ASME Internal Combustion Engine Award Committee (2015-Present)
- Member of ASME Internal Combustion Engine Division Executive Committee; Assistant Vice-chair (2014-Present)
- Established Transportation Science thrust area at the Bredesen Center for Interdisciplinary Research and Graduate Education at the University of Tennessee, Knoxville (2014)
- Member of SAE Executive Committee governing the Powertrain, Fuels, and Lubricants Activity (2008-present)
- Chairperson of the SAE Fuels & Combustion Committee (2008-2009)
- Reviewer for Society of Automotive Engineers, Journal of Energy & Fuels, Combustion Science and Technology, Journal of Vibration and Control, and International Journal of Engine Research
- Member of the SAE
- Member of ASME
- Member of the American Association for the Advancement of Science (AAAS)
- Member of The Combustion Institute

## MENTORING

**ORNL Technical Staff** (official mentoring program)

Dr. Jianlin Li, Manufacturing Systems Research, Energy and Environmental Sciences Directorate, 2015.

Dr. William Ray, Complex Systems, Computing and Computational Sciences Directorate, 2015.

Dr. Scott Curran, Fuels and Engines Research, Energy and Environmental Sciences Directorate, 2014.

**Graduate Degree Committees**

Alex Pawlowski, *in progress* Ph.D. Energy and Science Engineering, Bredesen Center, University of Tennessee. Serving as co-advisor.

Scott Curran, Ph.D. Energy and Science Engineering, University of Tennessee, "Fuel Economy and Greenhouse Gas Reduction Potentials of Advanced Combustion Modes in Light-Duty Vehicles", 2014. Served as co-advisor.

Gregory K. Lilik, Ph.D. Energy and Mineral Engineering, The Pennsylvania State University, "Fuel Property Impact on High Efficiency Clean Combustion", 2012.

Jeffery Massey, Ph.D. Mechanical Engineering, Missouri University of Science and Technology, "Acoustic and Vibration Energy Transmission Paths for Diagnostic and Control of Advanced Combustion Modes", 2011.

Thomas Johansson, Ph.D. Combustion Engines, Lund University (Sweden), "Turbocharged HCCI Engine, Improving Efficiency and Operating Range", 2010. Served as Faculty Opponent.

David E. Smith, Ph.D. Mechanical Engineering, University of Tennessee, "PHEV Emissions Impacts on Control Strategy and Fuel Economy", 2009.

Scott Curran, M.S. Mechanical Engineering, University of Tennessee, "On-Road Emissions Evaluation of Student-Produced Biodiesel", 2008.

Balaji Ramamurthy, M.S. Mechanical Engineering, University of Tennessee, “Design of a Periodic Flow Reversal Mechanism for Lean Burn Natural Gas Engines”, 2005.

Chris Hamilton, M.S. Mechanical Engineering, University of Tennessee, “First and second law analyses of conventional and advanced combustion modes”, 2005.

**ORNL Research Participants**

Ms. Michelle Edwards, HERE Summer Participant, “Evaluation of sampling frequency and noise impacts on feedback parameters for dynamic engine control”, 2013.

Mr. Ani Perumalla, Science Saturdays Summer Participant, “Advanced Propulsion System Evaluation from a Sustainability Perspective”, 2013.

Mr. Scott Curran, Post-Masters Research Associate, “Reaction Controlled Compression Ignition (RCCI) combustion in a multi-cylinder engine”, 2009-2012. Currently a staff member at ORNL and pursuing a PhD at the University of Tennessee.

Mr. Elliott Ortiz-Soto, Summer Graduate Research Associate, “Development of a spark-assisted HCCI combustion model for system-level fuel economy and control studies”, 2009. Currently pursuing a PhD at the University of Michigan.

Dr. Brian Kaul, Post-Doctoral Research Associate, “2nd Law analysis of heavy-duty diesel engines”, 2008. Currently a staff member at ORNL.

Mr. Greg Lilik, Summer Graduate Research Associate, “Fuel effects on advanced combustion operation in a light-duty diesel engine, 2008-2012. Currently a post-doctoral research fellow at Sandia National Laboratories.

Dr. Manbae Han, Post-Doctoral Research Associate, “Hydrocarbon speciation and fuel effects on advanced diesel combustion”, 2007-2008. Currently an Assistant Professor in South Korea.

Mr. Jeff Massey, Summer Graduate Research Participant, “Extracting diesel combustion information from production level knock sensors”, 2007-2008. Currently employed at Cummins Filtration.

Mr. Will Glewen, Summer Graduate Research Participant, “Development of high speed combustion metrics for spark assisted HCCI, 2007. Currently pursuing a PhD at the University of Wisconsin.

Dr. Thomas Briggs, Post-Doctoral Research Associate, “Advanced combustion operation of heavy-duty diesel engines”, 2007. Currently a Principal Engineer at Southwest Research Institute.

Dr. Kukwon Cho, Post-Doctoral Research Associate, “High Efficiency Clean Combustion (HECC) concepts for light-duty diesel engines”, 2006-2008. Currently employed at Liquid Piston LLC.

Dr. Zhiming Gao, Post-Doctoral Research Associate, “Modeling and analysis of advanced diesel combustion”, 2005-2006. Currently a staff member at ORNL.

Mr. James B. Tassitano, Post-Master Research Associate, “Hydrogen HCCI Combustion”, 2005. Current status unknown.

Dr. K. Dean Edwards, Post-Doctoral Research Associate, “Nonlinear Control of Lean Cyclic Dispersion”, 2003-2005. Currently a staff member at ORNL.

## PATENTS

R. M. Wagner, C. S. Daw, J. B. Green Jr., K. D. Edwards, "Method and Device for Diagnosing and Controlling Combustion Instabilities in Internal Combustion Engines Operating in or Transitioning to Homogeneous Charge Combustion Ignition Mode"; U.S. Patent 7,431,011; Issued October 7, 2008.

J. B. Green Jr., R. M. Wagner, C. S. Daw, "Combustion Diagnostic for Active Engine Feedback Control"; U.S. Patent 7,277,790 B1; Issued October 02, 2007.

## RECENT INVITED PRESENTATIONS

R. M. Wagner, "Leveraging Big Science to Push the Limits of Internal Combustion Engines", invited technical expert to accompany Southwest Research Institute leadership on discussions with the Japanese engine industry on global progress and prospects in internal combustion engine technologies. We will be visiting with approximately 10 Japanese industry leaders (Japan; March 2016).

R. M. Wagner, "Disruptive Opportunities for Small Engine Combustion Systems", SAE/JSAE 21st Small Engine Technology Conference (Osaka, Japan; November 2015).

R. M. Wagner, "Next Generation Compression Ignition Engines and Future Fuel Opportunities", SAE Energy Saving and Emission Reduction Forum (Shanghai, China; November 2015).

R. M. Wagner, "Future Engines – Incremental Advances Driving Disruptive Opportunities", opening keynote presentation at the 2015 SAE International High Efficiency Internal Combustion Engines Symposium (Detroit, MI USA; April 2015).

R. M. Wagner, *technical expert panel discussion* on "Emissions and Efficiency Solutions 5-10 Years Out; Regulations, Solutions, Obstacles, Most-Likely Surprises, Etc." at the 2015 SAE World Congress (Detroit, USA; April 2015).

R. M. Wagner, *technical expert panel discussion* on "High Efficiency Combustion Systems Advances and Advantages Relating to China's Increasing Demands for Fuel Efficiency and Fuel Economy" at the 2014 SAE Energy Saving & Emission Reduction Forum (Shanghai, China; November 2014).

R. M. Wagner, "Global Fuel and Combustion Opportunities for Future Internal Combustion Engines", 2014 SAE Energy Saving & Emission Reduction Forum (Shanghai, China; November 2014).

R. M. Wagner, "Future Combustion and Fuel Systems – Directions and Opportunities", keynote presentation, 2014 Global Powertrain Congress (Dearborn, MI; October 2014).

R. M. Wagner, "Next Generation Combustion Engines and Future Fuel Opportunities", University of Alabama Technical Workshop on Sustainable Fuels: Production and Combustion (Tuscaloosa, Alabama; July 2014).

R. M. Wagner, "Transitioning Advanced Combustion Concepts to Multi-cylinder Engines", International Energy Agency, 36th Task Leaders Meeting on Energy Conversation and Emissions Reduction in Combustion (Stavanger, Norway; June 2014).

R. M. Wagner, "Advanced Engine Development and Future Fuel Opportunities", Advanced engine lead for initial meeting of National Lab Consortium to Jointly Optimize Biofuels and Internal Combustion Engines (Golden, CO; June 2014).

R. M. Wagner, "ORNL Advanced Combustion Research and Future Fuel Opportunities", Saudi Aramco "Future of Transport Fuels" Workshop (Saudi Arabia; March 2014).

R. M. Wagner, “Pushing the Stability Limits of High Efficiency Internal Combustion Engines”, Clean Combustion Research Center, King Abdullah University of Science and Technology (Saudi Arabia; March 2014).

R. M. Wagner, “Future of Internal Combustion Engines”, Oak Ridge Institute for Continued Learning (Oak Ridge, TN; February 2014).

R. M. Wagner, “On Path to the Optimal Internal Combustion Engine”, SAE High Efficiency Combustion Systems International Symposium (Shanghai, China; December 2013).

(cancelled due to U.S. government shutdown) R. M. Wagner, “Leveraging Big Science to Push the Limits of Internal Combustion Engines”, ASME Internal Combustion Engine Division Annual Meeting (Dearborn, MI; October 2013).

R. M. Wagner, “Accelerating the Development of High Efficiency Engines”, Fifth International Symposium on Clean and High-efficiency Combustion in Engines (Tianjin, China; July 2013).

R. M. Wagner, “Sustainable Transportation and the Future of the Internal Combustion Engine”, ORNL Summer Student Seminar (Oak Ridge, TN; June 2013).

R. M. Wagner, “Pushing the Limits of Stability of Clean High Efficiency Engines”, *Invitation only* Present and Future Engines Conference (Delphi, Greece; June 2013).

R. M. Wagner, “Sustainable Transportation and the Future of the Internal Combustion Engine”, ORNL Sustainable Campus Initiative Seminar Series (Oak Ridge, TN; April 2013).

R. M. Wagner, S. C. Curran, J. B. Green, “A Perspective on the Future of High Efficiency Engines”, Keynote, XI$^{th}$ Conference on Engine Combustion Processes (Ludwigsburg, Germany; March 2013).

R. M. Wagner, “High Performance Computing: Accelerating the Development of High Efficiency Engines”, University of Tennessee Bredesen Center for Interdisciplinary Research and Graduate Education (Knoxville, TN; March 2013).

R. M. Wagner, S. Pannala, “High Performance Computing: Accelerating the Development of High Efficiency Engines”, Global Powertrain Congress (Troy, MI; October 2012).

R. M. Wagner, “Enabling the Next Generation of High Efficiency Engines”, 2012 Directions in Engine-Efficiency and Emissions Research, DOE (Dearborn, MI; October 2012).

R. M. Wagner, S. C. Curran, “Reactivity Controlled Compression Ignition Combustion in Multi-Cylinder Engines”, Special Session on Gasoline Compression Ignition Combustion, Society of Automotive Engineers Powertrain Fuels and Lubes Conference (Malmo, Sweden; September 2012).

R. M. Wagner, “Enabling the Next Generation of High Efficiency Engines”, IQPC The Fuel Efficient Engine Summit (Detroit, MI; August 2012).

R. M. Wagner, “Enabling the Next Generation of High Efficiency Engines”, Keynote, SAE International Technology Week (Tianjin, China; August 2012).

R. M. Wagner, “Opportunities and Challenges of New Engine Technologies and an Ever Expanding Parameter Space”, Emissions 2012 Conference (Ypsilanti, MI; June 2012).

R. M. Wagner, “Walking the Edge of Stability with Advanced Combustion”, Emissions 2012 Conference (Ypsilanti, MI; June 2012).

R. M. Wagner, “High Efficiency Combustion Systems and Operation on the Edge of Stability”, University of Wisconsin Lindbergh Lecture Series (Madison, WI; November 2011)

R. M. Wagner, “Dilute Mixtures and EGR”, Strategy development workshop on techniques for high-pressure combustion (Argonne, IL; August 2011).

C. E. A. Finney and R. M. Wagner, “Nonlinear Time Series Analysis of LSPI Events and Precursors”, Southwest Research Institute Pre-Ignition Prevention Program Meeting (San Antonio, TX; June 2011).

R. M. Wagner, “Enabling High Efficiency Combustion through an Improved Understanding of Cyclic Dispersion”, University of Wisconsin ERC Symposium on Future Engines and Their Fuels (Madison, WI; June 2011).

R. M. Wagner, “High Efficiency Combustion and Operation on the Edge of Stability”, CTi 3rd International Conference on Vehicle Emission Reduction Technologies (Novi, MI; May 2011)

R. M. Wagner, “A Perspective for Operating on the Edge of Stability”, Lund University (Lund, Sweden; December 2010).

R. M. Wagner, “Engine Efficiency Research at ORNL and High Efficiency Operation on the Edge of Stability”, Global Powertrain Congress (Troy, MI; November 2010).

R. M. Wagner, “Fuel Economy and Clean Transportation of the Future”, Technical Conference on Towards Carbon Neutral Vehicles sponsored by University of Michigan and Fraunhofer USA (Plymouth, MI USA; October 2010).

R. M. Wagner, “A Controls Perspective for High Efficiency Operation on the Edge of Stability”, Symposium on High Efficiency Internal Combustion Engines sponsored by Southwest Research Institute (San Antonio, TX USA; October 2010).

R. M. Wagner et al., “Achieving and Demonstrating Vehicle Technologies Engine Fuel Efficiency Milestones”, 2010 DOE Hydrogen and Vehicle Technologies Merit Review (Washington, DC USA; June 2010).

R. M. Wagner et al., “High Efficiency Clean Combustion in Multi-Cylinder Light-Duty Engines”, 2010 DOE Hydrogen and Vehicle Technologies Merit Review (Washington, DC USA; June 2010).

R. M. Wagner, “Dual-Fuel Combustion Approach to Improved Efficiency and Emissions in a Multi-Cylinder Engine”, 11th International Conference on Present and Future Automobile Engines (Shanghai, China; June 2010).

R. M. Wagner, “Post-Combustion Efficiency Opportunities and Challenges”, DOE Vehicle Technologies Program Technical Strategy Colloquium on Engine Efficiency Research & Development (Southfield, MI USA; 2010).

R. M. Wagner, “Engine Efficiency Research at ORNL in Support of DOE Vehicle Technologies Milestones”, Global Powertrain Congress (Troy, MI; November 2009).

R. M. Wagner, “ORNL Transportation Research for Tomorrow – Research Directions of Today Provide Insight into the Vehicles of Tomorrow”, University of Alabama Blackburn Academic Symposium on Energy (Tuscaloosa, AL; October 2009).

R. M. Wagner et al., “Achieving and Demonstrating Vehicle Technologies Engine Fuel Efficiency Milestones”, 2009 DOE Hydrogen and Vehicle Technologies Merit Review (Washington, DC; May 2009).

R. M. Wagner et al., “High Efficiency Clean Combustion in Multi-Cylinder Light-Duty Engines”, 2009 DOE Hydrogen and Vehicle Technologies Merit Review (Washington, DC; May 2009).

R. M. Wagner et al., “Enabling High Efficiency Ethanol Engines”, 2009 DOE Hydrogen and Vehicle Technologies Merit Review (Washington, DC; May 2009).

R. M. Wagner, "Engine Fuel Efficiency Research at ORNL", Department of Mechanical Engineering, Missouri University of Science & Technology (Rolla, MO; April 2009).

R. M. Wagner et al., "Spark assisted HCCI combustion modes and the potential for control", School of Mechanical Engineering, Purdue University (West Lafayette, IN; December 2007).

R. M. Wagner, C. S. Daw, K. D. Edwards, J. B. Green, "Global kinetics model for spark assisted HCCI," SAE HCCI Symposium 2007 (Lund, Sweden; September 2007).

## BOOK CHAPTER

R.M. Wagner, T.E. Briggs and J.P. Szybist (2015) "Exhaust Gas Energy Recovery" In D. Crolla, D.E. Foster, T. Kobayashi and N. Vaughan (Eds.) Encyclopedia of Automotive Engineering, John Wiley & Sons Ltd: Chichester, pp. 405-414. DOI: 10.1002/9781118354179.auto127.

## PUBLICATIONS

| Citation Indices* | All | Past 5 Years |
|---|---|---|
| Citations | 1605 | 1107 |
| h-index | 25 | 20 |
| i10-index | 46 | 40 |

**As of March 2, 2016*

### Journal Publications (peer reviewed)

1. D. Splitter, A. Pawlowski, R. Wagner, "A Historical Analysis of the Co-evolution of Gasoline Octane Number and Spark-Ignition Engines", Front. Mech. Eng. 1:16. doi: 10.3389/fmech.2015.00016, 2016.

2. A. Dempsey, S. Curran, R. Wagner, "A perspective on the range of gasoline compression ignition combustion strategies for high engine efficiency and low NOx & soot emissions: effects of in-cylinder fuel stratification", *International Journal of Engine Research*, currently available online before print, 2016.

3. A. Dempsey, S. Curran, R. Wagner, W. Cannella, "Effect of premixed fuel preparation for partially premixed combustion with a low octane gasoline on a light-duty multicylinder compression ignition engine", *J. Eng. Gas Turbines Power* 137(11), 111506, 2015.

4. T. Fansler, R. Wagner, "Cyclic dispersion in engine combustion – Introduction by special editors", Special Editor International Journal of Engine Research special issue on "Cyclic dispersion in engine combustion", April 2015 vol. 16 no. 3, 2015.

5. C. Finney, B. Kaul, S. Daw, R. Wagner, J. Green Jr., "Invited review: A review of deterministic effects in cyclic variability of internal combustion engines", invited submission to International Journal of Engine Research special issue on "Cyclic dispersion in engine combustion", International Journal of Engine Research April 2015 vol. 16 no. 3 366-378, 2015.

6. Z. Gao, S. Curran, J. Parks, D. Smith, R. Wagner, C. Daw, K. Edwards, J. Thomas, "Drive cycle simulation of high efficiency combustions on fuel economy and exhaust properties in light-duty vehicles", Applied Energy, ISSN 0306-2619, 2015.

7. C. Daw, C. Finney, B. Kaul, K. Edwards, R. Wagner, "Characterizing dilute combustion instabilities in a multi-cylinder spark-ignited engine using symbolic analysis", Phil. Trans. R. Soc. A, vol. 373, no. 2034,

2015. Invited submission to special issue on “Enhancing dynamical signatures of complex systems through symbolic computation".

8. S. Curran, R. Wagner, R. Graves, M. Keller, J. Green “Well-to-wheel analysis of direct and indirect use of natural gas in passenger vehicles,” *Energy*, Volume 75, Pages 194-203 doi: 10.1016/j.energy.2014.07.035, 2014.

9. B. Kaul, C. Finney, R. Wagner, and M. Edwards, "Effects of External EGR Loop on Cycle-to-Cycle Dynamics of Dilute SI Combustion," SAE Int. J. Engines 7(2):2014, doi:10.4271/2014-01-1236, 2014.

10. B. Kaul, R. Wagner, and J. Green Jr., "Analysis of Cyclic Variability of Heat Release for High-EGR GDI Engine Operation with Observations on Implications for Effective Control," *SAE International Journal of Engines*, **6**(1), doi: 10.4271/2013-01-0270, May 2013.

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