

# Maruthi Devarakonda

902 Battelle Boulevard, P.O. Box 999, Richland, WA 99352  
Tel: +1(906)370-9427 Email: maruthi.devarakonda@pnnl.gov

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## EDUCATION

- Michigan Technological University, Houghton, MI, USA** 2003-2007  
*Doctor of Philosophy in Mechanical Engineering*  
**Dissertation:** Dynamic Modeling, Simulation and Development of Model Based Control Strategies in a Urea-SCR Aftertreatment System in Heavy Duty Diesel Engines  
*Advised by Dr. Gordon Parker, Dr. John H. Johnson*
- University of Toledo, Toledo, OH, USA** 2001-2003  
*Master of Science in Mechanical Engineering*  
**Research Project:** Engine Instrumentation System Development for a McMaster Engine
- K. L. College of Engineering (KLCE), Guntur, India** 1996-2000  
*Bachelor of Technology in Mechanical Engineering*

## PROFESSIONAL EXPERIENCE

*Pacific Northwest National Laboratory, Richland, WA, USA*  
*US Department of Energy*  
04/2008 - Present; Staff Member, Energy and Efficiency Division, Energy and Environment Directorate

- Project Manager at PNNL for a university-lead emissions control project with objectives of (a) Bulk property prediction based on fundamental characterization of particulate matter in diesel particulate filters and (b) Optimal control strategy development in diesel particulate filters and NO<sub>x</sub> reduction catalysts for better fuel economy in heavy duty diesel engines.
- Modeling lead for various emission control projects. Developed device-level models for oxidation catalysts, particulate filters and NO<sub>x</sub> reduction catalysts for kinetics characterization and analysis. A key contributor to annual operating plans (AOP), annual progress reports and presentations for Advanced Combustion and Emission Control program at DOE-Vehicle Technologies.
- Systems modeling lead for various hydrogen storage and fuel cell projects. Developed systems models and simulation tools for various chemical hydride architectures for hydrogen storage on-board fuel cells. A key contributor to annual operating plans (AOP), annual progress reports and presentations for Hydrogen Storage Engineering Center of Excellence (HSECoE) at the DOE-Hydrogen and Fuel Cell Technologies.
- Authored proposals and concept papers for (a) Integrated thermal storage with waste heat recovery for buildings technologies and (b) Waste heat recovery in vehicles for improving the engine/fuel efficiency.

## RESEARCH EXPERIENCE

- *Pacific Northwest National Laboratory, Richland, WA*  
04/2008 - 12/2009; Post Doctoral Research Fellow, Energy and Environment Directorate.
- *Michigan Technological University, Houghton, MI*

01/2006 - 03/2008; Graduate Research Assistant., Mechanical Engineering - Engineering Mechanics Department

- *Navistar Inc, Melrose Park, IL*  
05/2005 - 09/2005; Summer Intern/Research Contractor, Advanced Aftertreatment Technologies

## **JOURNAL ARTICLES**

1. Devarakonda, M.N., Brooks, K.P., and Holladay, J.D., "A Solvated Ammonia Borane Model for Chemical Hydrogen Storage in Fuel Cell Applications", ASME Journal of Fuel Cell Science and Technology, (Submitted).
2. Brooks, K.P., Devarakonda, M.N., Rassat, S.D., and Holladay, J.D., "Systems Modeling of Chemical Hydride Hydrogen Storage Materials for Fuel Cell Applications", ASME Journal of Fuel Cell Science and Technology, 8(6), December 2011, 061021.
3. Devarakonda, M.N., Brooks, K.P., Ronnebro, E.C., and Rassat, S.D., "Systems Modeling, Simulation and Material Operating Requirements for Chemical Hydride Based Hydrogen Storage", International Journal of Hydrogen Energy, Special Issue on Hydrogen Storage, 2011 (Accepted, In Press).
4. Devarakonda, M.N., Tonkyn, R.G., Tran, D.N., Lee, J.H., and Herling, D.R., "Modeling Species Inhibition of NO Oxidation in Urea-SCR Catalysts for Diesel Engine NOx Control", ASME Journal of Engineering for Gas Turbines and Power, 133(9), September 2011, 092805.
5. Devarakonda, M.N., Holladay, J.D., Brooks, K.P., Rassat, S.D., and Herling, D.R., "Dynamic Modeling and Simulation Based Analysis of an Ammonia Borane (AB) Reactor System for Hydrogen Storage", ECS Transactions, 33(1), pp. 1959-1972, 2010.
6. Devarakonda, M.N., Parker, G.G., Johnson, J.H., and Strots, V.O., "Model Based Control System Design in a Urea-SCR Aftertreatment System Based on NH3 Sensor Feedback", International Journal of Automotive Technology, 10(6):653-662, 2009.
7. Devarakonda, M.N., Parker, G.G., Johnson, J.H., Strots, V.O., and Santhanam, S., "Model Based Estimation and Control System Development for a Urea-SCR Aftertreatment System", SAE International Journal of Fuels and Lubricants, 1(1):646-661, 2008.

## **CONFERENCE PROCEEDINGS**

1. Devarakonda, M.N., Tonkyn, R., and Lee, J.H., "Modeling Competitive Adsorption and Inhibition over Fe-Zn SCR Catalyst", Proceedings of SAE World Congress, 2012, 12PFL-0117 (Accepted).
2. Devarakonda, M.N., Brooks, K.P., Rassat, S.D., Ronnebro, E., and Holladay, J.D., "Chemical Hydrides for Hydrogen Storage in Fuel Cell Applications", Proceedings of SAE World Congress, 2012, 12PFL-0940 (Accepted).
3. Surenahalli, H.S., Parker, G.G., Johnson, J.H., and Devarakonda, M.N., "A Kalman Filter Estimator for a Diesel Oxidation Catalyst During CPF Active Regeneration", Proceedings of American Control Conference, 2012, (Review).
4. Devarakonda, M.N., Tonkyn, R., Tran, D., Lee, J.H., and Herling, D., "Modeling Competitive Adsorption for Effective NOx Control in Heavy Duty Diesel Engines", Proceedings of ASME-International Mechanical Engineering Congress and Exposition, IMECE 2010-39977, 2010.
5. Ronnebro, E., Devarakonda, M.N., Brooks, K.P., Rassat, S., and Herling, D., "Dynamic Modeling and Simulation of Ammonia Borane Hydrogen Storage Systems", Proceedings of AIChE Annual Meeting, 2010.
6. Devarakonda, M.N., Tonkyn, R., Tran, D., Lee, J.H., and Herling, D., "Modeling Species Inhibition of NO Oxidation in Urea-SCR Catalysts for Diesel Engine NOx Control", Proceedings of ASME-ICE Fall Technical Conference, ICEF2010-35054, 2010.
7. Brooks, K.P., Devarakonda, M.N., Rassat, S., King, D.A., and Herling, D., "Systems Modeling of

- Ammonia Borane Bead Reactor for Off-Board Regenerable Hydrogen Storage in PEM Fuel Cell Applications”, Proceedings of ASME 2010 Eighth International Fuel Cell Science, Engineering and Technology Conference, FuelCell2010- 33272, 2010.
8. Devarakonda, M.N., Tonkyn, R., and Herling, D., “Hydrocarbon Effect in a Urea-SCR Catalyst: An Experimental and Modeling Study”, SAE 2010-01-1171, Proceedings of SAE World Congress: Diesel Exhaust Emission Control, SP 2287., 2010.
  9. Devarakonda, M.N., Parker, G., Johnson J., Strots, V., and Santhanam, S., “Model Based Estimation and Control System Development for a Urea-SCR Aftertreatment System”, Proceedings of SAE World Congress: Diesel Exhaust Emission Control, SP 2154, pp 585-600, 2008.
  10. Devarakonda, M.N., Parker, G., Johnson, J., Strots, V., and Santhanam, S., “Adequacy of Reduced Order Models for Model Based Control in a Urea-SCR Aftertreatment System”, Proceedings of SAE World Congress: Diesel Exhaust Emission Control Modeling, SP 2155, pp 141-161, 2008.
  11. Parker, G., Agostini, M., Devarakonda, M.N., and Zenner, P., “Development of a Remote Control Systems Laboratory”, Proceedings of ASEE Annual Conference, Session 2166, pp 1-9, 2004.

#### **INVENTION DISCLOSURE**

- “Variable Concentration Slurry Reactor System” - Kriston Brooks, Scot Rassat, Jamie Holladay, Darrell Herling and **Maruthi Devarakonda**, Invention Disclosure filed with United States Patents and Trademark Office (USPTO), 2010.
- “A Control Strategy for NO<sub>x</sub> and NH<sub>3</sub> Reduction in Urea-SCR Aftertreatment Systems” - **Maruthi Devarakonda**, Gordon Parker and John Johnson, US Patent filed with United States Patents and Trademark Office (USPTO), US 2009/0133384A1, May 28th 2009.

#### **AWARDS**

- Outstanding Performance Award, Pacific Northwest National Laboratory, February 2011.
- Best Abstract Award, Graduate School Poster Competition, Michigan Tech University, Houghton, MI, 2004
- Outstanding Teaching Assistant Award, University of Toledo, Toledo, OH, 2003.

#### **HONORS AND RECOGNITION**

- Book Editor, Nova Publishers, Hauppauge, NY., 2011.
- Editorial Board, International Journal of Vehicle Systems Modeling and Testing, Inderscience Publishers, UK, 2011-.
- Associate Editor, SAE International Journal of Engines, 2010-.
- Invited Section Delegate, ASME-Leadership Training Conference, Dallas, TX., March 3-6 2011.
- Early Career Panelist, ASME Student Leadership Summit, 2010, 2011.
- Biography listed in Marquis Who’s Who in America - 2009-2011.

#### **PROFESSIONAL SERVICE**

- Track Organizer - Smart Grid, Micro-grid Concepts and Energy Storage, Thermodynamics and Thermo-economics of Energy Systems, ASME International Conference on Energy Sustainability, August 2011.
- Topic Organizer-ASME International Mechanical Engineering Congress and Exposition (IMECE2010, IMECE 2011-Advanced Combustion and Emission Control Track).
- Session Chair - CLEERS 2011, ESFuelCell 2011 (Hydrogen Storage), IMECE 2010 (Energy Systems and Environment), ICEF 2010, 2011 (Emission Control, Instrumentation, Controls

and Hybrids), ICES 2012 (Instrumentation, Controls and Hybrids), SAE World Congress 2010, 2011, 2012 (Emission Control Modeling), JSAE 2011 (Instrumentation and Controls).

- Technical Reviewer - Journal of Physical Chemistry, International Journal of Hydrogen Energy, Applied Catalysis B: Environmental, Industrial and Engineering Chemistry Research, Catalysis Letters, AIChE Journal, Journal of Automobile Engineering (IMEchE, Part D), Journal of Aerospace Engineering (IMEchE, Part G), International Journal of Control, Journal of Renewable and Sustainable Energy, ASME & SAE conferences.
- Technical Reviewer - Laboratory Directed Research and Development (LDRD) Programs, Pacific Northwest National Laboratory.
- Organizing Committee - Annual Post Doc Poster Session, Pacific Northwest National Laboratory, 2009-.