Curriculum Vitæ

Somesh Prasad Roy
Updated June, 2019

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Academic Positions

Aug, 2016 –	**Assistant Professor** Department of Mechanical Engineering, Marquette University, Milwaukee, WI.
2014 – 2016	**Postdoctoral Scholar** PI: Prof. Michael Modest, University of California, Merced CA.

Education

2014	Ph. D., Mechanical Engineering with Graduate Minor in Computational Science, The Pennsylvania State University, University Park, PA. USA. 16802
2004	M. Tech, Thermal, Energy and Environmental Engineering Indian Institute of Technology, Kharagpur, INDIA. 721302
2004	B. Tech (Hons), Mechanical Engineering Indian Institute of Technology, Kharagpur, INDIA. 721302

Grants Awarded: External

March, 2018 – Feb, 2020	CRII:OAC: Novel techniques for improving convergence and scalability of a Monte Carlo radiation solver for large-scale combustion simulations. Agency: National Science Foundation (NSF) Amount: $190,951
Sept, 2018 – Sept, 2023	Connecting Experiments and Simulations while Designing Functionality into the Dynamic Behavior of Surrogate Energetic Systems. (as Co-PI) Agency: Air force Office of Scientific Research (AFOSR) Amount: $1,502,289 PI: Dr. John Borg

Teaching (at Marquette University)

Fall 2016 –	MEEN 3330: Fundamentals of Heat Transfer
Fall 2017, 2018	MEEN 3320: Fluid Mechanics
Spring 2018	MEEN 6391: Special Topics in Mechanical Engineering – Turbulent Combustion
Fall 2019	MEEN 6391: Special Topics in Mechanical Engineering – Numerical Methods in Heat and Fluid Flow

Publications: Peer-reviewed Journals

2019	A Detailed Modeling Study of Radiative Heat Transfer in a Heavy-duty Diesel Engine. C. Paul, S. Ferreyro-Fernandez, D. Haworth, **S. Roy**, and M. Modest. Combustion and Flame. 200 (2019). 325-341.
2018	Soot and Spectral Radiation Modeling for High-pressure Turbulent Spray Flames. S. Ferreyro-Fernandez, C. Paul, A. Sircar, A. Imren, D. Haworth, **S. Roy**, and M. Modest. Combustion and Flame. 190 (2018). 402-415.
2017	Monte Carlo Simulation for Radiative Transfer in a High-pressure Industrial Gas Turbine Combustion Chamber. Tao Ren, Michael F. Modest, and **Somesh P. Roy**. Journal of Engineering for Gas Turbines and Power. 140 (2017) 051503.
2017	Development of a Multiphase Photon Monte Carlo Method for Spray Combustion and Its Application in High-pressure Conditions. **Somesh P. Roy**, Jian Cai, and Michael F. Modest. International Journal of Heat and Mass Transfer. 115 (2017) 453-456
2017	Effect of Multiphase Radiation on Coal Combustion in a Pulverized Coal Jet Flame. Bifen Wu, **Somesh P. Roy**, Xinyu Zhao, and Michael F. Modest. Journal of Quantitative Spectroscopy and Radiative Transfer. 197 (2017) 154-165
2016	A Comparison of Specularly Reflective Boundary Conditions and Rotationally Invariant Formulations for Discrete Ordinate Methods in Axisymmetric Geometries. Jian Cai, **Somesh P. Roy**, and Michael F. Modest. Journal of Quantitative Spectroscopy and Radiative Transfer. 182 (2016), 75-86.
2016	A Systematic Comparison of Detailed Soot Models and Gas-phase Chemical Mechanisms in Laminar Premixed Flames. **Somesh P. Roy** and D. C. Haworth. Combustion Science and Technology. 188 (2016) 1021-1053.
2015	Development of High Order P_N Models for Radiative Heat Transfer in Special Geometries and Boundary Conditions. W. Ge, M. F. Modest, **S. P. Roy**. Journal of Quantitative Spectroscopy and Radiative Transfer. 172 (2015) 98-109.
2015	Dynamics of Flow–Soot Interaction in Wrinkled Nonpremixed Ethylene-Air Flames. P. G. Arias, V. R. Lecoustre, **S. P. Roy**, D. C. Haworth, H. G. Im, A. Trouvé. Combustion Theory and Modeling. 19 (2015), 568-586.
2014	Implementation of High Order Spherical Harmonics Methods for Radiative Heat Transfer on OpenFOAM. W. Ge, R. Marquez, M. F. Modest, **S. P. Roy**. Journal of Heat Transfer. 137 (2014), 052701.
2014	Development of High Fidelity Soot Aerosol Dynamics Models using Method of Moments with Interpolative Closure. **S. P. Roy**, P. G. Arias, V. R. Lecoustre, D. C. Haworth, H. G. Im, A. Trouvé. Aerosol Science and Technology. 48 (2014), 379-391.
2014	Direct Numerical Simulations of Non-premixed Ethylene-Air Flames: Local Flame Extinction Criterion. V. R. Lecoustre, P. G. Arias, **S. P. Roy**, H. G. Im, T. F. Lu, D. C. Haworth, A. Trouvé. Combustion and Flame. 161 (2014), 2933-2950

Publications: Peer-reviewed Conference Proceedings

June 2019	A Photon Monte Carlo Solver Utilizing a Low Discrepancy Sequence for Thermal Radiation in Combustion Systems. J. Farmer and **S. Roy**. Proceedings of the 9^{th} International Symposium on Radiative Transfer, RAD-19. June, 2019. Athens, Greece.

April 2019	An Efficient Monte Carlo-based Solver for Thermal Radiation in Participating Media. J. Farmer and **S. Roy**. 4th Thermal and Fluids Engineering Conference, TFEC - 2017. April, 2019. Las Vegas, NV, USA.
June 2017	Monte Carlo Simulation for Radiative Transfer in a High-pressure Industrial Gas Turbine Combustion Chamber. T. Ren, M. F. Modest, **S. Roy**. ASME 2017 Summer Heat Transfer Conference, SHTC - 2017. June, 2017. Bellevue, WA, USA.
May 2017	Application of High-order Spherical Harmonics Methods for Radiative Transfer in Simulation of a Turbulent Jet Flame. W. Ge, T. Ren, M. F. Modest, **S. Roy**, and D. C. Haworth. 7th ICHMT International Symposium on Advances in Computational Heat Transfer. May, 2017. Napoli, Italy.
June 2016	Multiphase Radiative Heat Transfer Calculations in High-pressure Spray Combustion. **S. P. Roy**, W. Ge, J. Cai, and M. F. Modest. 8th International Symposium on Radiative Transfer, RAD-16. June, 2016. Cappdocia, Turkey.
June 2016	Monte Carlo Modeling of Radiative Transfer in a Pulverized Coal Jet Flame. B. Wu, **S. P. Roy**, M.F. Modest, and X. Zhao. 8th International Symposium on Radiative Transfer, RAD-16. June, 2016. Cappdocia, Turkey.
May 2015	Photon Monte Carlo Method for Radiation Calculations in Spray Combustion. **S. P. Roy**, J. Cai, and M. F. Modest. 6th ICHMT International Symposium on Advances in Computational Heat Transfer. May, 2015. Piscataway, NJ, USA.
May 2015	Computational Cost and Accuracy Comparison of Radiation Solvers with Emphasis on Combustion Simulations. **S. P. Roy**, J. Cai, W. Ge, and M. F. Modest. 6th ICHMT International Symposium on Advances in Computational Heat Transfer. May, 2015. Piscataway, NJ, USA.

Other Conferences

May 2019	Effect of EGR and radiation on soot morphology in ECN Spray-A combustion chamber. K. M. Mukut and **S. P. Roy**. 17th International Conference on Numerical Combustion, NC19. May, 2019. Aachen, Germany.
March 2019	Detailed modeling of a small-scale turbulent pool fire. B. Wu, X. Zhao and **S. P. Roy**. 11th US National Combustion Meeting. March, 2019. Pasadena, CA, USA.
March 2019	An Investigation of Soot Evolution in High-pressure Spray Combustion. K. M. Mukut and **S. P. Roy**. 11th US National Combustion Meeting. March, 2019. Pasadena, CA, USA.
May 2018	A Sensitivity Study on Soot and NOx Formation in High Pressure Combustion System. K. M. Mukut and **S. P. Roy**. 2018 Spring Technical Meeting of Central States Section of the Combustion Institute. Minneapolis, MN, USA. May, 2018. Minneapolis, MN, USA.
April 2017	Soot and Spectral Radiation Modeling for a High-Pressure Turbulent Spray Flame. S. Ferreyro-Fernandez, C. Paul, A. Sircar, A. Imren, D. C. Haworth, **S. Roy**, M. F. Modest. 10th U. S. National Combustion Meeting. April, 2017. College Park, MD, USA.
April 2017	Modelling Radiative Heat Transfer and Turbulence-Radiation Interactions in Engines. C. Paul, A. Sircar, S. Ferreyro-Fernandez, A. Imren, D.C. Haworth, **S. Roy**, W. Ge, M.F. Modest. 10th U. S. National Combustion Meeting. April, 2017. College Park, MD, USA.

April 2017	Improvements to Photon Monte Carlo Radiation Solver for Combustion Simulations **S. Roy**, S. Weise, A. Gupta, M. Modest, C. Hasse, D. Haworth The 16^{th} International Conference on Numerical Combustion, Society for Industrial and Applied Mathematics. April, 2017. Orlando, USA.
April 2017	Radiative Heat Transfer Modelling in a Heavy-Duty Diesel Engine. C. Paul, A. Sircar, S. Ferreyro-Fernandez, A. Imren, D.C. Haworth, **S. Roy**, W. Ge, M.F. Modest. 16^{th} International Conference on Numerical Combustion, SIAM. April, 2017. Orlando, FL, USA.
April 2017	Turbulence Radiation Coupling in Boundary Layers of Heavy-duty Diesel Engines. A. Sircar, C. Paul, S. Ferreyro-Fernandez, A. Imren, D.C. Haworth, **S. Roy**, W. Ge, M.F. Modest. 16^{th} International Conference on Numerical Combustion, SIAM. April, 2017. Orlando, FL, USA.
April 2017	Soot and Spectral Radiation Modeling in ECN Spray A and in Engines. D.C. Haworth, S. Ferreryo-Fernandez, C. Paul, A. Sircar, A. Imren, **S.P Roy**, W. Ge, M.F. Modest. International Multidimensional Engine Modeling User's Group Meeting at the SAE Congress. April, 2017. Detroit, MI, USA. 2017
Nov 2016	Impact of nongray multiphase radiation in pulverized coal combustion. **S. Roy**, B. Wu, M. Modest, and X. Zhao. 69^{th} Annual Meeting of the American Physical Society–Division of Fluid Dynamics. November, 2016 Portland, OR, USA.
Nov 2016	Coupling Between Turbulent Boundary Layer and Radiative Heat Transfer Under Engine-Relevant Conditions. A. Sircar, C. Paul, S. Ferreyro-Fernandez, A. Imren, D.C. Haworth, **S. Roy**, W. Ge, M.F. Modest. 69^{th} Annual Meeting of the American Physical Society–Division of Fluid Dynamics. November, 2016 Portland, OR, USA.
Nov 2016	Radiation and Turbulence-Chemistry-Soot-Radiation Interactions in a High-Pressure Turbulent Spray Flame. S. Ferreyro-Fernandez, , C. Paul, A. Sircar, A. Imren, D. C. Haworth, **S. Roy**, M. F. Modest. 69^{th} Annual Meeting of the American Physical Society–Division of Fluid Dynamics. November, 2016 Portland, OR, USA.
Nov 2016	Radiative Heat Transfer and Turbulence-Radiation Interactions in a Heavy-Duty Diesel Engine. C. Paul, A. Sircar, S. Ferreyro-Fernandez, A. Imren, D.C. Haworth, **S. Roy**, W. Ge, M.F. Modest. 69^{th} Annual Meeting of the American Physical Society–Division of Fluid Dynamics. November, 2016 Portland, OR, USA.
March 2016	Radiative Heat Transfer and Turbulence-Radiation Interactions in a Heavy-Duty Diesel Engine. C. Paul, A. Sircar, A. Imren, S. Ferreyro-Fernandez, **S.P Roy**, W. Ge, D.C. Haworth, M.F. Modest. 2016 Spring Technical Meeting of Eastern States Section of the Combustion Institute. March, 2016. Princeton, NJ, USA.
March 2016	A computational study of radiative heat transfer in pulverized coal jet flame. B. Wu, **S. P. Roy**, M.F. Modest, and X. Zhao. 2016 Spring Technical Meeting of Eastern States Section of the Combustion Institute. March, 2016. Princeton, NJ, USA.
May 2015	Radiative Heat Transfer Under Engine-Relevant Conditions. **S. P. Roy**, J. Cai, W. Ge, S. Ferreyro-Fernandez, A. Sircar, D.C. Haworth and M.F. Modest. 9^{th} U.S. National Combustion Meeting. May, 2015. Cincinnati, USA.
April 2015	Modeling Radiative Heat Transfer in Engines. D.C. Haworth, **S.P Roy**, J. Cai, A. Sircar, A. Imren, M.F. Modest. International Multidimensional Engine Modeling User's Group Meeting at the SAE Congress. April, 2015. Detroit, MI.
Nov 2013	A Study of Turbulence-Chemistry-Soot-Radiation Interaction in Luminous Turbulent Jet Flames. **Somesh P. Roy** and D. C. Haworth. 66^{th} Annual Meeting of the American Physical Society–Division of Fluid Dynamics. November, 2013. Pittsburgh, USA.

June 2013	High-Fidelity Simulations of Sooting Diffusion Flames Using the Method of Moments with Interpolative Closure. P.G. Arias, **S. Roy**, V. Lecoustre, H.G. Im, D. Haworth, A. Trouvé, Z. Luo, T. F. Lu. 6th European Combustion Meeting. June, 2013. Lund, Sweden.
May 2013	Direct Numerical Simulations of Diffusion Flame Extinction at Different Pressures. Vivien R. Lecoustre, Paul G. Arias, **Somesh Roy**, Z. Luo, Dan C. Haworth, Hong G. Im, Tianfeng F. Lu, Arnaud Trouvé. 8th U.S. National Combustion Meeting. May, 2013. Salt Lake City, USA.
Aug 2013	Computational Diagnostics of Wrinkled Nonpremixed Flame Extinction at Different Pressures. V. R. Lecoustre, P. G. Arias, **S. P. Roy**, H. G. Im, T. F. Lu, D. C. Haworth, A. Trouvé. 7th International Symposium on Scale Modeling (ISSM7). August, 2013. Hirosaki, Japan.
April 2013	An Assessment of Gas-Phase Mechanisms in Sooting Laminar Premixed Ethylene Flames using a Discrete Sectional Method. **Somesh P. Roy** and D. C. Haworth. 14th International Conference on Numerical Combustion, Society for Industrial and Applied Mathematics. April, 2013. San Antonio, USA.
April 2013	A Computational Study of Turbulent Nonpremixed Sooting Flames using a High Order Method of Moments. P.G. Arias, V.R. Lecoustre, **S. Roy**, W. Wang, Z. Luo, D.C. Haworth, H.G. Im, T.F. Lu, K.L. Ma, R. Sankaran, A. Trouvé. 14th International Conference on Numerical Combustion, Society for Industrial and Applied Mathematics. April, 2013. San Antonio, USA.
April 2013	Simulations of Axisymmetric Coflow Laminar Diffusion Flames. A. Dasgupta, **S.P. Roy**, and D.C. Haworth. 14th International Conference on Numerical Combustion, Society for Industrial and Applied Mathematics. April, 2013. San Antonio, USA.
March 2011	An Assessment of Gas-Phase Mechanisms in Sooting Laminar Premixed Ethylene Flames using a Discrete Sectional Method. **Somesh P. Roy** and D. C. Haworth. 7th U.S. National Combustion Meeting. March, 2011. Atlanta, USA.
March 2011	Direct Numerical Simulation of Temporally Evolving Luminous Jet Flames with Detailed Fuel and Soot Chemistry. P.G. Arias, V.R. Lecoustre, **S. Roy**, W. Wang, Z. Luo, D.C. Haworth, H.G. Im, T.F. Lu, K.L. Ma, R. Sankaran, A. Trouvé. 7th U.S. National Combustion Meeting. March, 2011. Atlanta, USA.
May 2009	Soot Modeling in Laminar Flames using a Discrete Sectional Method. **Somesh P. Roy**, R. S. Mehta, and D. C. Haworth. 6th U.S. National Combustion Meeting. May, 2009. Ann Arbor, USA.