

CURRICULUM VITAE

Gaurav Mittal

Associate Professor
Department of Mechanical Engineering
ASEC 115, The University of Akron, Akron, OH
gaurav@uakron.edu; 330-972-8672

RESEARCH INTERESTS

Chemical kinetics of hydrocarbon fuels; alternative fuels; design of novel and well-characterized experimental facilities for combustion studies; autoignition at elevated pressures relevant to engines; reduced kinetic mechanisms for CFD simulations; CFD simulation of engines; flame phenomena.; laser diagnostics of combustion.

EDUCATION

Ph.D. Mechanical Engineering, 2006
Case Western Reserve University, Cleveland, Ohio
Specialization: Combustion
CGPA: 4.0 / 4.0

M.Tech. Computer Applications, 2001
Indian Institute of Technology, Delhi, India
CGPA: 7.79 / 10

B.Tech. (Hons) Mechanical Engineering, 1998
Indian Institute of Technology, Kharagpur, India
CGPA: 7.77 / 10

POSITIONS HELD

Associate Professor, August 2014 – Present
The University of Akron, Akron, OH

Assistant Professor, August 2008 – August 2014
The University of Akron, Akron, OH
Established and directed a High Pressure Combustion Laboratory for fundamental research in combustion.

Postdoctoral Research Associate, October 2005 – August 2008
Case Western Reserve University, Cleveland, Ohio
Supervised several projects and graduate students in the Combustion Diagnostics Laboratory under grants from DOD, DOE, NASA and NSF.

Graduate Engineering Trainee, August 1998 – January 1999
Engineers India Limited, Delhi, India

SERVICE ON UNIVERSITY/DEPARTMENTAL COMMITTEES

- Chair of the Departmental RTP (Reappointment, Tenure and Promotion) Committee, 2016
- Served on Mechanical Engineering Department Chair Search Committee, 2013
- Faculty adviser for SAE Formula Combustion Team at U. Akron.
- Review of Graduate student admission to ME.
- Undergraduate student advising for academic years 2011-present
- Adviser for new student orientations
- Student recruitment through high school visit days.

PROFESSIONAL ACTIVITIES

Principal Investigator on Funded Research

- ‘NSF-DOE Partnership on advanced combustion engines: Ignition and combustion characteristics of transportation fuels under lean-burn conditions for advanced engine concepts’, funded by Argonne National Lab, \$60,000, 4/2014-3/2015
- ‘A novel facility for studying flame propagation at elevated pressures and temperatures’, funded by National Science Foundation, \$155,400, 9/2010-8/2013
- NSF REU Supplement to ‘A novel facility for studying flame propagation at elevated pressures and temperatures’, \$12,500
- ‘In-situ production of high energy nanofuels by laser ablation’, NASA, \$35,000, 9/2012-9/2013.
- ‘Developing an improved Rapid Compression Machine’, funded by Argonne National Lab, \$50,000, 4/2011-7/2012
- ‘High pressure combustion facility for development and testing of advanced materials for aero-engines’, funded by Firestone Research Initiative, \$7,000, 6/2010-5/2011

Technical Review for Journals

- Combustion and Flame
- Proceedings of the Combustion Institute
- Fuel
- Energy and Fuel
- Combustion Science and Technology
- Flow, Turbulence and Combustion
- Journal of Applied Fluid Mechanics
- ASME Journal of Engineering for Gas Turbines and Power
- International Journal of Hydrogen Energy
- International Journal of Energy Research
- ASME Journal of Engineering for Gas Turbine and Power
- International Communications in Heat and Mass Transfer

Technical Conferences Session Chair

- 5th US Combustion Meeting of Combustion Institute, San Diego CA 2007
- 2008 Technical Meeting of the Central States Section of The Combustion Institute, Tuscaloosa AL
- 6th US National Combustion Meeting, Ann Arbor MI, 2009.

Professional Society Membership

- The Combustion Institute

Technical Reviews of Research Proposals

- Proposal review for the Petroleum Research Fund of the American Chemical Society
- NSF review panel of ‘Combustion, Fire and Plasma Division’, 2011. The panel reviewed and recommended from 18 proposals.
- NSF-DOE panel on Advanced Combustion Engines, 2012. The panel reviewed and recommended from 19 proposals.

Notable Invited Presentations

- “A Rapid Compression Machine for Chemical Kinetic Studies”, Presented at the Sandia National Lab of the US DOE, Livermore, CA, 2006.
- “Combustion Investigations Using a Rapid Compression Machine”, Argonne National Lab, September 2008, Invited presentation as part of ‘Bridging the Gap’ initiative at ANL
- “Experimental Facilities for Studying Combustion Characteristics of Practical Fuels at Elevated Pressures”, 2010 Annual Combustion Research Meeting of the US Department of Energy.
- “A Rapid Compression Machine with Crevice Containment”, presented at the Department of Energy (BES and EERE) meeting to identify a roadmap for DOE offices for RCM related research, August 2010.
- “High Pressure Combustion Research”, Babcock and Wilcox, Barberton, May 2011.

EDUCATIONAL AND SUPERVISORY ACTIVITIES

Courses Taught

UNIVERSITY OF AKRON, AKRON, OH

Undergraduate

4600: 301 Thermal Science
4600: 310 Fluid Mechanics I
4600: 300 Thermodynamics I
4600: 301 Thermodynamics II
4600: 315 Heat Transfer
4600: 484 ME Lab

4600: 486 Internal Combustion Engines (Special Topics)
4600: 486 Combustion (Special Topics)

Graduate

4600: 696 Internal Combustion Engines (Special Topics)
4600: 696 Combustion (Special Topics)

Graduate Students Research Supervision

Anil Bhari (MS, 2010) A rapid compression machine with the novel concept of crevice containment

Mickael Chomier (M.S., 2013) Effect of vortex roll-up and crevice mass flow on ignition in a rapid compression machine.

Varun Anthony Davies (M.S., 2014) Autoignition study of ethanol and n-heptane in a rapid compression machine

Michael Crawford (M.S., 2014) A computational study of mixing in jet stirred reactors.

Bhavya Sree Godavarthi (M.S., 2015) A computational study on the effect of injection strategy on emissions in a DME fueled CI engine.

Ragavendra Prasad Panakarajupally (M.S., 2016) Sensitivity and control of ethanol PPCI

Bikash Parajuli (Ph.D., 2016) Dimethyl ether : Laminar flame speed measurement in a novel dynamic combustion facility and autoignition at elevated pressures

Graduate Students Dissertation Committee

Jason Hartwig (MS, 2009)

Gavin Evezard (Ph.D., Univ of Cape Town, 2009)

Dipin Kalapurakal (MS, 2012)

Stefan Moldovan (Ph.D., 2013)

Vijay K. Cheeda (Ph.D., IIT Madras, 2016)

Ashkan Nazari (MS, 2016)

Other Supervisory Roles

Faculty adviser for SAE Formula Combustion Team at U. Akron.

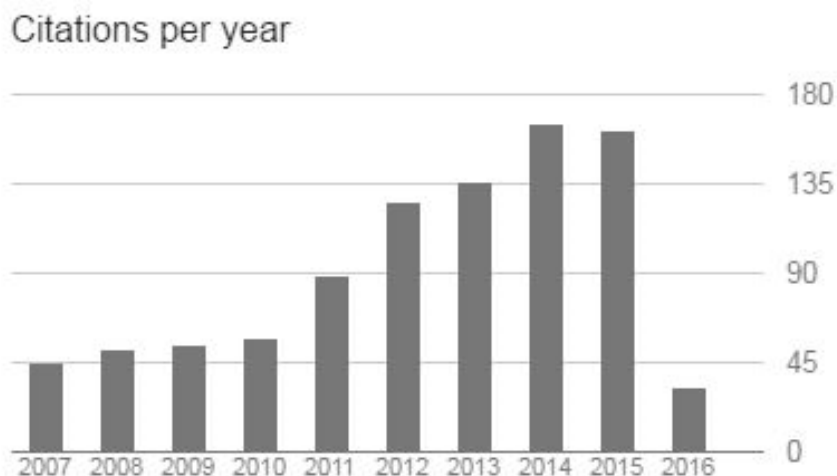
Mentored undergraduate students under the Tiered Mentoring Program at the University of Akron and NSF REU.

Mentored undergraduate senior design projects.

PUBLICATIONS

Citation report based on Google Scholar (accessed April 2016)

Citation indices	All	Since 2011
Citations	922	706
h-index	15	15
i10-index	19	19



Refereed Journal Publications

Impact factors reported are 5-Year Impact Factors, when available

1. Mittal, G.; Sung, C.J. (2006) Aerodynamics inside a rapid compression machine, Combust. Flame 145 (1-2), 160-180. **Times cited – 94, Impact Factor = 3.557**
2. Mittal, G.; Sung, C.J.; Yetter, R.A. (2006) Autoignition of H₂/CO at elevated pressures in a rapid compression machine, Int. J. Chem. Kin. 38, 516-529. **Times cited – 103, Impact Factor = 1.5**
3. Mittal, G.; Sung, C.J. (2007) A rapid compression machine for chemical kinetics studies at elevated pressures and temperatures, Combust. Sci. Tech. 179(3) 497-530. **Times cited – 109, Impact Factor = 1**
4. Mittal, G.; Sung, C.J.; Fairweather, M.; Tomlin, A.S.; Griffiths, J.F.; Hughes, K.J. (2007) Significance of the HO₂ + CO reaction during the combustion of CO + H₂ mixtures at high pressures, Proc. Combust. Inst. 31, 419-427. **Times cited – 67, Impact Factor = 2.622**

5. Mittal, G.; Sung, C.J. (2007) Autoignition of toluene and benzene at elevated pressures in a rapid compression machine, *Combust. Flame* 150, 355-368. **Times cited – 65, Impact Factor = 3.557**
6. Kumar, K.; Mittal, G.; Sung, C.J.; Law, C.K. (2008) Experiments on ethylene/O₂/diluent mixtures: Laminar flame speeds with preheat and ignition delays at high pressure, *Combust. Flame* 153 (3) 343-354. **Times cited – 52, Impact Factor = 3.557**
7. Mittal, G; Sung, C. J. (2008) Homogeneous charge compression ignition of binary fuel blends, *Combust. Flame* 155, 431- 439. **Times cited – 16, Impact Factor = 3.557**
8. Mittal, G.; Raju, M.P.; Sung, C. J. (2008) Computational fluid dynamics modeling of hydrogen ignition in a rapid compression machine, *Combust. Flame* 155, 417-428. **Times cited – 30, Impact Factor = 3.557**
9. Mittal, G; Chaos, M.; Sung, C. J.; Dryer, F.L. (2008) Dimethyl ether autoignition in a rapid compression machine: Experiments and chemical kinetic modeling, *Fuel Processing Technology* 89(12) 1244-1254. **Times cited – 76, Impact Factor = 4.031**
10. Mittal, G.; Sung, C.J. (2009) Autoignition of methylcyclohexane at elevated pressures, *Combust. Flame* 156, 1852-1855. **Times cited – 29, Impact Factor = 3.557**
11. Kumar, K.; Mittal, G.; Sung, C.J. (2009) Autoignition of n-decane under elevated pressure and low-to-intermediate temperature conditions, *Combust. Flame* 156, 1278-1288. **Times cited – 51, Impact Factor = 3.557**
12. Mittal, G.; Raju, M.P.; Sung, C. J. (2010) CFD modeling of two-stage ignition in a rapid compression machine: Assessment of zero-dimensional approach, *Combust. Flame* 157, 1316-1324. **Times cited – 25, Impact Factor = 3.557**
13. Allen, C.; Mittal, G.; Sung, C.J.; Toulson, E.; Lee, T. (2010) An aerosol rapid compression machine for studying energetic-nanoparticle-enhanced combustion of liquid fuels, *Proc. Combust. Inst.* 33, 3367-3374. **Times cited – 65, Impact Factor = 2.622**
14. Mittal, G.; Raju, M.P.; Bhari, A. (2011) A numerical assessment of the novel concept of crevice containment in a rapid compression machine, *Combust. Flame* 158, 2420-2427. **Times cited – 8, Impact Factor = 3.557**
15. Mittal, G.; Raju, M.P.; Sung, C.J. (2012) Vortex formation in a rapid compression machine: Influence of physical and operating parameters, *Fuel* 94, 409-417. **Times cited – 8, Impact Factor = 4.091**
16. Das, A.K.; Sung, C.J.; Zhang, Y; Mittal, G. (2012) Ignition delay study of moist hydrogen/oxidizer mixtures using a rapid compression machine, *International Journal of Hydrogen Energy* 37, 6901–6911. **Times cited – 27, Impact Factor = 3.659**

17. Mittal, G.; Gupta, S. (2012) Computational assessment of an approach for implementing crevice containment in rapid compression machines, *Fuel* 102, 536-544. **Times cited – 10, Impact Factor = 4.091**
18. Goldsborough, S.S.; Banyon, C.; Mittal, G. (2012) A computationally efficient, physics-based model for simulating heat loss during compression and the delay period in RCM experiments, *Combust. Flame* 159, 3476-3492. **Times cited – 12, Impact Factor = 3.557**
19. Goldsborough, S.S.; Mittal, G.; Banyon, C. (2013) Methodology to account for multi-stage ignition phenomena during simulations of RCM experiments, *Proc. Combust. Inst.* 34, 685-693. **Times cited – 10, Impact Factor = 2.622**
20. Mittal, G.; Bhari, A. (2013) A rapid compression machine with crevice containment, *Combust. Flame* 160, 2975-2981. **Times cited – 9, Impact Factor = 3.557**
21. Mittal, G.; Chomier, M. (2014) Interpretation of experimental data from rapid compression machines without creviced pistons, *Combust. Flame* 161, 75-83. **Times cited – 7, Impact Factor = 3.557**
22. Mittal, G.; Chomier, M. (2014) Effect of crevice mass transfer in a rapid compression machine, *Combust. Flame* 161, 398-404. **Times cited – 4, Impact Factor = 3.557**
23. Mittal, G.; Burke, S.M.; Davies, V.A.; Parajuli, B.; Metcalfe, W.; Curran, H.J. (2014) Autoignition of ethanol in a rapid compression machine, *Combust. Flame* 161, 1164-1171. **Times cited – 15, Impact Factor = 3.557**

Conference Papers and Presentations

1. Mittal, G.; Sung, C.J. (2004) A rapid compression machine for chemical kinetics studies at elevated temperature and pressure, *Proc. of the 2004 Technical Meeting of the Central State Section of the Combust. Inst.*
2. Mittal, G.; Sung, C.J. (2005) Characterization of temperature field inside a rapid compression machine. *Proc. of the 4th Joint Meeting of the US Sections of the Combust. Inst.*
3. Mittal, G.; Sung, C.J. (2006) Autoignition of toluene at elevated pressures in a rapid compression machine, *Proc. of the 2006 Technical Meeting of the Central States Section of the Combust. Inst.*
4. Mittal, G.; Sung, C.J. (2006) Experimental investigation of autoignition of toluene-isooctane blends, *Proc. of the 2006 Technical Meeting of the Central States Section of the Combust. Inst.*
5. Kumar, K.; Mittal, G.; Sung, C.J.; Law, C.K. (2006) An experimental and kinetic investigation on ethylene/O₂/diluent mixtures: Laminar flame speeds with preheat and high pressure autoignition, *Proc. of the 2006 Technical Meeting of the Central States Section of the Combust. Inst.*

6. Mittal, G.; Sung, C.J. (2007) Homogeneous charge compression ignition of binary blends relevant to gasoline surrogates, 5th US Combustion Meeting, San Diego.
7. Mittal, G.; Sung, C.J. (2007) Ignition of moist syngas in a rapid compression machine. 5th US Combustion Meeting, San Diego.
8. Kumar, K.; Mittal, G.; Sung, C.J. (2007) Autoignition of n-decane under high pressure conditions, 5th US Combustion Meeting, San Diego.
9. Mittal, G.; Raju, M.P.; Sung, C. J.; Kundu, K. (2007) A computational fluid dynamic study of a rapid compression machine, Eastern States Section of the Combustion Institute, Charlottesville, VA.
10. Mittal, G.; Chaos, M.; Sung, C. J.; Dryer, F.L. (2007) A rapid compression machine of dimethyl ether autoignition, Eastern States Section of the Combustion Institute, Charlottesville, VA.
11. Mittal, G.; Raju, M.P.; Sung, C. J. (2008) Assessment of zero-dimensional approach for modeling rapid compression machine experiments, 2008 Technical Meeting of The Central States Section of The Combustion Institute
12. Mittal, G.; Sung, C. J. (2008) An experimental study of autoignition of Methylcyclohexane, 2008 Technical Meeting of The Central States Section of The Combustion Institute.
13. Mittal, G.; Sung, C. J. (2008) Methylcyclohexane oxidation in a rapid compression machine, 32nd International Symposium on Combustion, Montreal, Canada.
14. Mittal, G.; Raju, M.P.; Sung, C. J. (2009) Assessment of zero-dimensional approach for modeling two-stage ignition in a rapid compression machine, Proc. of the 6th US National Combustion Meeting.
15. Das, A.K.; Sung, C.J.; Mittal, G. (2009) Ignition delay study of moist syngas mixtures using a rapid compression machine, Proc. Of the 6th US National Combustion Meeting.
16. Mittal, G.; Crawford, M. (2010) Computational fluid dynamics study of mixing inside a jet stirred reactor, 2010 Technical Meeting of The Central States Section of The Combustion Institute.
17. Goldsborough, S.S.; Banyon, C.; Mittal, G. (2011) A computationally efficient, physics-based model for heat loss during compression and the delay period in rapid compression machine experiments, 2011 US Combustion Meeting of the Combustion Institute, March 2011, Paper 2A07.
18. Goldsborough, S.S.; Mittal, G.; Banyon, C. (2011) Methodology to account for multi-stage ignition events during simulations of RCM experiments, 2011 Fall Technical Meeting of the Eastern States Section of the Combustion Institute, Univ. of Connecticut, Paper # A10.

19. Goldsborough, S.S.; Mittal, G.; Richardson, R. et al. (2012) Characterizing and understanding discrepancies between rapid compression machine experiments, Poster presentation at the 34th International Symposium on Combustion, Poland.
20. Mittal, G.; Chomier, M. (2013) On the interpretation of experimental data from rapid compression machines, 8th US National Combustion Meeting, Salt Lake City UT.
21. Mittal, G.; Parajuli, B.; Davies, V. (2013) An experimental facility for studying flame propagation at elevated pressures, 8th US National Combustion Meeting, Salt Lake City UT.
22. Mittal, G.; Davies, V.; Parajuli, B. (2013) Autoignition of ethanol in a rapid compression machine, 8th US National Combustion Meeting, Salt Lake City UT.
23. Gupta, S.; Parajuli, B.; Mittal, G.; Cung, K.; Johnson, J.; Lee, S.Y. ; Siuchta, G. (2014) RCM studies of DME ignition and combustion under highly diluent conditions, 6th International DME Conference. San Diego.
24. Parajuli, B.; Mittal, G.; Gupta, S.; Lee, S.Y. ; Cung, K. (2015) A rapid compression machine study of DME autoignition, 9th US National Combustion Meeting, Cincinnati.