RESUME

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Academic Qualifications

B.Tech: University College of Engineering, JNTU Kakinada, AP, 2005
M.Tech: Indian Institute of Technology Kanpur, India, 2008
Ph.D: Indian Institute of Technology Bombay, India, 2013

Professional Experience

May 2019 – Present: Asst. Prof., Department of Mechanical Engineering, IIT Kharagpur, India.
June 2017 – May 2019: Visiting Faculty, School of Energy Science & Engineering, IIT Kharagpur, India.
Jan 2017 – June 2017: Assistant Professor, PDPU, Gandhinagar, Gujarat, India.
October 2013 – December 2016: Post-Doctoral Fellow, CCRC, KAUST, Saudi Arabia.
March 2013 – October 2013: Research associate, IIT Bombay, Mumbai, India.
June 2008 – December 2008: Assistant Manager Trainee, NMSEZ, Mumbai, India.

Awards and Achievements

- **Excellence in Ph.D. thesis award- IIT Bombay 2014**
- **MIT TR 35** India – 2012 Young Innovator award (flameless combustion with liquid fuels)
- **6th ENERTIA Award 2012**- India's Award for Sustainable Energy & Power
- **Travel Award – Combustion Institute** for 34th International Symposium on Combustion

Areas of Research

Flameless/MILD combustion with liquid fuels; Emission Control; Heat Exchanger design; Chemical Kinetics; Auto ignition; Heavy Fuel Oil combustion; Low emission combustion with biodiesel; Numerical modelling; Spray formation and Analysis; Ammonia and Hydrogen combustion

Teaching Experience

ME60232: Theory of Combustion and Emissions (UG & PG Elective)
ME30005: Heat Transfer (UG 3rd Year)
ME21202: Basic Thermodynamics (UG 2nd Year)
CE13003: Engineering Drawing and Computer Graphics (UG 1st Year)

List of publications

International Journals:

[1]. Sharma, D., Lee, B. J., Dash, S. K., & **Reddy, V. M.** (2023). Experimental and numerical investigation on ultra-high intensity premixed LPG-air combustion in a novel porous stack burner. ***Energy***, 127148.

[2]. Vijrumbana, Y., Singh, A. S., Vakamalla, T. R., & **Reddy, V. M.** (2023). A Chemical Kinetic Analysis: Influence of post-flame chemistry, combustion pressure, premixing degree (fully premixed to non-premixed), and secondary air supply on NOx emissions from NH3/CH4-air combustion. ***Thermal Science and Engineering Progress***, 101750.

[3]. Sharma, D., Garnayak, S., Bandopadhyay, A., Dash, S. K., & **Vanteru, M. R.** (2023). Influence of jet velocity and heat recuperation on the flame stabilization in a non-premixed mesoscale combustor: An exergetic approach. ***Physics of Fluids***, *35*(2), 025110.

[4]. Garnayak, S., Sharma, D., Dash, S. K., & **Reddy, V. M.** (2023). Numerical and Chemical Kinetic Analyses on the Formation of CO and CO2 for C1–C4 Hydrocarbon Alkanes in a Hot Co-Flow under MILD Combustion. ***Energy & Fuels.***

[5]. Singh, A. S., Sharma, D., Dash, S. K., & **Reddy, V. M**. Effect of Intermediate Radical on NOx and De-NOx Characteristics of NH3/H2/Air Flames at High Pressure. ***Chemical Engineering & Technology***. (Accepted)

[6]. Vijrumbana, Y., Singh, A. S., Lee, B. J., & **Reddy, V. M.** (2023). Chemical kinetic analysis to study the potential of fuel staging in reducing the emissions from NH3/CH4-air combustion at different pressures. ***Fuel***, *339*, 127404.

[7]. Mohapatra, S., Alsulami, R., Karmakar, S., Dash, S. K., & **Reddy, V. M.** (2022). Experimental and Computational Investigation upon Combustion Characteristics of Liquid Fuel in a Novel Combustor with Hybrid Swirl and Recirculation Bowl. ***ACS omega***.

[8]. Garnayak, S., Pasha, A. A., Alsulami, R., Nemitallah, M. A., Jameel, A. G. A., Dash, S. K., & **Reddy, V. M.** (2022). Numerical investigation to evaluate the effects of gravity and pressure on flame structure and soot formation of turbulent non-premixed methane-air flame. ***Propulsion and Power Research***.

[9]. Singh, A. S., Jameel, A. G. A., Dash, S. K., & **Reddy, V. M.** (2022). Numerical analysis on influence of hydrogen peroxide (H2O2) addition on the combustion and emissions characteristics of NH3/CH4-air (O2/N2)/H2O2 mixture. ***International Journal of Hydrogen Energy***, *47*(87), 37052-37071.

[10]. Devi, K., Hanmaiahgari, P. R., Balachandar, R., & **Vanteru, M. R.** (2022). Reynolds number and submergence ratio effects on turbulence structures in the shallow wake of a horizontal pipe located on a rough bed. ***Physics of Fluids***, *34*(9), 095122.

[11]. Singh, A. S., Dash, S. K., & **Reddy, V. M.** (2022). Chemical kinetic analysis on influence of hydrogen enrichment on the combustion characteristics of ammonia air using newly proposed reaction model. ***International Journal of Energy Research***, *46*(5), 6144-6163.

[12]. Aljaman, B., Ahmed, U., Zahid, U., **Reddy, V. M.**, Sarathy, S. M., & Jameel, A. G. A. (2022). A comprehensive neural network model for predicting flash point of oxygenated fuels using a functional group approach. ***Fuel***, *317*, 123428.

[13]. Mohapatra, S., Mohapatro, M. B. R., Pasha, A. A., Alsulami, R. A., Dash, S. K., & **Reddy, V. M.** (2022). Adaptability of different mechanisms and kinetic study of methane combustion in steam diluted environments. ***Scientific Reports***, *12*(1), 1-19.

[14]. Sharma, D., Singh, A. S., Alsulami, R., Lee, B. J., Dash, S. K., & **Reddy, V. M.** (2022). Numerical investigations on tri-fuel chemical kinetics of hydrogen+ Methane+ LPG/air mixtures using reduced skeletal mechanism. ***International Journal of Hydrogen Energy***, *47*(54), 23038-23059.

[15]. Soni, N., Sharma, D., Nimesh, V., & **Reddy, V. M.** (2022). Solar energy assisted thermal treatment model to decontaminate airborne viruses in hospital. ***Thermal Science and Engineering Progress***, *36*, 101516.

[16]. Soni, N., Hanmaiahgari, P. R., & **Reddy, V. M.** (2022). Novel thermal treatment model to decontaminate airborne SARS Cov-2 virus for residential and commercial buildings. ***Heat Transfer***, *51*(6), 5996-6026.

[17]. Qasem, M. A. A., van Oudenhoven, V. C., Pasha, A. A., Pillai, S. N., **Reddy, V. M.**, Ahmed, U., ... & Jameel, A. G. A. (2022). A machine learning model for predicting threshold sooting index (TSI) of fuels containing alcohols and ethers. ***Fuel***, *322*, 123941.

[18]. Reddy, M. P., Singh, A. S., **Reddy, V. M.**, Elwardany, A., & Reddy, H. (2022). Computational analysis of influence of particle size, oxygen concertation, and furnace temperature on the ignition characteristics of pulverized high ash and high moisture coal particle. ***Alexandria Engineering Journal***, *61*(8), 6169-6180.

[19]. Mohapatra, S., Garnayak, S., Lee, B. J., Elbaz, A. M., Roberts, W. L., Dash, S. K., & **Reddy, V. M.** (2021). Numerical and chemical kinetic analysis to evaluate the effect of steam dilution and pressure on combustion of n-dodecane in a swirling flow environment. ***Fuel***, *288*, 119710.

[20]. Soni, N., Sharma, D., Rahman, M. M., Hanmaiahgari, P. R., & **Reddy, V. M.** (2021). Mathematical modeling of solar energy based thermal energy storage for house heating in winter. ***Journal of Energy Storage***, *34*, 102203.

[21]. Singh, A. S., Mohapatra, S., Boyapati, R., Elbaz, A. M., Dash, S. K., Roberts, W. L., & **Reddy, V. M.** (2021). Chemical kinetic modeling of the autoignition properties of ammonia at low–intermediate temperature and high pressure using a newly proposed reaction mechanism. ***Energy & Fuels***, *35*(16), 13506-13522.

[22]. Garnayak, S., Mohapatra, S., Dash, S. K., Lee, B. J., & **Reddy, V. M.** (2021). Effect of the Preheated Oxidizer Temperature on Soot Formation and Flame Structure in Turbulent Methane-Air Diffusion Flames at 1 and 3 atm: A CFD Investigation. ***Energies***, *14*(12), 3671.

[23]. Garnayak, S., Elbaz, A. M., Kuti, O., Dash, S. K., Roberts, W. L., & **Reddy, V. M.** (2022). Auto-ignition and numerical analysis on high-pressure combustion of premixed methane-air mixtures in highly preheated and diluted environment. ***Combustion Science and Technology***, *194*(15), 3132-3154.

[24]. Nimesh, V., Kumari, R., Soni, N., Goswami, A. K., & **Reddy, V. M.** (2021). Implication viability assessment of electric vehicles for different regions: An approach of life cycle assessment considering exergy analysis and battery degradation. ***Energy Conversion and Management***, *237*, 114104.

[25]. Sharma, D., Mahapatra, S., Garnayak, S., Arghode, V. K., Bandopadhyay, A., Dash, S. K., & **Reddy, V. M.** (2020). Development of the Reduced Chemical Kinetic Mechanism for Combustion of H2/CO/C1–C4 Hydrocarbons. ***Energy & Fuels***, *35*(1), 718-742.

[26]. Nimesh, V., Sharma, D., **Reddy, V. M.**, & Goswami, A. K. (2020). Implication viability assessment of shift to electric vehicles for present power generation scenario of India. ***Energy***, *195*, 116976.

[27]. Mohapatra, S., Nehe, P., Dash, S. K., & **Vanteru, M. R.** (2019). Numerical analysis of lifted spray flames in various coflow conditions. ***Combustion Science and Technology***.

[28]. Sreekireddy, P., Reddy, T. K. K., Selvaraj, P., **Reddy, V. M.**, & Lee, B. J. (2019). Analysis of active cooling panels in a scramjet combustor considering the thermal cracking of hydrocarbon fuel. ***Applied Thermal Engineering***, *147*, 231-241.

[29]. Shantanu, M., **Reddy, V. M.**, & Karmakar, S. (2018). Experimental and numerical studies on heat recirculated high intensity meso-scale combustor for mini gas turbine applications. ***Energy Conversion and Management***, *176*, 324-333.

[30]. Chen, Z., **Reddy, V. M.**, Ruan, S., Doan, N. A. K., Roberts, W. L., & Swaminathan, N. (2017). Simulation of MILD combustion using Perfectly Stirred Reactor model. ***Proceedings of the Combustion Institute***, *36*(3), 4279-4286.

[31]. **Reddy, V. M.**, Rahman, M. M., Gandi, A. N., Elbaz, A. M., Schrecengost, R. A., & Roberts, W. L. (2016). Cenosphere formation from heavy fuel oil: a numerical analysis accounting for the balance between porous shells and internal pressure. ***Combustion Theory and Modelling***, *20*(1), 154-172.

[32]. Nehe, P., **Reddy, V. M.**, & Kumar, S. (2015). Investigations on a new internally-heated tubular packed-bed methanol–steam reformer. ***International Journal of Hydrogen Energy***, *40*(16), 5715-5725.

[33]. **Reddy, V. M.**, Trivedi, D., Sawant, D., & Kumar, S. (2015). Investigations on emission characteristics of liquid fuels in a swirl combustor. ***Combustion Science and Technology***, *187*(3), 469-488.

[34]. **Reddy, V. M.**, Katoch, A., Roberts, W. L., & Kumar, S. (2015). Experimental and numerical analysis for high intensity swirl based ultra-low emission flameless combustor operating with liquid fuels. ***Proceedings of the Combustion Institute***, *35*(3), 3581-3589.

[35]. **Reddy, V. M.**, Biswas, P., Garg, P., & Kumar, S. (2014). Combustion characteristics of biodiesel fuel in high recirculation conditions. ***Fuel processing technology***, *118*, 310-317.

[36]. **Reddy, V. M.**, Sudheer, S., Prabhu, S. V., & Kumar, S. (2013). Design and calibration of a new compact radiative heat-flux gauge (RHFG) for combustion applications. ***Sensors and Actuators A: Physical***, *203*, 62-68.

[37]. **Reddy, V. M.**, & Kumar, S. (2013). Development of high intensity low emission combustor for achieving flameless combustion of liquid fuels. ***Propulsion and Power Research***, *2*(2), 139-147.

[38]. **Reddy, V. M.**, Sawant, D., Trivedi, D., & Kumar, S. (2013). Studies on a liquid fuel based two stage flameless combustor. ***Proceedings of the Combustion Institute***, *34*(2), 3319-3326.

[39]. **Reddy, V. M.**, Trivedi, D., & Kumar, S. (2012). Experimental investigations on lifted spray flames for a range of coflow conditions. ***Combustion science and technology***, *184*(1), 44-63.

Book Chapters

[1]. **Reddy, V. M.**, & Roberts, W. L. (2017). Numerical Modeling of MILD Combustion at High Pressure to Predict the Optimal Operating Conditions. In *Combustion for Power Generation and Transportation: Technology, Challenges and Prospects* (pp. 55-76). Singapore: Springer Singapore.

[2]. **Reddy, V. M.**, Kumar S. (2016). Flameless Combustion with Liquid Fuels. In Energy Combustion and Propulsion – New Perspectives (pp. 219 – 238). Athena Academi.

Conference Papers

[1]. Sharma, D., Srinivasarao, M., Dash, S.K., & Reddy, V. M. (2022). "Numerical Investigation on the Effect of Oxygen Enrichment on the Combustion and Emission Characteristics of Premixed LPG Flames". 4th National Aerospace Propulsion Conference, 19-20 December, IIT Bombay, India.

[2]. Sharma, D., Dash, S.K., & Reddy, V. M. "Effect of Hydrogen Enrichment on Heat Release Rate and Emission Characteristics of Premixed LPG Flames: A Chemical Kinetic Analysis". 13th Asia-Pacific Conference on Combustion, 5-9 December, Abu Dhabi (UAE).

[3]. Sharma, D., Dash, S.K., & Reddy, V. M. (2021). "Exergy Analysis on Excess Enthalpy Combustion of LPG + H2/air mixture in an Ultra-High Intensity Meso-scale Combustor, 6th International Conference on Sustainable Energy and Environmental Challenges (VI SEEC), December 27-29, Lucknow, India.

[4]. Singh, A. S., Sharma, D., Dash, S.K., & Reddy, V. M. (2022). "Chemical Kinetic Analysis on Effect of Intermediate Radical Production on NOx and De-NOx Characteristics of NH3/H2/Air Flames at High Pressure". 1st International Conference in Fluid Thermal and Energy Systems, June 9-11, NIT Calicut, Kerala, India.

[5]. Singh, A. S., Mohapatra, S., Dash, S.K., & Reddy, V. M. (2021). "Computational Study of Influence of Oxygen Enrichment on the Heat Release Rate and Emission Characteristics of NH3/O2/N2 Mixture". 13th Asia-Pacific Conference on Combustion, 5-9 December, Abu Dhabi (UAE).

[6]. Singh, A. S., S, Dash, S.K., & Reddy, V. M. (2021) "Chemical Kinetic analysis of NH3/CH4–O2/N2/H2O2 Mixture to Evaluate the Feasibility of Air Replacement with H2O2". 6th International Conference on Sustainable Energy and Environmental Challenges (VI SEEC), December 27-29, Lucknow, India.

[7]. Singh, A. S, Vijrumbana, Y, Garnayak, S., Dash, S.K., & Reddy, V. M. (2022). "Understanding of Mild Combustion Characteristics of NH3/Air Flames in N2 And H2O (Steam) Diluted Environment at Atmospheric Pressure, 4th National Aerospace Propulsion Conference, 19-20 December, IIT Bombay, India.

[8]. Srinivasarao M., & Reddy, V. M. (2022). "Thermo diffusion Flame in MILD Regime Using a Modified Reacting Solver". 4th National Aerospace Propulsion Conference, 19-20 December, IIT Bombay, India.

[9]. Garnayak, S., Mohapatra, S., Dash, S.K., & Reddy, V. M. (2018). "Liquid Fuel Combustion with Extremely Diluted Oxidizer in High Swirl Flows at High Pressure". 2th National Aerospace Propulsion Conference, 17-19 December, IIT Kharagpur, India.

[10]. Garnayak, S., Mohapatra, S., Dash, S.K., Reddy, V. M., & Dash, S.K. (2021). "Effect of N2, CO2, and H2O Dilution on MILD Combustion of CH4/H2 Flame with Extremely Low Oxygen Content". 6th International Conference on Sustainable Energy and Environmental Challenges (VI SEEC), December 27-29, Lucknow, India.

[11]. Soni, N., Singh, G., & Reddy, V.M. (2021). "Numerical Modelling of Solar Thermal Energy Storage System for House Heating in Ladakh". 15th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics (HEFAT), July 25-28, Amsterdam, Netherlands.

[12]. Pavan, K.P.S., Soni, N., Singh, G., & Reddy, V.M. (2021). "Analytical Analysis on Adaptability of Solar Concentric Heating System and Energy storage for a Bituminous Aggregate Mixing Plant". 15th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics (HEFAT), July 25-28, Amsterdam, Netherlands.

[13]. Mohapatra, S., Garnayak, S., Dash, S.K., Reddy, V. M., & Dash, S.K. "A Numerical Study on Non-Premixed Combustion of Liquid Fuel with Swirl Flow and Dilution at High Pressure Conditions". 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT), July 22-24, Wicklow, Ireland.

[14]. Mohapatra, S., Garnayak, S., & Reddy, V. M. (2018). "Reduction of Emissions by Steam Dilution in High Swirl Liquid Fuel Combustion". 2th National Aerospace Propulsion Conference, 17-19 December, IIT Kharagpur, India.

[15]. Vijrumbana, Y., Singh, A. S., & Reddy, V. M. (2022). "A Chemical Kinetic Analysis: Influence of post-flame chemistry, combustion pressure, premixing degree (fully premixed to non-premixed), and secondary air supply on NOx emissions from NH3/CH4-air combustion". 1st International Conference in Fluid Thermal and Energy Systems, June 9-11, NIT Calicut, Kerala, India.

[16]. Ashraf W., Ramgopal M., & Reddy, V. M. (2022). "Performance analysis of a s-CO 2 based solar flat plate collector". 8th International conference on advances in energy research, IIT Bombay, India.

[17]. Ashraf W., Ramgopal M., & Reddy, V. M. (2022). "An experimental and computational study of a solar flat plate collector by developing a MATLAB code for water and s-CO2 as the heat transfer fluids". Two-day International conference on Net-zero emission technologies for sustainable development: challenges and opportunities, IIT(ISM) Dhanbad, India.

[18]. V M Reddy, Trivedi D, Kumar S. "Experimental investigations on lifted spray flames in a co-flow field". 23rd International Colloquium on Dynamics of Reactive and Explosive Systems, University of California, Irvine, USA, 24-29 July 2011.

[19]. V M Reddy, Trivedi D, Kumar S. "Investigation of lifted flame dynamics with biodiesel in coflow field". International Conference on Advances in Energy Research (ICAER), Indian Institute of Technology Bombay, Dec., 9-11, 2011

[20]. Sawant D, V M Reddy, Trivedi D, Kumar S. "Computational analysis to determine the optimal burner geometry for achieving flameless combustion with liquid fuels".22nd National conference on I. C. Engines and Combustion, NIT Calicut, India. Dec., 10-13 2011.

[21]. V M Reddy, Sawant D, Trivedi D, Kumar S. “Studies on a liquid fuel based two stage flameless combustor”. 34th International Symposium on Combustion, Warsaw University of Technology, Warsaw, Poland. 29th July- 3rd Aug, 2012.
[22]. V M Reddy, Sawant D, Kumar S. “Studies on optimization of a liquid fuel based low emission combustor”. GTIndia2012-9674, Proceedings of the 2012 ASME GT India conference, Mumbai. Dec. 1st, 2012.
[23]. V M Reddy, Kumar S. “Development of high intensity ultra low emission combustor with biodiesel”. 4th International Symposium on Energy & Environment: ACCESS, Oberoi Hotel. Mumbai, India. Dec. 9 - 12, 2012
[24]. V M Reddy, Sawant D, Kumar S. “Development of combustor for achieving flameless combustion of liquid fuels”. National Propulsion Conference, IIT Madras, Chennai. Feb. 21-23, 2013.
[25]. Nehe, P. Kumar, S, Reddy, V.M, Characteristics of hydrogen produced by methanol reformation in compact whirling orbital plate fluidized bed reactor. Asia-Pacific Conference on Combustion, ASPACC 2017; University of Sydney, Sydney; Australia; 10 - 14 December 2017; Code 133864.
[26]. Subhankar M, V Mahendra Reddy, S K Dash. Reduction of emissions by steam dilution in high swirl liquid fuel combustion, NAPC-2018.
[27]. Subrat G, V Mahendra Reddy, S K Dash. Liquid fuel combustion in extremely diluted oxidizer at high swirl flows operates at high pressure, NAPC-2018.
[28]. Ashok K, Roshan S, Karmakar S, Roy A, Reddy VM. Numerical analysis to predict optimal computational technique for liquid fuel combustion in highly swirling flows. NAPC-2018.