

P. (GOKUL) GOKULAKRISHNAN, Ph.D.

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EDUCATION:

NSERC Post-doctoral Fellow, 2003, Mechanical & Aerospace Engineering, Princeton University.

Ph.D., 2002, Chemical Engineering, Queen's University.

M.Sc.(Eng.), 1997, Chemical Engineering, Queen's University.

B.Sc.(Eng.), 1994, Chemical Engineering, University of Moratuwa.

THESIS:

Doctoral Research Project: The Chemistry of Product Gas Entrainment in Low-NO_x, Multi-Jet, Natural-Gas Burners (*experimental & numerical*)

Masters' Research Project: The Effect of Chlorine on the Formation of Nitrogen Oxides in a Fluidized Bed Combustor (*experimental*)

PROFESSIONAL EXPERIENCE:

Senior Engineer, Combustion Science & Engineering, Inc., Dec. 2003 to present.

Areas of Interest: Experimental and Numerical Combustion, Reaction Engineering, and Transport Phenomena; Detailed Chemical Kinetic Models for practical Fuels such as Gasoline, Kerosene and Jet Fuels; Reduced Kinetic Models for CFD Simulation in Gas Turbine Applications; Reactive Flow Simulation of Supersonic Combustion; and Modeling Multi-Phase Coal Gasification and Combustion. Responsible for developing reduced kinetic mechanisms for methane and heavy-hydrocarbons. Also, responsible for developing experimental techniques and instrumentation for combustion related projects.

Visiting Research Fellow, Princeton University Dept. of Mechanical & Aerospace Eng, July 2002 – Dec. 2003.

Responsible for developing a reduced kinetic model to predict the engine performance by validating the model predictions against the experimental data obtained in a high-pressure flow reactor. The research project includes experimental and modeling study of the oxidation of gasoline and its surrogate mixtures pertaining to the operating conditions of an internal combustion engine (*proprietary research for Honda, Japan*).

Graduate Research Assistant, Queen's University, Dept. of Chemical Engineering, Jan. 1995 – May 2002.

Responsible for building laboratory-scale flow reactor and sampling system to perform experiments to study the effect of product gas entrainment on NO_x formation in a low-NO_x burner. Implemented a six-factor, two-level fractional factorial experimental design to identify significant variables. Developed reduced kinetic mechanism for methane oxidation using Principal Component Analysis (PCA).

PROFESSIONAL STANDING:

Member, American Institute of Aeronautics and Astronautics (AIAA)
Member, American Institute of Chemical Engineers (AIChE)
Member, American Society for Mechanical Engineers (ASME)

SELECTED PUBLICATIONS:

Refereed Journals

- Gokulakrishnan, P., McLellan, P. J., Lawrence, A. D. and Grandmaison, E. W. (2005), Kinetic Analysis and Model Reduction of NO-Sensitized Methane Oxidation, *Chemical Engineering Science*, **60**, pp.3683–3692.
- Gokulakrishnan, P., McLellan, P. J., Lawrence, A. D. and Grandmaison, E. W. (2004), Application of Functional-PCA to Analyze and Reduce Complicated Chemical Mechanisms, *Computers and Chemical Engineering*, accepted.
- Gokulakrishnan, P. and Lawrence, A. D. (1999), An Experimental Study of the Inhibiting Effect of Chlorine in a Fluidized Bed Combustor, *Combustion and Flame*, **116**, 640–652
- Lawrence, A. D., Bu, J. and Gokulakrishnan, P. (1999), The Interaction between SO₂, NO_x, HCl and Ca in a Bench-Scale Fluidized Combustor, *Journal of the Institute of Energy*, **72**, 34–40

Refereed Conference Proceedings

- Gokulakrishnan, P., Kwon, S., Hamer, A. J., Klassen, M. S. and Roby, R. J. (2006), Reduced Kinetic Mechanism for Reactive Flow Simulation of Syngas/Methane Combustion at Gas Turbine Conditions, ASME Turbo-Expo, Paper# GT2006-90573.
- Gokulakrishnan, P., Klassen, M. S. and Roby, R. J. (2005), Development of Detailed Kinetic Mechanism to Study Low Temperature Ignition Phenomenon of Kerosene, ASME Turbo-Expo, Paper #GT2005-68268.
- Lawrence, A. D., Bu, J. and Gokulakrishnan, P. (1999), The Combined Effect of Calcium-based Solids and Hydrogen Chloride on Nitric Oxide and Sulphur Dioxide Emissions from a Bench-scale Fluidized Bed Combustor, ASME 15th International Conference on Fluidized Bed Combustion, Reno, Nevada.
- Gokulakrishnan, P. and Lawrence, A. D. (1997), A Detailed Study of the Role of Halogens in the Inhibition of Nitrogen Oxide Formation in Fluidized Bed Incinerators, ASME 14th International Conference on Fluidized Bed Combustion, Vancouver, British Columbia.