Curriculum Vitae

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https://scholar.google.com/citations?user=toF8mUoAAAAJ&hl=en

Education

Degree	Branch	College/ University	CGPA/ %
PhD (2017-Jan'23)	Mechanical (Thermal) Engineering	IIT Delhi	9.80/10
B. Tech (2010-14)	Mechanical Engineering(2014[@],[+])	MANIT, Bhopal	8.83/10
Senior Secondary School 2009	PCM	CBSE	85.2/100
Higher Secondary School 2007		M P Board	85.6/100

[@]July 2014 to Dec 2014 worked as GET in Heidelberg Cement India Ltd., Damoh, M.P., India.
[+]Jan 2015 to July 2017 prepared for ESE but was short of 6 marks in qualifying the same in the year 2016.

Research Experience

Teaching Assistant at IIT Delhi in Thermodynamics, Fluid Mechanics and Combustion courses from July 2017 to 21st July 2022

Research Associate at IIT Delhi from 22nd July 2022 to 21st April 2023 working on a Pressurized Drop Tube Reactor project elaborated in the Project Summary Section.

Early Doc Fellow at IIT Delhi from 22nd April 2023 to 21st July '23, working on the aforementioned project.

Selected for **Postdoctoral** at the Washington University in St. Louis, Missouri, USA and Kyushu University, Fukuoka, Japan.

Assistant Professor in the Department of Fuel Minerals and Metallurgical Engineering at IIT (ISM) Dhanbad. (16th Aug '23 onwards). Currently teaching Power Plant Eng. To M. Tech students.

IIT Delhi PhD Thesis

Title: Coupled Interactions between Flow Field and Combustion inside Entrained Flow Coal Reactors.

Supervisors: Prof. Mayank Kumar & Prof. Anupam Dewan

Description: Comprehensive numerical models were developed for a single swirl burner (SSB) lab-scale pulverized coal furnace and a tangentially-fired pilot-scale entrained flow (EF) gasifier. Using these models, the impact of coal particle size on the flow field is investigated in the case of the SSB furnace. Further, in the case of the tangentially-fired reactor, impact of mass throughput, injection angle, reactor pressure and particle size on the flow field and reactor performance were investigated. The impact of these parameters on the critical flow structures formed in EF reactors, which impact the reactor's performance, is shown to be captured by the appropriate definition of swirl strength.

Technical Skills

Modeling and Simulation	Pulverized Solid-fuel Combustion in Entrained Flow Reactors using Ansys-Fluent
Programming Languages	MATLAB

Publications

Journals:

1. **N.K. Sahu**, M. Kumar, A. Dewan, "Computational study of 16 kW_{th} furnace cofired using pulverized bituminous coal and liquified petroleum gas operated in un-staged and air-staged conditions," **ASME Journal of Energy Resources Technology, I.F.= 3.00, 2020, 143(8), p. 082102.**
   https://doi.org/10.1115/1.4048868

2. **N.K. Sahu,** M. Kumar, A. Dewan, "Sophisticated interplay of operating conditions governs flow field transition and optimal conversion inside tangentially fired gasifiers," **Energy, I.F.=9.00, 2022, 252 (8), p. 123975.**
   https://doi.org/10.1016/j.energy.2022.123975

3. **N.K. Sahu,** A. Dewan, M. Kumar, "Computational investigation on the impact of coal feed size in a tangentially fired gasifier," **Combustion Science and Technology, I.F.=2.133, Published, 2022.**
   https://doi.org/10.1080/00102202.2022.2157210

4. **N.K. Sahu**, A. Dewan, M. Kumar, "Characterizing flow field transition in a tangential injection pressurized gas-fired reactor," **Thermal Science and Engineering Progress, I.F.=4.80, 2023, 41, p. 101811.**
   https://doi.org/10.1016/j.tsep.2023.101811

Conference Proceedings:

1. **N.K. Sahu,** M. Kumar, A. Dewan, "Computational study of coal combustion in an entrained flow furnace," **AIP Conference Proceedings, 2019, 2148 (1), p. 030055.**
   https://doi.org/10.1063/1.5123977

2. **N.K. Sahu,** M. Kumar, A. Dewan, "Computational study of non-reactive swirling flow in tangentially-fired configuration gasifier," **Materials Today: Proceedings, 2020, 28, pp. 2053-2056.**
https://doi.org/10.1016/j.matpr.2020.02.400

3. **N.K. Sahu,** M. Kumar, A. Dewan, "A Computational study of entrained flow furnace with swirl burner configuration and low turbulence intensity flow," **Fluid Mechanics and Fluid Power. Lecture Notes in Mechanical Engineering. Springer (2021), Singapore.** https://doi.org/10.1007/978-981-16-0698-4_8

Project Summary on which I worked during PhD and Post Doctoral at IIT Delhi

Organization: Indian Institute of Technology Delhi, India (**funded by SERB, Govt. of India**)

Title: Pressurized drop tube furnace (PDTF) experiments towards obtaining high-pressure kinetics of Indian coals and coal blends

Period: June 2019 – August 2023

Project objective

The primary goal is to develop a Pressurized Drop Tube Reactor facility and obtain kinetics at conditions of high pressure, temperature and heating rates for a variety of Indian coals and coal blends. High pressure kinetics for Indian coals are not available in the open literature and present a major obstacle towards development of indigenous high-pressure gasification and oxy-coal combustion technologies. The following objectives are pursued towards that goal:

a) To understand fundamental devolatilization and gasification kinetics of individual Indian coals and coal blends under conditions as encountered in pressurized gasifiers and oxy-coal combustors using a Pressurized Drop Tube Furnace (PDTF).

b) To understand char particle structure and morphology evolution under pressurized gasification conditions using PDTF experiments, right from rapid heating and pyrolysis to burnout and slag formation.

c) To develop a coal kinetics and structural evolution model for plugging into the integrated Multiphysics/CFD model, based on the insights gained from the PDTF experiments.