

# Dr. Sirshendu Mondal (PhD)

ASSISTANT PROFESSOR, DEPARTMENT OF MECHANICAL ENGINEERING, NIT DURGAPUR, INDIA

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**VITA**                      **Citizenship:** Indian                      **Marital status:** Married                      **Gender:** Male  
**Category:** General

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**EDUCATION**

**Jadavpur University**, West Bengal, India (In a DAAD sandwich program with TU Munich, Germany)  
*Doctorate of Philosophy*, Mechanical Engineering                      *Dec 2008 - Nov 2014*

**Jadavpur University**, West Bengal, India  
*Master of Engineering (Heat Power)*, Mechanical Engineering                      *Jul 2006 - May 2008*

**Kalyani Govt. Engineering College**, West Bengal, India  
*Bachelor of Technology*, Mechanical Engineering                      *Jul 2002 - May 2006*

**Bolpur N. N. B. High School**, West Bengal, India  
*Higher Secondary*, Science, WBCHE                      *May 2001*

**Bolpur High School**, West Bengal, India  
*Secondary*, WBBSE                      *May 1999*

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**RESEARCH INTERESTS**                      Dynamics in Thermo-fluidic systems, Nonlinear time series analysis, Synchronization analysis

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**RESEARCH EXPERIENCE**

**Senior Scientist** in Department of Aerospace Engineering, IIT Madras, India. Jan 2018 – June 2018. Mentor: Prof. R. I. Sujith.

**Post-doctoral fellow** in Department of Aerospace Engineering, IIT Madras, India. Jan 2015 – Dec 2018. Mentor: Prof. R. I. Sujith.

**Senior Project officer** in Department of Aerospace Engineering, IIT Madras, India. Dec 2014 – Jan 2015. Mentor: Prof. R. I. Sujith.

**DAAD sandwich fellow** in Chair of Thermodynamics, TU Munich, Germany. Oct 2012 – March 2014. Mentor: Prof. W. Polifke.

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**TEACHING / WORK EXPERIENCE**

**Assistant Professor** at National Institute of Technology Durgapur, India. Dec 2018 - Present

**Assistant Professor** at Amrita Vishwa Vidyapeetham, Kollam, Kerala. July 2018 - Dec 2018

**Teaching Assistant** for Thermoacoustic Instabilities in Aerospace Propulsion, at Indian Institute of Technology Madras

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AWARDS,  
FELLOWSHIPS,  
HONOURS &  
RECOGNITIONS

**Invited Speaker**, One-day Workshop on “Recent Trends in Mechanical Engineering”, December 15, (2021), at Government Engineering College, Samastipur.

**Invited Speaker**, Online Workshop on “Recent Trends in Sustainable Energy and Industrial Technologies”, March 17 – 19 (2021)

**Invited Speaker**, Online Workshop on “Recent Trends in Thermo-Fluid” (RTTF 21), February 22 – 26 (2021)

**Invited Speaker**, Indo-US Online Workshop on “Application of Machine Learning and Dynamical Systems Approach for Early Detection and Control of Combustion Instabilities”, January 5 – 7 (2021)

**Invited Speaker**, International Workshop on Energy, Environment and Multiphase Flows, February 24 - 26, at IIT Kanpur (2020)

**Invited Speaker**, International Workshop on Energy, Power & Environment, March 17 - 19, at NIT Kurukshetra (2019)

**Editor’s Pick**, Chaos: An Interdisciplinary Journal of Nonlinear Science - Nevin Thomas, Sirshendu Mondal, Samadhan A Pawar and R. I. Sujith ”Effect of Time-Delay and Dissipative Coupling on Amplitude Death in Coupled Thermoacoustic Oscillators” (2018)

**International Travel Support**, DST - Science and Engineering Research Board (2017)

**ISEES young scientist award** from International Society for Energy Environment and Sustainability, IIT Kanpur, India (2017)

**Best poster award** (2nd Prize) in IWEPE held at IIT Kanpur (2017)

**Institute Post-doctoral fellowship**, IIT Madras (2015)

**DAAD sandwich fellowship**, Germany (2012)

**Senior Research Fellowship** by Council of Scientific & Industrial Research (CSIR), Human Resource Development Group, Government of India. (2009)

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PUBLICATIONS

**Journals**

33. Prasad, J. S., Datta, A., & **Mondal, S.** (2024). Flow and thermal behavior of solar air heater with grooved roughness. *Renewable Energy*, 220, 119698.

32. Akshay, S., Gopalakrishnan, E. A., Sowmya, V., Venkatramani, J., Tripathi, D., Prasad, J. S., & **Mondal, S.** (2023). Open Set Domain Adaptation for Classification of Dynamical States in Nonlinear Fluid Dynamical Systems. *IEEE Access*.

31. Tripathi, D., **Mondal, S.**, & Venkatramani, J. (2023). Frequency-specific phase synchronization analysis of a stall-induced aeroelastic system undergoing 2:1 internal resonance in a low-speed wind tunnel. *Nonlinear Dynamics*, 111, 12899–12920.

30. Bhattacharya, A., **Mondal, S.**, De, S., Mukhopadhyay, A., & Sen, S. (2023). Synchronization behaviour between two candle flame oscillators with similar and dissimilar amplitudes of oscillations. *Combustion Theory and Modelling*, 1-16, doi.org/10.1080/13647830.2023.2165966.

29. Ghosh Mazumder, A., Saha, R., **Mondal, S.**, Ghosh, K., Mukhopadhyay, A., & Sen,

- S. (2022). Dynamics of a single-phase natural circulation system under harmonic excitation. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 32(12), 123125.
28. Ghosh, A., **Mondal, S.**, & Sujith, R. I. (2022). Occasional coupling enhances amplitude death in delay-coupled oscillators. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 32(10), 101106.
27. De, S., Mondal, S., Bhattacharya, A., **Mondal, S.**, Mukhopadhyay, A., & Sen, S. (2022). Dynamics of Premixed Flames Near Lean and Rich Blowout. *Combustion Science and Technology*, 1-17.
26. Tripathi, D., Shreenivas, R., Bose, C., **Mondal, S.**, & Venkatramani, J. (2022). Experimental investigation on the synchronization characteristics of a pitch-plunge aeroelastic system exhibiting stall flutter. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 32(7), 073114.
25. Bhattacharya, A., De, S., **Mondal, S.**, Mukhopadhyay, A., & Sen, S. (2022). Early detection of lean blowout using recurrence network for varying degrees of premixedness. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 32(6), 063105.
24. Raj, A., Raaj, A., Venkatramani, J., & **Mondal, S.** (2021). Effect of parameter mismatch and dissipative coupling on amplitude death regime in a coupled nonlinear aeroelastic system. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 31(12), 123112.
23. Bhattacharya, A.; De, S.; **Mondal, S.**; Mukhopadhyay, A.; Sen, S. (2021). Recurrence network analysis exploring the routes to thermoacoustic instability in a Rijke tube with inverse diffusion flame. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 31, 033117,
22. Raaj, A., **Mondal, S.**, & Jagdish, V. (2021). Investigating amplitude death in a coupled nonlinear aeroelastic system. *International Journal of Non-Linear Mechanics*, 129, 103659.
21. Mohapatra, S., **Mondal, S.**, & Mahapatra, P. S. (2020). Spatiotemporal dynamics of a self-propelled system with opposing alignment and repulsive forces. *Physical Review E*, 102(4), 042613.
20. Roy, A.; **Mondal, S.**; Pawar, A. S.; & Sujith, R. I. (2020). On the mechanism of open-loop control of thermoacoustic instability in a laminar premixed combustor. *Journal of Fluid Mechanics*, 884.
19. De, S.; Bhattacharya, A.; **Mondal, S.**; Mukhopadhyay, A.; & Sen, S. (2020). Application of recurrence quantification analysis for early detection of lean blowout in a swirl-stabilized dump combustor. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 30, 043115
18. Godavarthi, V.; Kasthuri, P.; **Mondal, S.**; Sujith, R. I.; Marwan, N.; & Kurths, J. (2020). Synchronization transition from chaos to limit cycle oscillations when a locally coupled chaotic oscillator grid is coupled globally to another chaotic oscillator. *Chaos: An interdisciplinary Journal of nonlinear science*, 30, 033121.
17. De, S., Bhattacharya, A., **Mondal, S.**, Mukhopadhyay, A. & Sen, S. (2020). Identification and early prediction of lean blowout in premixed flames. *Sadhana*, 45(1), 1-12
16. Raaj, A., Venkatramani, J. & **Mondal, S.** (2019). Synchronization of pitch and plunge motions during intermittency route to aeroelastic flutter. *Chaos: An interdisciplinary Journal of nonlinear science*, 29, 043129
15. Dange, S., Manoj, S., Banerjee, S., Pawar, S. A., **Mondal, S.** & Sujith, R. I. (2019). Oscillation Quenching and Phase-Flip Bifurcation in Coupled Thermoacoustic Systems. *Chaos: An interdisciplinary Journal of nonlinear science*, 29(9), 093135

14. Manoj, K., Pawar, S. A., Dange, S., **Mondal, S.**, Sujith, R. I., Surovyatkina, E., & Kurths, J. (2019). Synchronization route to weak chimera in four candle-flame oscillators. *Physical Review E*, 100(6), 062204.
13. **Mondal, S.**, Pawar, S. A. & Sujith, R. I. (2019). Forced synchronization and asynchronous quenching of periodic oscillations in a thermoacoustic system. *Journal of Fluid Mechanics*, 864, 73-96.
12. De, S., Bhattacharya, A., **Mondal, S.**, Mukhopadhyay, A. & Sen, S. (2018). Investigation of flame behavior and dynamics prior to lean blowout in a combustor with varying mixedness of reactants for early detection of lean blowout. *International journal of spray and combustion dynamics*, 0(0), 1-20
11. Pawar, S. A., **Mondal, S.**, George, N. B. & Sujith, R. I. (2018). Synchronization Behaviour during the Dynamical Transition in Swirl-Stabilized Combustor: Temporal and Spatiotemporal Analysis. *AIAA Journal*, 57(2), 836-847.
10. Thomas, N., **Mondal, S.** Pawar, S. A. & Sujith, R. I. (2018). Effect of Noise amplification During the Transition to Amplitude Death in Coupled Thermoacoustic Oscillators. *Chaos: An interdisciplinary Journal of nonlinear science*, 28, 093116
9. Thomas, N., **Mondal, S.**, Pawar, S. A. & Sujith, R. I. (2018). Effect of Time-Delay and Dissipative Coupling on Amplitude Death of Coupled Thermoacoustic Oscillators. *Chaos: An interdisciplinary Journal of nonlinear science*, 28, 033119 (**chosen as the Editor's pick and highlighted in AIP Scilight**)
8. **Mondal, S.**, Unni, V. R. & Sujith, R. I. (2017). Onset of thermoacoustic instability in turbulent combustors: an emergence of synchronized periodicity through formation of chimera-like states. *Journal of Fluid Mechanics*, 811, 659-681
7. **Mondal, S.**, Pawar, S. A. & Sujith, R. I. (2017). Synchronous behavior of two interacting oscillatory systems undergoing quasiperiodic route to chaos. *Chaos: An interdisciplinary Journal of nonlinear science*, 27, 103119
6. **Mondal, S.**, Mukhopadhyay, A. & Sen, S. (2016) Bifurcation analysis of steady states and limit cycles in a thermal pulse combustor model, *Combustion Theory and Modelling*, 21:3, 487 – 502
5. **Mondal, S.**, Mukhopadhyay, A., & Sen, S. (2015). Nonlinear dynamics in pulse combustor: A review. *Pramana*, 84:3, 443 – 453
4. **Mondal, S.**, Mukhopadhyay, A. & Sen, S. (2013) Dynamic Characterization of a Laboratory-Scale Pulse Combustor, *Combustion Science and Technology*, 186:2, 139 – 152
3. **Mondal, S.**, Mukhopadhyay, A. & Sen, S. (2012) Effects of Inlet Conditions on Dynamics of a Thermal Pulse Combustor, *Combustion Theory and Modelling*, 16:1, 59 – 74
2. Ghosh, S., **Mondal, S.**, Mondal, T., Mukhopadhyay, A. & Sen, S. (2010) Dynamic characterization of candle flame, *International journal of spray and combustion dynamics*, 2:3, 267–284
1. Datta, S., **Mondal, S.**, Mukhopadhyay, A., Sanyal, D. & Sen, S. (2009) An investigation of nonlinear dynamics of a thermal pulse combustor, *Combustion Theory and Modelling*, 13:1, 17 – 38.

## Conferences

### Peer-Reviewed

11. Dutta, S., Chakraborty, A., Mukherjee, A., & **Mondal, S.** Experimental Analysis and Reduced-order Modelling of Merging flames, *Proceedings of ASME Turbo Expo 2023 - Gas Turbine India Conference (GTIndia 2023)*, December 7-8, 2023, Bangalore, Karnataka, India
10. Dutta, S., Chakraborty, A., Mukherjee, A., & **Mondal, S.** Spatiotemporal Dynamics of Merging Flames: Experiments and Spectral Proper Orthogonal Decomposition Analysis, *Proceedings of the 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC 2023)*, December 14-17, 2023, IIT Patna, Patna-801106, Bihar, India
9. Prasad, J. S., Datta, A., & **Mondal, S.** Numerical Study of Thermal and Flow Behaviour near the Heated Wall with Novel Offset Ribs Incorporated Inside a Solar Air Heater, *Proceedings of the 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC 2023)*, December 14-17, 2023, IIT Patna, Patna-801106, Bihar, India
8. Bhattacharjee, S. S., Das, S. S., Datta, A., & **Mondal, S.** Efficacy of core cooling over natural and forced convection based surface cooling of Li-ion batteries, *Proceedings of the 48th National Conference on Fluid Mechanics and Fluid Power (FMFP 2021)*, December 27-29, 2021, Online
7. Bhattacharjee, S. S., & **Mondal, S.** Effect of coolant precooling on axial core cooling of lithium-ion battery, *Proceedings of the International Conference on Mechanical Engineering and Renewable Energy 2021 (ICMERE 2021)*, 12 – 14 December 2021, Online
6. Bhattacharjee, S. S., Datta, A., & **Mondal, S.** Improved cooling system of Li-ion batteries by axial water flow through the core, *Proceedings of the 26th National and 4th International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC 2021)*, December 17-20, 2021, Online
5. Mondal, R., Bose, C., & **Mondal, S.** Synchronization Study on Vortex-Induced Vibrations using Wake Oscillator Model, *Second International Nonlinear Dynamics Conference (NODYCON 2021)*, February 16-19, 2021, online
4. Mazumder, A. G., Saha, R., **Mondal, S.**, Ghosh, K., Mukhopadhyay, A. & Sen, S. Effect of fluctuating heater power on the dynamics of a single-phase square NCL, *25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2019)*, 28-31 December, 2019, IIT Roorkee, India.
3. **Mondal, S.**, Mukhopadhyay, A., Sen, S. & Polifke, W. Characterization of mixing and flow properties from numerical simulation of cold flow in non-premixed combustor, *ASME Gas turbine India Conference, GTINDIA2014*, 15-17 December, 2014, New Delhi, India.
2. **Mondal, S.**, Mukhopadhyay, A. & Sen, S. Effect of CO<sub>2</sub> dilution with Methane in Thermal Pulse Combustor, *n3l – Int'l Summer School and Workshop on Non-normal and Nonlinear Effects in Aero- and Thermoacoustics*, Munich, Germany, 18th June – 21st June 2013.
1. **Mondal, S.**, Mukhopadhyay, A. & Sen, S. Dynamic Characterization of A Laboratory-scale Thermal Pulse Combustor, *Proceedings of ASME Turbo Expo, GT2012*, Copenhagen, Denmark, 11th June – 15th June 2012.

## Abstract-Reviewed

17. Mohapatra, S., Harikrishnan, S., **Mondal, S.** and Mahapatra P. S. Dynamical analysis of a system of active disks with competing interaction rules, *Complex Fluids 2020*, IIT Bombay, December 10-12, 2020.
16. De, S., Agarwal, P., **Mondal, S.**, Bhattacharya, A., Mukhopadhyay, A., and Sen, S. Experimental Investigation on the Dynamics of Premixed Flame near Rich Blow-off (RBO), Proceedings of *International Conference on Energy and Sustainable Development (ICESD 2020)*, Jadavpur University, Kolkata, February 14-15, 2020.
15. Prasad, J. S., **Mondal, S.**, Mukhopadhyay, A., Sen, S. Forced response of a model thermal pulse combustor, Proceedings of *International Conference on Energy and Sustainable Development*, Jadavpur University, Kolkata, February 14-15, 2020.
14. Bhattacharya, A., **Mondal, S.**, Saha, S., Chakroborty, A., Singh, P., De, S., Mukhopadhyay, A., Sen, S. Dynamic Transitions in Coupled Candle Flame Oscillators, *International Conference on Energy and Sustainable Development*, Jadavpur University, Kolkata, February 2020, pp.337-340.
13. Pawar, S. A, **Mondal, S.**, George, N. B. and Sujith, R. I. Synchronization Behaviour During the Dynamical Transition in Swirl-Stabilized Combustor: Temporal and Spatiotemporal Analysis, 2018 *AIAA SciTech Forum*, Florida, 08-12 January, 2018.
12. Thomas, N., **Mondal, S.**, Pawar, S. A. and Sujith, R. Amplitude Death Behaviour of Coupled Thermoacoustic Oscillators., *70th Annual meeting of American Physical Society Division of Fluid Dynamics (APS DFD 2017)*, Denver, Colorado, 19-21 November, 2017.
11. **Mondal, S.**, Pawar, S. A. and Sujith, R. Forced synchronization and asynchronous quenching in a thermo-acoustic system, *70th Annual meeting of American Physical Society Division of Fluid Dynamics (APS DFD 2017)*, Denver, Colorado, 19-21 November, 2017.
10. **Mondal, S.**, Unni, V. R. and Sujith, R. I. (2017). Chimera-like states observed during the transition to thermoacoustic instability in turbulent combustor. *International Workshop on Energy, Propulsion and Environment (IWEPE 2017)*, IIT Kanpur, India, 8-11 March
9. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Stability analysis of limit cycle behaviour in thermal pulse combustor model, *10th Asia-Pacific Conference on Combustion*, Beijing, China, 19-22 July, 2015.
8. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Nonlinear Prediction of deterministic time series in Thermal Pulse Combustor, *10th Asia-Pacific Conference on Combustion*, Beijing, China, 19-22 July, 2015.
7. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Heat Transfer Characteristics of Thermal Pulse Combustor, Proceedings of the *21st National and 10th International ISHMT-ASME Heat and Mass Transfer Conference*, December 27-30, 2011, IIT Madras, India.
6. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. An Experimental Study of Laboratory-Scale Thermal Pulse Combustor, *The Fifth European Combustion Meeting*, Cardiff University, Cardiff, Wales, UK, 28th June - 1st July 2011.
5. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. An Experimental Investigation of Dynamics of a Thermal Pulse Combustor, Proceedings of the *37th International and 4th National Conference on Fluid Mechanics and Fluid Power (FMFP2010)*, December 16-18, 2010, IIT Madras, Chennai, India.

4. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Dynamics of a Laboratory-Scale Thermal Pulse Combustor, *8th Asia-Pacific Conference on Combustion*, December 10-13, 2010, Hyderabad-500031 (India).
3. Ghosh, S., **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Nonlinear Dynamic Study of a Flickering Flame, Proceedings of the *20th National and 9th International ISHMT-ASME Heat and Mass Transfer Conference*, January 4-6, 2010, Mumbai, India.
2. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Effects of Preheating and Dilution of Reactants on Dynamics of Thermal Pulse Combustor, *7th Asia-Pacific Conference on Combustion*, National Taiwan University, Taipei, Taiwan 24-27 May 2009.
1. **Mondal, S.**, Mukhopadhyay, A. and Sen, S. Effects of Inlet Conditions on Dynamics of Thermal Pulse Combustor, *Thirty Fifth National Conferences on Fluid Mechanics and Fluid Power*, December 11-13, 2008, PES Institute of Technology, Bangalore.

## Book / Book Chapters

8. Rik Mondal, Chandan Bose, **Sirshendu Mondal**, "*Synchronization Study on Vortex-Induced Vibrations Using Wake Oscillator Model*", In: *Advances in Nonlinear Dynamics*. Springer, Cham, 65-74, 2022.
7. **Sirshendu Mondal**, Nevin Thomas, "*Mitigation of Thermoacoustic Instability Through Amplitude Death: Model and Experiments*", In: De A., Gupta A., Aggarwal S., Kushari A., Runchal A. (eds) *Sustainable Development for Energy, Power, and Propulsion*. Green Energy and Technology. Springer, Singapore, 287-322, 2020.
6. Achintya Mukhopadhyay, Dipankar Narayan Basu, **Sirshendu Mondal**, Swarnendu Sen, "*Dynamic Behaviour, Identification and Control of Energy Systems*" In "*Dynamics and Control of Energy Systems*", Springer, Singapore, 29-45, ISBN: 7989811505362, (2019).
5. Achintya Mukhopadhyay, Swarnendu Sen, Dipankar Narayan Basu, **Sirshendu Mondal** (Editors) "*Dynamics and Control of Energy Systems*", Springer, Singapore, 1-526, (2019).
4. **Sirshendu Mondal**, Achintya Mukhopadhyay, "*Unfolding Nonlinear Characteristics of Noise-Contaminated Real-World Data*" In "*Dynamics and Control of Energy Systems*", Springer, Singapore, 29-45, ISBN: 7989811505362, (2019).
3. **Sirshendu Mondal**, Samadhan A Pawar, R I Sujith, "*Synchronization transition in thermoacoustic system: Temporal and Spatiotemporal analysis*" In "*Energy for Propulsion - A Sustainable Technologies Approach*", Springer, Singapore, 125-150, (2018).
2. **Sirshendu Mondal**, Swarnendu Sen, Achintya Mukhopadhyay, "*Characterization of turbulent combustion systems using dynamical systems theory*" In "*Modelling and Simulations of Turbulent Combustion*", Springer, Singapore, 543-567, (2018)
1. Swarnendu Sen, **Sirshendu Mondal**, Achintya Mukhopadhyay, "*Dynamics of Thermal Pulse Combustor*" Chapter 11 pp. 269 – 312, In "*Energy, Combustion and Propulsion: New Perspectives*", Athena Academic, UK 2015. ISBN: 9781910390290, (2015)

**Simulation:** ANSYS-FLUENT

**Languages:** English (Professional Proficiency), Bengali, Hindi

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