Swetaprovo Chaudhuri

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Research interests

Turbulent reacting flows, aerospace propulsion, droplets and aerosols

Education and training

2010 – 2013 Princeton University – Mechanical and Aerospace Engineering
Postdoc
Mentor: Professor C. K. Law

2006 – 2010 University of Connecticut – Mechanical Engineering
PhD in Energy and Thermal Sciences, *GPA: 3.992/4.000*
Advisor: Professor B. M. Cetegen

2002 – 2006 Jadavpur University – Mechanical Engineering
BE with Honors, *GPA: 8.610/10.000*

Honors and awards

2021 Associate Fellow – American Institute of Aeronautics and Astronautics

2019 Heuckroth Distinguished Faculty Award in Aerospace Engineering – University of Toronto Institute for Aerospace Studies

2017 Young Scientist Medal – Indian National Science Academy

2016 Associate – Indian Academy of Sciences

2010 Graduate Research Fellowship Award, First Prize – Department of Mechanical Engineering, University of Connecticut

2009 Doctoral Dissertation Fellowship – University of Connecticut

2009 ASME Foundation Scholarship – American Society of Mechanical Engineers

2009 Graduate Pre-doctoral Fellowship – Department of Mechanical Engineering, University of Connecticut

2008 Graduate Research Fellowship Award, Second Prize – Department of Mechanical Engineering, University of Connecticut

Appointments

2019 – present	**University of Toronto** – Institute for Aerospace Studies Associate Professor with tenure
2018 – 2019	**Indian Institute of Science** – Department of Aerospace Engineering Associate Professor with tenure
2013 – 2018	**Indian Institute of Science** – Department of Aerospace Engineering Assistant Professor
2014 – 2014	**Princeton University** – Department of Mechanical and Aerospace Engineering Visiting Associate Research Scholar
2011 – 2013	**Princeton University** – Department of Mechanical and Aerospace Engineering Associate Research Scholar
2010 – 2011	**Princeton University** – Department of Mechanical and Aerospace Engineering Postdoctoral Research Associate
2006 – 2010	**University of Connecticut** – Department of Mechanical Engineering Research Assistant

Contributions

- **Flame blowoff mechanism**: Applying laser diagnostics and high-speed imaging in a laboratory burner as well as in a prototypical afterburner, we proposed and experimentally validated a new mechanism of lean blowoff of bluff body stabilized turbulent premixed flames. The generality and validity of this blowoff mechanism have subsequently been demonstrated by many groups around the world not only for bluff body flames but even for initial stages of interacting swirl flame blowoff. The series of papers on blowoff serve as powerful examples where laser-based diagnostics have been used to solve a fundamental combustion problem of industrial relevance and scale.
- **Turbulent flame speed of expanding flames**: Using theory and experiments we obtained and validated a model for turbulent flame speed – a self-similar scaling relation for turbulent expanding flames over a large range of fuels, pressure, and turbulence Reynolds number. Once again, several groups around the world have corroborated this scaling.
- **Flame Particle Tracking**: We developed Forward Flame Particle Tracking (FFPT), as well as its back in time variant, Backward Flame Particle Tracking (BFPT): computational diagnostics for turbulent combustion. Applying BFPT-FFPT on DNS datasets, we have found how the turbulent

premixed flames generate at the leading points to evolve and eventually annihilate at the trailing regions of the corresponding surfaces. Development and application of these techniques on in-house computed DNS datasets have provided unprecedented, causal insights into flame surface generation, annihilation, flame element dispersion, ignition, and extinction in turbulent flows.

- **Local flame speed in turbulence**: Recently, we have shown that in both moderate or intensely turbulent conditions, large enhancement of local flame displacement speed from their standard laminar values result from flame-flame interactions. We have also derived an analytical model for such local flame propagation rate as a function of curvature and validated the model using Direct Numerical Simulations.

- **Mitigating instability by actuating the swirler in a combustor**: We were the first to show that in a laboratory combustor the otherwise static swirler could be actuated to a rotary motion, such that the higher intensity turbulence and higher swirl number generated can assist in mitigating thermoacoustic instabilities. A new synchronization model for flamelet oscillators has been proposed that can reproduce the intermittency dynamics en route to mitigation. This experimental setup also offers a controlled environment where instability to noise transition, or vice versa, could be precisely inflicted.

- **Optically accessible supersonic combustion facility**: At IISc, we conceptualized, designed, and developed a Mach 2.2, 1kg/s, 1600K stagnation temperature, direct connect supersonic combustion facility, ab-initio. This optically accessible facility is the first of its kind in India and has been commissioned and tested.

Journal papers and preprints

[1] Yuvraj, W. Song, H. Dave, H. G. Im, and **S. Chaudhuri**, "Local flame displacement speeds of hydrogen-air premixed flames in moderate to intense turbulence," *Combustion and Flame*, vol. 236, p. 111812, 2022.

[2] **S. Chaudhuri**, P. Kasibhatla, A. Mukherjee, W. Pan, G. Morrison, S. Mishra, and V. K. Murty, "Analysis of overdispersion in airborne transmission of covid-19," *Preprint medRxiv, https://doi.org/10.1101/2021.09.28.21263801*, 2021.

[3] A. Roy, S. Singh, A. Nair, **S. Chaudhuri**, and R. Sujith, "Flame dynamics during intermittency and secondary bifurcation to longitudinal thermoacoustic instability in a swirl-stabilized annular combustor," *Proceedings of the Combustion Institute*, vol. 38, no. 4, pp. 5171–5180, 2021.

[4] A. Rasheed, S. Sharma, P. Kabi, A. Saha, **S. Chaudhuri**, and S. Basu, "Precipitation dynamics of surrogate respiratory sessile droplets leading to possible fomites," *Journal of Colloid and Interface Science*, vol. 600, pp. 1–13, 2021.

[5] S. Majee, A. Saha, **S. Chaudhuri**, D. Chakravortty, and S. Basu, "Two-dimensional mathematical framework for evaporation dynamics of respiratory droplets," *Physics of Fluids*, vol. 33, no. 10, 2021.

[6] **S. Chaudhuri**, A. Saha, and S. Basu, "An opinion on the multiscale nature of covid-19 type disease spread," *Current Opinion in Colloid and Interface Science*, vol. 54, 2021.

[7] S. Singh, A. Roy, K. Reeja, A. Nair, **S. Chaudhuri**, and R. Sujith, "Intermittency, secondary bifurcation and mixed-mode oscillations in a swirl-stabilized annular combustor: Experiments and modeling," *Journal of Engineering for Gas Turbines and Power*, vol. 143, no. 5, 2021.

[8] S. Sharma, R. Pinto, A. Saha, **S. Chaudhuri**, and S. Basu, "On secondary atomization and blockage of surrogate cough droplets in single- and multilayer face masks," *Science Advances*, vol. 7, no. 10, 2021.

[9] P. Kabi, V. Razdan, D. Roy, L. Bansal, S. Sahoo, R. Mukherjee, **S. Chaudhuri**, and S. Basu, "Evaporation-induced alterations in oscillation and flow characteristics of a sessile droplet on a rose-mimetic surface," *Soft Matter*, vol. 17, no. 6, pp. 1487–1496, 2021.

[10] Z. Liu, V. Unni, **S. Chaudhuri**, R. Sui, C. Law, and A. Saha, "Self-turbulization in cellularly unstable laminar flames," *Journal of Fluid Mechanics*, vol. 917, 2021.

[11] Z. Liu, V. Unni, **S. Chaudhuri**, C. Law, and A. Saha, "Local statistics of laminar expanding flames subjected to darrieus–landau instability," *Proceedings of the Combustion Institute*, vol. 38, no. 2, pp. 1993–2000, 2021.

[12] S. Basu, P. Kabi, **S. Chaudhuri**, and A. Saha, "Insights on drying and precipitation dynamics of respiratory droplets from the perspective of covid-19," *Physics of Fluids*, vol. 32, no. 12, 2020.

[13] **S. Chaudhuri**, S. Basu, and A. Saha, "Analyzing the dominant sars-cov-2 transmission routes toward an ab initio disease spread model," *Physics of Fluids*, vol. 32, no. 12, 2020.

[14] S. Kumar, S. Malavalli, **S. Chaudhuri**, and S. Basu, "Spray characteristics and flow topologies of high shear injector at high primary swirl," *International Journal of Multiphase Flow*, vol. 131, 2020.

[15] **S. Chaudhuri**, S. Basu, P. Kabi, V. Unni, and A. Saha, "Modeling the role of respiratory droplets in covid-19 type pandemics," *Physics of Fluids*, vol. 32, no. 6, 2020.

[16] G. Ramachandran, A. Dutta, H. Durairaj, and **S. Chaudhuri**, "On the interaction of swirling flames in a lean premixed combustor," *Journal of Engineering for Gas Turbines and Power*, vol. 142, no. 3, 2020.

[17] A. Dutta, G. Ramachandran, and **S. Chaudhuri**, "Investigating thermoacoustic instability mitigation dynamics with a kuramoto model for flamelet oscillators," *Physical Review E*, vol. 99, no. 3, 2019.

[18] H. Dave and **S. Chaudhuri**, "Evolution of local flame displacement speeds in turbulence," *Journal of Fluid Mechanics*, 2019.

[19] V. Unni, **S. Chaudhuri**, and R. Sujith, "Flame blowout: Transition to an absorbing phase," *Chaos*, vol. 28, no. 11, 2018.

[20] P. Kabi, B. Chattopadhyay, S. Bhattacharyya, **S. Chaudhuri**, and S. Basu, "Evaporation-oscillation driven assembly: Microtailoring the spatial ordering of particles in sessile droplets," *Langmuir*, vol. 34, no. 42, pp. 12642–12652, 2018.

[21] H. Dave, A. Mohan, and **S. Chaudhuri**, "Genesis and evolution of premixed flames in turbulence," *Combustion and Flame*, vol. 196, pp. 386–399, 2018.

[22] A. Kalbhor, **S. Chaudhuri**, and L. Chitilappilly, "Autoignition of hydrogen in shear flows," *Physics of Fluids*, vol. 30, no. 5, 2018.

[23] R. Vishwanath, P. Tilak, and **S. Chaudhuri**, "An experimental study of interacting swirl flows in a model gas turbine combustor," *Experiments in Fluids*, vol. 59, no. 3, 2018.

[24] P. Kabi, **S. Chaudhuri**, and S. Basu, "Micro to nanoscale engineering of surface precipitates using reconfigurable contact lines," *Langmuir*, vol. 34, no. 5, pp. 2109–2120, 2018.

[25] S. Mahesh, R. Gopakumar, B. Rahul, A. Dutta, S. Mondal, and **S. Chaudhuri**, "Instability control by actuating the swirler in a lean premixed combustor," *Journal of Propulsion and Power*, vol. 34, no. 3, pp. 708–719, 2018.

[26] J. Singh, R. Vishwanath, **S. Chaudhuri**, and R. Sujith, "Network structure of turbulent premixed flames," *Chaos*, vol. 27, no. 4, 2017.

[27] **S. Chaudhuri**, H. Kolla, H. Dave, E. Hawkes, J. Chen, and C. Law, "Flame thickness and conditional scalar dissipation rate in a premixed temporal turbulent reacting jet," *Combustion and Flame*, vol. 184, pp. 273–285, 2017.

[28] H. Uranakara, **S. Chaudhuri**, and K. Lakshmisha, "On the extinction of igniting kernels in near-isotropic turbulence," *Proceedings of the Combustion Institute*, vol. 36, no. 2, pp. 1793–1800, 2017.

[29] P. Kabi, **S. Chaudhuri**, and S. Basu, "Insights into drying of noncircular sessile nanofluid droplets toward multiscale surface patterning using a wall-less confinement architecture," *Langmuir*, vol. 32, no. 42, pp. 10977–10986, 2016.

[30] H. Im, P. Arias, **S. Chaudhuri**, and H. Uranakara, "Direct numerical simulations of statistically stationary turbulent premixed flames," *Combustion Science and Technology*, vol. 188, no. 8, pp. 1182–1198, 2016.

[31] R. Gopakumar, S. Mondal, R. Paul, M. S., and **S. Chaudhuri**, "Mitigating instability by actuating the swirler in a combustor," *Combustion and Flame*, vol. 165, pp. 361–363, 2016.

[32] A. Sanyal, S. Basu, and **S. Chaudhuri**, "Controlling particle deposit morphologies in drying nanoparticle laden sessile droplets using substrate oscillations," *Physical Chemistry Chemical Physics*, vol. 18, no. 21, pp. 14549–14560, 2016.

[33] H. Uranakara, **S. Chaudhuri**, H. Dave, P. Arias, and H. Im, "A flame particle tracking analysis of turbulence-chemistry interaction in hydrogen-air premixed flames," *Combustion and Flame*, vol. 163, pp. 220–240, 2016.

[34] **S. Chaudhuri**, "Pair dispersion of turbulent premixed flame elements," *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, vol. 91, no. 2, 2015.

[35] P. Kabi, S. Basu, A. Sanyal, and **S. Chaudhuri**, "Precision stacking of nanoparticle laden sessile droplets to control solute deposit morphology," *Applied Physics Letters*, vol. 106, no. 6, 2015.

[36] A. Sanyal, S. Basu, and **S. Chaudhuri**, "Agglomeration front dynamics: Drying in sessile nano-particle laden droplets," *Chemical Engineering Science*, vol. 123, pp. 164–169, 2015.

[37] F. Wu, A. Saha, **S. Chaudhuri**, and C. Law, "Propagation speeds of expanding turbulent flames of c4 to c8 n-alkanes at elevated pressures: Experimental determination, fuel similarity, and stretch-affected local extinction," *Proceedings of the Combustion Institute*, vol. 35, no. 2, pp. 1501–1508, 2015.

[38] **S. Chaudhuri**, A. Saha, and C. Law, "On flame-turbulence interaction in constant-pressure expanding flames," *Proceedings of the Combustion Institute*, vol. 35, no. 2, pp. 1331–1339, 2015.

[39] **S. Chaudhuri**, "Life of flame particles embedded in premixed flames interacting with near isotropic turbulence," *Proceedings of the Combustion Institute*, vol. 35, no. 2, pp. 1305–1312, 2015.

[40] P. Kabi, S. Basu, and **S. Chaudhuri**, "Deployment strategy for controlled morphologies in sessile, mixed colloidal droplets," *RSC Advances*, vol. 5, no. 109, pp. 89586–89593, 2015.

[41] F. Wu, A. Saha, **S. Chaudhuri**, and C. Law, "Facilitated ignition in turbulence through differential diffusion," *Physical Review Letters*, vol. 113, no. 2, 2014.

[42] A. Saha, **S. Chaudhuri**, and C. Law, "Flame surface statistics of constant-pressure turbulent expanding premixed flames," *Physics of Fluids*, vol. 26, no. 4, 2014.

[43] A. Sanyal, S. Basu, S. Chowdhuri, P. Kabi, and **S. Chaudhuri**, "Precision control of drying using rhythmic dancing of sessile nanoparticle laden droplets," *Applied Physics Letters*, vol. 104, no. 16, 2014.

[44] **S. Chaudhuri**, F. Wu, and C. Law, "Scaling of turbulent flame speed for expanding flames with markstein diffusion considerations," *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, vol. 88, no. 3, 2013.

[45] S. Tuttle, **S. Chaudhuri**, K. Kopp-Vaughan, T. Jensen, B. Cetegen, M. Renfro, and J. Cohen, "Lean blowoff behavior of asymmetrically-fueled bluff body-stabilized flames," *Combustion and Flame*, vol. 160, no. 9, pp. 1677–1692, 2013.

[46] V. Akkerman, **S. Chaudhuri**, and C. Law, "Accelerative propagation and explosion triggering by expanding turbulent premixed flames," *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, vol. 87, no. 2, 2013.

[47] S. Yoo, **S. Chaudhuri**, K. Sacksteder, P. Zhang, D. Zhu, and C. Law, "Response of spherical diffusion flames subjected to rotation: Microgravity experimentation and computational simulation," *Combustion and Flame*, vol. 159, no. 2, pp. 665–672, 2012.

[48] **S. Chaudhuri**, S. Kostka, M. Renfro, and B. Cetegen, "Blowoff mechanism of harmonically forced bluff body stabilized turbulent premixed flames," *Combustion and Flame*, vol. 159, no. 2, pp. 638–640, 2012.

[49] **S. Chaudhuri**, F. Wu, D. Zhu, and C. Law, "Flame speed and self-similar propagation of expanding turbulent premixed flames," *Physical Review Letters*, vol. 108, no. 4, 2012.

[50] S. Tuttle, **S. Chaudhuri**, S. Kostka Jr., K. Kopp-Vaughan, T. Jensen, B. Cetegen, and M. Renfro, "Time-resolved blowoff transition measurements for two-dimensional bluff body-stabilized flames in vitiated flow," *Combustion and Flame*, vol. 159, no. 1, pp. 291–305, 2012.

[51] **S. Chaudhuri**, V. Akkerman, and C. Law, "Spectral formulation of turbulent flame speed with consideration of hydrodynamic instability," *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, vol. 84, no. 2, 2011.

[52] **S. Chaudhuri**, S. Kostka, S. Tuttle, M. Renfro, and B. Cetegen, "Blowoff mechanism of two dimensional bluff-body stabilized turbulent premixed flames in a prototypical combustor," *Combustion and Flame*, vol. 158, no. 7, pp. 1358–1371, 2011.

[53] K. Saha, **S. Chaudhuri**, and B. Cetegen, "Modeling of ceramic particle heating and melting in a microwave plasma," *Journal of Heat Transfer*, vol. 133, no. 3, 2011.

[54] S. Patel, **S. Chaudhuri**, and M. Pikal, "Choked flow and importance of mach i in freeze-drying process design," *Chemical Engineering Science*, vol. 65, no. 21, pp. 5716–5727, 2010.

[55] **S. Chaudhuri**, S. Kostka, M. Renfro, and B. Cetegen, "Blowoff dynamics of bluff body stabilized turbulent premixed flames," *Combustion and Flame*, vol. 157, no. 4, pp. 790–802, 2010.

[56] **S. Chaudhuri** and B. Cetegen, "Blowoff characteristics of bluff-body stabilized conical premixed flames in a duct with upstream spatial mixture gradients and velocity oscillations," *Combustion Science and Technology*, vol. 181, no. 4, pp. 555–569, 2009.

[57] **S. Chaudhuri**, A. Mukhopadhyay, M. Biswas, B. Cetegen, and S. Basu, "Control of combustion in a thermally stabilized burner," *Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy*, vol. 223, no. 2, pp. 127–139, 2009.

[58] **S. Chaudhuri** and B. Cetegen, "Response dynamics of bluff-body stabilized conical premixed turbulent flames with spatial mixture gradients," *Combustion and Flame*, vol. 156, no. 3, pp. 706–720, 2009.

[59] **S. Chaudhuri** and B. Cetegen, "Blowoff characteristics of bluff-body stabilized conical premixed flames with upstream spatial mixture gradients and velocity oscillations," *Combustion and Flame*, vol. 153, no. 4, pp. 616–633, 2008.

Book chapters

[60] M. Hatwar, A. Nayak, H. Dave, U. Aggarwal, and S. Chaudhuri, "Cluster analysis of turbulent premixed combustion using on-the-fly flame particle tracking," *Green Energy and Technology*, pp. 389–413, 2021.

[61] S. De, A. Agarwal, S. Chaudhuri, and S. Sen, "Preface," *Energy, Environment, and Sustainability*, pp. vii–ix, 2018.

[62] S. De and S. Chaudhuri, "Mechanics and modelling of turbulence–combustion interaction," *Energy, Environment, and Sustainability*, pp. 3–43, 2018.

[63] S. Basu, S. Chaudhuri, B. Cetegen, and A. Saha, "Mixing dynamics in interacting vortices," *Green Energy and Technology*, pp. 317–343, 2018.

[64] S. Chaudhuri, "Global and local viewpoints to analyze turbulence-premixed flame interaction," *Combustion for Power Generation and Transportation: Technology, Challenges and Prospects*, pp. 101–123, 2017.

Patents

[65] S. Chaudhuri, R. Gopakumar, S. Mondal, R. Paul, and S. Mahesh, "Mitigating instability by actuating the swirler in a combustor," Oct. 7 2015. Indian patent 378037, Internal Application PCT/IB2016/055940.

[66] S. Basu, K. Rajamanickam, S. Roy, and S. Chaudhuri, "Injector for dispensing an effervescent fluid and a fluid injector system thereof," June 13 2017. India Patent 321005, US Patent App. 16/621,453, International Application PCT/IB2018/054229.

Publications in conferences (only scopus indexed papers are mentioned here)

[67] S. Singh, A. Roy, K. Reeja, A. Nair, S. Chaudhuri, and R. Sujith, "Intermittency, secondary bifurcation and mixed-mode oscillations in a swirl-stabilized annular combustor: experiments and modeling," *Proceedings of the ASME Turbo Expo*, vol. 4B-2020, 2020.

[68] N. Thakor, C. Miranda, and S. Chaudhuri, "Flame stabilization in high enthalpy supersonic flows: Experiments and simulations," *AIAA Scitech 2020 Forum*, vol. 1 PartF, 2020.

[69] S. Kumar, S. Chaudhuri, and S. Basu, "On effect of the flare angle on the behaviour of the flow field of twin-radial swirlers/high shear injector," *ASME 2019 Gas Turbine India Conference, GTINDIA 2019*, vol. 2, 2019.

[70] G. Ramachandran, A. Dutta, H. Durairaj, and S. Chaudhuri, "On the interaction of swirling flames in a lean premixed combustor," *Proceedings of the ASME Turbo Expo*, vol. 4A-2019, 2019.

[71] A. Kalbhor, A. Moitro, S. Chaudhuri, and L. Chitilappilly, "Hydrogen jet autoignition in a co-flow and in a wake of heated air," *International Conference on Computational Methods for Thermal Problems*, no. 223309, pp. 43–46, 2018.

[72] H. Dave, M. Abinesh, and S. Chaudhuri, "Genesis and evolution of premixed flames in turbulence," *International Conference on Computational Methods for Thermal Problems*, no. 223309, pp. 330–333, 2018.

[73] A. Mohan, H. Dave, and S. Chaudhuri, "Evolution of surface elements of premixed flames in turbulence," *11th Asia-Pacific Conference on Combustion, ASPACC 2017*, vol. 2017-December, 2017.

[74] H. Dave, M. Abinesh, and S. Chaudhuri, "Genesis and evolution of premixed flames in turbulence," *11th Asia-Pacific Conference on Combustion, ASPACC 2017*, vol. 2017-December, 2017.

[75] A. Dutta, R. Gopakumar, B. Rahul, J. Singh, and S. Chaudhuri, "On the dynamics of instability mitigation by actuating the swirler in a combustor," *11th Asia-Pacific Conference on Combustion, ASPACC 2017*, vol. 2017-December, 2017.

[76] R. Gopakumar, R. Vishwanath, J. Singh, A. Dutta, and S. Chaudhuri, "On the dynamics of instability mitigation by actuating swirler motion in a lean premixed turbulent combustor," *ASME 2017 Gas Turbine India Conference, GTINDIA 2017*, vol. 1, 2017.

[77] B. Raja and S. Chaudhuri, "Limit phenomena in turbulent premixed interacting swirl flames," *ASPACC 2015 - 10th Asia-Pacific Conference on Combustion*, 2015.

[78] H. Im, P. Arias, S. Chaudhuri, and H. Uranakara, "Direct numerical simulations of statistically stationary turbulent premixed flames," *ASPACC 2015 - 10th Asia-Pacific Conference on Combustion*, 2015.

[79] K. Kumar and S. Chaudhuri, "Lagrangian analysis of persistence of curvature and tangential strain rate on propagating level set surfaces forced by turbulence," *ASPACC 2015 - 10th Asia-Pacific Conference on Combustion*, 2015.

[80] H. Uranakar, S. Chaudhuri, and K. Lakshmisha, "Turbulence-transport-chemistry interaction in statistically planar premixed flames and ignition kernels in near isotropic turbulence," *ASME 2014 Gas Turbine India Conference, GTINDIA 2014*, 2014.

[81] S. Yang, S. Chaudhuri, D. Zhu, and C. Law, "Dynamics and morphology of colliding spherical flames," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2013*, pp. 143–148, 2013.

[82] A. Saha, S. Chaudhuri, and C. Law, "Flame surface statistics of expanding turbulent flame," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2013*, pp. 21–26, 2013.

[83] F. Wu, A. Saha, S. Chaudhuri, and C. Law, "An investigation on fuel similarity of turbulent flames for c4-c8 n-alkanes," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2013*, pp. 27–32, 2013.

[84] V. Akkerman, S. Chaudhuri, and C. Law, "Evolution and morphology of globally-spherical and bubble-shaped accelerating deflagration fronts: Stability, dynamics and possibility of detonation triggering," *8th US National Combustion Meeting 2013*, vol. 3, pp. 2084–2095, 2013.

[85] S. Yoo, S. Chaudhuri, K. Sacksteder, P. Zhang, D. Zhu, and C. Law, "Dynamics and morphology of spherical diffusion flames under rotation," *50th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition*, 2012.

[86] S. Chaudhuri, F. Wu, D. Zhu, and C. Law, "Turbulent flame speed and self-similar propagation of expanding premixed flames," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2011*, pp. 648–658, 2011.

[87] S. Chaudhuri, S. Kostka, S. Tuttle, M. Renfro, and B. Cetegen, "Blowoff dynamics of v-shaped bluff body stabilized, turbulent premixed flames in a practical scale rig," *48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition*, 2010.

[88] S. Tuttle, S. Chaudhuri, S. Kostka, M. Kulakhmetov, B. Cetegen, and M. Renfro, "Transitional blowoff behavior of wake-stabilized flames in vitiated flow," *48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition*, 2010.

[89] S. Chaudhuri, S. Kostka, S. Tuttle, M. Renfro, and B. Cetegen, "Understanding blowoff dynamics of bluff body stabilized turbulent flames in a prototypical combustor," *Fall Meeting of the Eastern States Section of the Combustion Institute 2009*, pp. 37–49, 2009.

[90] S. Tuttle, J. Kostka, S., S. Chaudhuri, M. Kulakhmetov, B. Cetegen, and M. Renfro, "Instantaneous and time-resolved blowoff transition measurements for two-dimensional bluff body-stabilized flames in vitiated flow," *Fall Meeting of the Eastern States Section of the Combustion Institute 2009*, pp. 50–59, 2009.

[91] S. Chaudhuri and B. Cetegen, "Effects of spatial mixture gradients on stabilization zone temperatures of bluff-body stabilized turbulent premixed conical flames," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2007 "Chemical and Physical Processes in Combustion"*, pp. 342–346, 2007.

[92] S. Basu, S. Chaudhuri, and B. Cetegen, "Soot topography in a planar diffusion flame wrapped by interacting line vortices," *Fall Technical Meeting of the Eastern States Section of the Combustion Institute 2007 "Chemical and Physical Processes in Combustion"*, pp. 316–320, 2007.

[93] S. Chaudhuri and B. Cetegen, "Blow-off characteristics of bluff body stabilized conical premixed flames with spatial mixture gradients and upstream velocity modulations," *5th US Combustion Meeting 2007*, vol. 1, pp. 638–652, 2007.

Edited Book

[94] S. De, A. K. Agarwal, S. Chaudhuri, and S. Sen, *Modeling and simulation of turbulent combustion*. Springer, 2018.

Research Funding

2021 – 2022 Investigating the effects of alternative fuels on the combustion instabilities of two staged combustion system [C$ 63k]
National Research Council Canada
Principal Investigator: S. Chaudhuri

2021 – 2026 Structure, propagation, and stabilization of turbulent flames at aircraft engine conditions [C$ 160k]
Natural Sciences and Engineering Research Council of Canada, Discovery Grant
Principal Investigator: S. Chaudhuri

2021 – 2022 Direct numerical simulations of turbulent reacting and multiphase flows (HPC time allocation worth [C$ 62k])
Compute Canada, Resource Allocation Competitions
Principal Investigator: S. Chaudhuri

2021 – 2026 Kinetics-transport interaction towards deposition of carbon particulates in mesochannel: supercritical fuel flows [C$ 220k]
Canada Foundation for Innovation, John R. Evans Leaders Fund
Principal Investigator: S. Chaudhuri
Co-Principal Investigator: Prof. O. L. Gulder

2021 – 2022 Mathematics for Public Health and Variants of Concern [C$ 100k]
Canadian Institutes of Health Research
Principal Investigator: Prof. V.K. Murty

2016 – 2022 Next generation low-emission combustor technologies for high-efficiency compact aviation gas turbine engines [C$ 3104k]
Ontario Research Fund
Principal Investigator: Prof. O. L. Gulder

2019 – 2022 Heuckroth Distinguished Faculty Award in Aerospace Engineering [C$ 200k]
University of Toronto Institute for Aerospace Studies

2013 – 2019 Funding secured as Principal Investigator at Indian Institute of Science ≈ INR 100 million

Research supervision: PhD students

2020 – present **Yazdan Naderzadah**, Local flame displacement speed measurements in turbulence
University of Toronto Institute for Aerospace Studies

2020 – present **Arnab Mukherjee**, Large scale disease dynamics from flow physics of airborne transmission
University of Toronto Institute for Aerospace Studies

2019 – present **Kartikeya Akojwar**, Coke formation in supercritical fuel flows
University of Toronto Institute for Aerospace Studies

2019 – present **Yuvraj**, Turbulence-flame interaction at high Karlovitz numbers
University of Toronto Institute for Aerospace Studies

2015 – present **Ankit Dutta**, Synchronization and combustion dynamics in lean premixed combustors
Indian Institute of Science

2013 – 2020 **Gopakumar R**, Dynamics of actuated and interacting swirl premixed flames in model gas turbine combustors
Indian Institute of Science
Present position: postdoc at Sandia National Laboratories

2013 – 2020 **Prasenjit Kabi**, A study of internal transport mechanisms in evaporating sessile droplets leading to dynamic self-assembly
Indian Institute of Science, co-supervised with S. Basu
Present position: postdoc at University College London

2014 – 2019 **Himanshu L. Dave**, Structure and propagation of premixed flames in turbulence
Indian Institute of Science
Present position: postdoc at Université libre de Bruxelles

2013 – 2018 **Harshavardhana Uranakara**, Flame Particle Tracking analysis of turbulence-premixed flame interaction
Indian Institute of Science
Present position: postdoc at KAUST

Research supervision: MASc students

2017 – 2021 **Vishal Singh**, Spray interaction with supersonic crossflow
Indian Institute of Science

2017 – 2019 **Mallikarjuna Tilak**, Analysis of interacting swirling flows
Indian Institute of Science

2017 – 2019 **Abinesh Mohan**, Lagrangian flame element analysis of turbulence-premixed flame interactions
Indian Institute of Science

MTech project supervision

2018 – 2019 **Nitin Chandy Joseph**
Indian Institute of Science

2018 – 2019 **Nithin Somasekharan**
Indian Institute of Science

2017 – 2018	**Mehul Kumar** Indian Institute of Science
2017 – 2018	**Harish S.** Indian Institute of Science
2016 – 2017	**Mohammad Anwar** Indian Institute of Science
2016 – 2017	**Abhijit Kalbhor** Indian Institute of Science
2016 – 2017	**Lakshmi Ganesh Shankar** Indian Institute of Science
2013 – 2014	**Kaladasi Dileep Kumar** Indian Institute of Science

Teaching

Fall 2021	**AER 1324: Introduction to Turbulence** University of Toronto
Spring 2021 Spring 2020	**AER 510: Aerospace Propulsion** University of Toronto
Fall 2017 Fall 2015	**AE 245: Mechanics and Thermodynamics of Propulsion** Indian Institute of Science
Spring 2016 Spring 2015 Spring 2014	**AE 250: Advanced Combustion** Indian Institute of Science
Fall 2018 Fall 2016 Fall 2014	**AE 276: Experimental Techniques** (few lectures) Indian Institute of Science
Summer 2017	**Combustion in Air Breathing Aero Engines (NPTEL)** 30 hours MOOC https://nptel.ac.in/courses/101/108/101108068/

Invited Talks

October 2021	Hydrogen in aerospace propulsion, part 1: Ignition and extinction *Pratt and Whitney mini conference on hydrogen*
September 2021	Hydrogen in aerospace propulsion, part 2: Flame propagation, interaction, and dynamics *Pratt and Whitney mini conference on hydrogen*

July 2021	Turbulent Combustion II: Structure and propagation of turbulent flames *Princeton Combustion Institute Summer School 2021*
July 2021	Local Structure and Propagation of Turbulent Premixed Flames *Pratt and Whitney Canada Seminar Series*
June 2021	Estimating overdispersion from turbulent diffusion of infectious aerosols *Ontario Science Table*
June 2021	Analyzing overdispersion from turbulent diffusion of infectious aerosols *Modeling Consensus Table*
March 2021	Propagation and structure of premixed flames in turbulence *Guest lecture in graduate course on Combustion: Princeton University*
March 2021	Genesis and evolution of premixed flames in turbulence *Pratt and Whitney Canada Seminar Series*
February 2021	Constructing an ab-initio disease spread model to decipher Covid-19 type pandemics *Department of Mechanical Engineering, University of Connecticut*
February 2021	Constructing a disease spread model from the flow physics of infectious droplets and aerosols *The Fields Institute, Toronto*
December 2020	Analyzing the dominant SARS-CoV-2 transmission routes towards an ab initio disease spread model *Complex Fluids Conference, IIT Bombay*
March 2019	How Swirl Flames Interact in a Multi Nozzle Model Gas Turbine Combustion *International Workshop on Energy Power and Environment, Kurukshetra*
November 2018	Evolution of Flame Speeds in Turbulence at Different Pressures *International Conference on Combustion and Energy Utilization, Sendai, Japan*
May 2018	Autoignition of Hydrogen in Shear Flows *ASeT 2018: Future Directions in Propulsion Conference, LPSC ISRO*
April 2018	Genesis, Evolution and Annihilation of Premixed Flames in Turbulence *Taiwan Annual National Conference on Energy and Combustion*
March 2018	Turbulent Combustion Dynamics in Aero Engine Combustors *University of Toronto Institute for Aerospace Studies*
March 2018	Genesis, Evolution and Annihilation of Premixed Flames in Turbulence *KAUST Research Conference on Combustion in Extreme Environments*
February 2018	Genesis and Evolution of Premixed Flames in Turbulence *Prof. P. J. Paul Memorial Meet, Hyderabad*
December 2016	Dispersion, Propagation and Extinction of Flame Elements in Turbulence *International Discussion Meeting on Chemical Kinetics for Aerospace Applications, IISc*

February 2016	Mitigating Instability by Actuating the Swirler in a Combustor *Prof. P. J. Paul Memorial Meet at VSSC, Trivandrum*
February 2016	Lagrangian Investigations of Turbulent Premixed Flames *Complex System Approach to Self-Organization, IIT Madras*
August 2015	Local and Global Viewpoints in Turbulent Combustion *IISc Astrophysics Seminar*
August 2015	Lagrangian Viewpoint of Turbulent Premixed Combustion *Prof. P. J. Paul Memorial Meet, Mahabalipuram*
January 2015	Local and Global Viewpoints in Turbulent Combustion: Turbulent Flame Speed and Flame Particle Tracking *International Workshop on Sustainable Energy Power and Propulsion, organized by Jadavpur University, IITK, University of Maryland, University of Illinois and Chicago*
March 2014	Turbulent Combustion at NCCRD, IISc *Pan India Combustion Workshop IITM*
February 2014	Two Problems in Turbulent Combustion: Experiments and DNS *Prof. P. J. Paul Memorial Meet, Jain University*
February 2014	Blowoff Dynamics and its Measurements *Thermo-acoustic and Aero-acoustic nonlinearities in green combustors with orifice structures Workshop, Indian Institute of Technology, Madras*
July 2013	Turbulent Combustion: Flame Speed and Flame Blowoff *Vikram Sarabhai Space Center, ISRO*
July 2013	Two Problems in Turbulent Combustion: Flame Propagation and Stabilization *Indian Institute of Technology, Madras*
July 2013	A Brief Journey with Turbulent Reacting Flows *Jadavpur University*
January 2012	Two Problems in Turbulent Combustion: Flame Propagation and Stabilization *Indian Institute of Science, Bangalore*
December 2011	Propagation and Stabilization of Turbulent Premixed Flames *Imperial College London*
November 2009	Dynamics and Diagnostics of Turbulent Premixed Flames *Max Planck Institute for Dynamics and Self Organization, Göttingen*
August 2009	Blowoff Mechanism and Forced Response of Bluff Body Stabilized Turbulent Premixed Flames *Princeton University*

University Service

2020 – present	UTIAS Curriculum Committee

2020 – present	UTIAS Seminar Committee (Chair)
2020 – present	UTIAS Planning Committee
2017	IISc AE Department Review Committee
2017	IISc AE Department Review Committee
2014	IISc AE Department Development Committee
2013	GATE Examination Committee
2013 – 2019	IISc ICER Research Student Admission
2013 – 2019	IISc AE Research Student Admission
2013 – present	Doctoral and Masters evaluation committees at UTIAS and at IISc

Academic service

Served as reviewer for the following journals and conferences

1. Combustion and Flame 2. Progress in Energy and Combustion Science 3. Proceedings of the Combustion Institute 4. Journal of Fluid Mechanics 5. AIAA Journal 6. AIAA Journal of Propulsion and Power 7. International Journal of Spray and Combustion Dynamics 8. Physics of Fluids 9. Combustion Science and Technology 10. International Journal of Hydrogen Energy 11. Experimental Thermal and Fluid Sciences 12. Chinese Journal of Aeronautics, Elsevier 13. Sadhana, Indian Academy of Sciences, Springer 14. Physics Letters A 15. Chaos: An Interdisciplinary Journal of Nonlinear Science 16. PLOS One 17. International Journal of Heat and Mass Transfer 18. International Symposium in Combustion 19. ASME Turbo Expo 20. ASME GT India Conference 21. ILASS Asia 22. International Heat Transfer Conference 23. Asia Pacific Conference on Combustion 24. International Conference on Computational Methods in Thermal Problems 25. Journal of Aerospace Technology and Management 26. Atmospheric Chemistry and Physics 27. Science of the Total Environment 28. Current Science 29. Springer Books

Served as reviewer for the following funding agencies

1. Science and Engineering Research Board, Government of India. 2. ISRO-IISc Space Technology Cell

Professional memberships

2021 – Present	**Modeling Consensus Table, Ontario**
2019 – Present	**AIAA Propellants and Combustion Technical Committee**
2006 – Present	**American Society of Mechanical Engineers**
2006 – Present	**Combustion Institute**