Dr. Nikhil Ashokbhai Baraiya

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Correspondence Address:
Department of Mechanical Engineering,
Saradar Vallabhbhai National Institute of
Technology Surat,
Ichchhanath, Surat-395007, India

EDUCATION

PhD **(2014 – 2019)**

Institution: Indian Institute of Technology-Madras, India.

Title: Syngas Combustion Dynamics in a Turbulent Bluff-body Combustor.

Supervisor: Prof. S.R. Chakravarthy

CGPA: 8.17

Master of Technology (Turbomachines) **(2010–2012)**

Institution: SVNIT-Surat, India.

Thesis Title: Numerical and Experimental Investigation on Can Type Gas Turbine Combustion Chamber.

Supervisor: Dr. R. D. Shah

CGPA: 9.18

Bachelor of Engineering (Mechanical Engineering) **(2005-2009)**

Institution: Shantilal Shah Engineering College Bhavnagar, India (Affiliated to Bhavnagar University, Bhavnagar, India)

Percentage in course work: 66.97%

Graduated in *First class* with *Distinction* (Department second in Mechanical Engineering, Bhavnagar university).

RESEARCH EXPERIENCE

- Acoustic characterization ofa combustor.
- High speed OH* chemiluminescence imaging.
- Flow field characterization using High Speed PIV.
- Study of flow/flame interaction by simultaneous time resolved PIV and OH* chemiluminescence during combustion instability in turbulent combustor.

GRADUATE COURSES

- Combustion explosion and detonation.
- Elements of gas dynamics and propulsion.
- Combustion flow diagnostics.
- Acoustic instability

SKILLS

- **Programming languages:** C, FORTRAN.
- **Tools and software:** ANSYS-Fluent, Matlab, Auto CAD, Lab-view (data acquisition).

PROFESSIONAL EXPERIENCE

1. **Assistant Professor,**
   Mechanical Engineering Department
   Nirma Institute of technology, Ahmedabad **(July 2012 to December-2012)**

   Roles and Responsibilities:

Course instructor: -

- Elements of Mechanical Engineering
- Engineering Graphics 1 and 2

Lab Instructor: -

- Hydro and thermal turbo machines lab.
- Elements of Mechanical Engineering
- Engineering Graphics 1 and 2

2. **Assistant Professor,**
   Department of Mechanical Engineering
   Sardar Vallabhbhai National Institute of technologySurat **(November 2019 to Current date)**

Roles and Responsibilities:

Course instructor: -

- **ME 602**: Gas Dynamics and Flow Through Turbomachines Passages
- **ME 612**: Design of Thermal Turbo machine
- **ME 721:** Advance Thermodynamics and Combustion
- **ME 403**: Energy Systems

Lab Instructor:

- Fluid Mechanics
- Heat and Mass Transfer
- FF&T
- **ME 612:** Design of Thermal Turbo Machines
- **ME 604:** Thermal Turbo Machines
- **ME207:** Measurement and Instrumentation

Lab In-charge: -

Reacting Gas Dynamics

JOURNAL PAPER

1. **Nikhil A. Baraiya and S. R. Chakravarthy**, "Effect of syngas composition on high frequency combustion instability in a non-premixed turbulent combustor." *International Journal of Hydrogen Energy 2019*. Vol. 44, issue.12, pp.6299-6312. https://doi.org/10.1016/j.ijhydene.2019.01.115

2. **Nikhil A. Baraiya and S. R. Chakravarthy, "**Excitation of high frequency thermoacoustic oscillations by syngas in a non-premixed bluff body combustor." *International Journal of Hydrogen Energy 2019*. Volume 44, Issue 29, 7 June 2019, Pages 15598-15609. https://doi.org/10.1016/j.ijhydene.2019.04.087

3. **N. Baladandayuthapani, , Nikhil A. B. and S. R. Chakravarthy,** "Effect of inlet flow turbulence on the combustion instability in a premixed backward-facing step combustor." *Proceedings of combustion institute 2019*. Volume 37, Issue 4, 2019, Pages 5189-5196. https://doi.org/10.1016/j.proci.2018.06.143

4. **Nikhil A. Baraiya, Vikram Ramanan, N. Baladandayuthapani, Chetankumar S. Vegad and S. R. Chakravarthy,** "Experimental Investigation Into the Role of Mean Flame Stabilization On the Combustion Dynamics of High-Hydrogen Fuels in a Turbulent Combustor." *Journal of Engineering for Gas Turbines and Power 2021. **Paper No:** GTP-20-1588.* https://doi.org/10.1115/1.4050067

5. **Nikhil A. Baraiya, Vikram Ramanan, N. Baladandayuthapani, Chetankumar S. Vegad and S. R. Chakravarthy, "**Role of pumping and wrinkle propagation mechanisms in exciting different acoustic-modes in turbulent syngas combustion." *International Journal of Hydrogen Energy 2021*. Volume 46, Issue 24, 6 April 2021, Pages 13413-13429. https://doi.org/10.1016/j.ijhydene.2021.01.151

6. **Nikhil A. Baraiya, Vikram Ramanan, N. Baladandayuthapani, Chetankumar S. Vegad and S. R. Chakravarthy,** "Investigation of Oscillatory States Involving Acoustic Mode Shifts in a Turbulent Syngas Combustion using Non-stationary Time-series Analysis." *Flow, Turbulence and Combustion* 2021 (In press).
7. **Vikram Ramanan, Nikhil A. Baraiya, and S. R. Chakravarthy,** "Experimental Analysis of Two-period Quasi-periodic Oscillations in a Turbulent Hydrogen Combustor." *Journal of Visualization 2021* (In press)

8. **Nikhil A. Baraiya, Vikram Ramanan, N. Baladandayuthapani, Chetankumar S. Vegad and S. R. Chakravarthy,** "Dynamic Mode Decomposition Analysis of Time-varying Transition From Low-frequency instability to High-frequency Instability in turbulent combustor." Physics of Fluid (Under preparation)

9. **Vikram Ramanan, Nikhil A. Baraiya, and S. R. Chakravarthy,** "Detection and identification of nature of mutual synchronization for low and high-frequency non-premixed syngas combustion dynamics." Physics of Fluid (Under preparation)

10. **Nikhil A. Baraiya, Vikram Ramanan, N. Baladandayuthapani, Chetankumar S. Vegad and S. R. Chakravarthy,** "Investigation into Flame Dynamics and Role of Phase in Transition from Lower to Higher Acoustic Mode in Turbulent Syngas Combustion." Combustion Science and Technology (Under preparation)

CONFERENCE PAPERS

1. **Nikhil, A.B., Baladandayuthapani, N., Chakravarthy, S. R. and Balachandran, R**. Experimental investigation of combustion dynamics in synthesis gas combustor, *10th ASPACC*, July-2015, Beijing, China.

2. **Nikhil, A.B., Baladandayuthapani, N., Chakravarthy, S. R. and Balachandran, R**. The effect of syngas composition on combustion dynamics of bluff-body type combustor. *International Symposium on Thermoacoustic Instablities*, June 2016, Munich, Germany.

3. **Baladandayuthapani, N., Ramanan, V., Nikhil A. B. and Chakravarthy, S. R.**. Turbulence induced instability in a backward facing step combustor. *International Symposium on Thermoacoustic Instablities*, June 2016, Munich, Germany.

4. **Nikhil, A. Baraiya, Baladandayuthapani, N. and Chakravarthy SR.** *Experimental Investigation of Combustion Dynamics in a Turbulent Syngas Combustor*. Proceedings of ASME Turbo Expo 2017

5. **Nikhil, A. Baraiya., and Chakravarthy SR.** *Effect of chemical composition of syngas on combustion dynamics inside bluff-body type turbulent syngas combustor*. Proceedings of ASME Turbo Expo 2018

6. **Nikhil, A. Baraiya., and Chakravarthy S. R.** *The role of mean flame anchoring on the stability characteristics of syngas, synthesis natural gas and hydrogen fuels in a turbulent non-premixed bluff-body combustor*. Proceedings of ASME Turbo Expo 2019

7. **Baraiya, N.A. and Chakravarthy, S.R., 2020**. Effect of Fuel Composition on Thermoacoustic Instability in a Turbulent Combustor. Flame 2020, Amity University, Noida, India

8. **Baraiya, N.A. and Chakravarthy, S.R., 2020**. Experimental Investigation of Combustion Instability in Syngas Turbulent Combustor. Flame 2020, Amity University, Noida, India (Best paper award)

BOOK/ BOOK CHAPTER

1. **Nikhil A. Baraiya and S. R. Chakravarthy**, *Syngas combustion Dynamics in a bluff body turbulent combustor*. Mukhopadhyay, A., Basu D. N., Mondal, S.,and Sen, S. (Eds.). Monograph on Dynamics and Control of Energy Systems. Springer 2020(pp. 239-263).

CONFERENCE/ SEMINARS/ STTPS/ WORKSHOPS

1. TEQIP-III sponsored STTP on "**Thermal management: An overview, challenges and solutions**" from 2nd -7th November 2020 (Organized)
2. TEQIP-III sponsored STTP on "**Combustion Concepts and Applications**" from 30th November to 4th December 2020 (Organized)

INVITED LECTURES

1. " Gas Turbine Combustion Diagnostics." In Webinar series on " An Engineering Approach to the Gas Turbine Systems." At KLS GIT, Belgavi on 29th July 2020.
2. " Thermo acoustics Instabilities." In TEQIP sponsored STTP on Combustion Concepts and Applications at SVNIT

AWARDS AND ACHIEVEMENTS

1. **Young Engineer Turbo Expo Travel Award** for ASME Turbo Expo at Phoenix Arizona USA 2019
2. **ASME (American Society of Mechanical Engineering) Active Member from** 2018.
3. **Placement coordinator at SVNIT Surat for M.Tech Turbomachines** (2010-2012).
4. **Department second** in Mechanical Engineering, Bhavnagar University.
5. **Placement coordinator for Mechanical Engineering Department at** Shantilal Shah Engineering College, Bhavnagar(2007-2009).
6. **Coordinator** Technomantra 2K8 at Shantilal Shah Engineering College, Bhavnagar (2008).
7. **Best Paper award** in Flame 2020, at Amity University, Noida, India

CO-CURRICULAR ACTIVITIES

- Manufacturing Of Cryogenics Pressure Vessel' **Inox India Ltd. Kandla**(1 month vocational training)**(June2008)**

- Manufacturing Of Helical gears **Elecon Comp. Ltd. V.V.Nagar** (1 month vocational training) **(Dec 2008)**
- Took part in many national level robotics events held at Nirma Univeristy, L.D. College of engineering, Chanaga Institute of technology, C U Shah college of engineering and Sankalchand Patel College of Engg**(2006-2008)**
- Attended Gian course on **Combustion and flow Diagnostics**, conducted by Prof. A. Dreizler. **(Oct. 2016)**

PhD Opening

Enthusiastic and interested students who wants to pursue PhD under the Research area given below can contact me at nikhil@med.svnit.ac.in The areas of Research are:

- Combustion Dynamics
- Hydrogen-enriched Fuels Combustion
- Alternate Fuels
- Combustion Diagnostics
- Combustion Kinetics
- Non-linear Dynamics
- Supersonic Combustion
- Fuel Cell