

# Venkat Narayanaswamy

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## Education Training

### PH. D. | MAY 2010 | THE UNIVERSITY OF TEXAS AT AUSTIN

- Major: Aerospace Engineering
- Advisor: Prof. Noel Clemens

### BACHELOR OF TECHNOLOGY | JULY 2004 | INDIAN INSTITUTE OF TECHNOLOGY MADRAS

- Major: Aerospace Engineering
- Minor: Industrial Engineering

### POSTDOCTORAL FELLOW | MAY 2011 | THE UNIVERSITY OF TEXAS AT AUSTIN POSTDOCTORAL FELLOW | AUG 2012 | RWTH AACHEN, GERMANY

## EMPLOYMENT HISTORY

Associate Professor, North Carolina State University	08/18 - present
Assistant Professor, North Carolina State University	08/12 – 08/18
Graduate Research Assistant, The University of Texas at Austin	08/04 – 05/10

## HONORS AND AWARDS

- 2023 Associate Fellow, American Institute for Aeronautics and Astronautics
- 2022 Fulbright Nehru US Scholar, The Fulbright Foundation
- 2022 US Air Force Faculty Scholar, Department of Defense
- 2020 Alumnus of National Academy of Engineers US Frontiers of Engineering Symposium
- 2019 International coordinator under Scheme for Promotion of Academic and Research Collaboration (SPARC), Government of India
- 2017 Honoree, Chancellor's Faculty Excellence Reception, North Carolina State University
- 2016 Air Force Summer Faculty Fellowship, American Society of Engineering Education
- 2016 AFOSR Young Investigator Program (YIP) Award, Department of Defense
- 2014 New Investigator Award, North Carolina Space Grant, NASA
- 2013 Faculty Research and Professional Development Award, North Carolina State Univ.
- 2013 NCSU Nominee, ORAU Ralph. E. Powe Junior Faculty Award
- 2003 Young Engineer Fellowship, Indian Institute of Science, Govt of India
- 1998 Scholarship under National Talent Search Examination, Govt of India

## RESEARCH ARTICLES IN PEER-REVIEWED JOURNALS

2022

1. Sahoo, A., and Narayanaswamy, V., "A Novel Approach for Quenching measurements of Kr  $4p^6S_0^1 \rightarrow 5p[3/2]_2$  Transition Using Absorption Spectra", Under Review, Applied Optics, 2022.
2. Walz, J., and Narayanaswamy, V., "Dual Mitigation of Separation and Skin Friction Drag in High Speed Flows using Viscoelastic Material Implants", Under Review, Physics of Fluids, 2022.
3. Varigonda, S., and Narayanaswamy, V., "Investigations of FSI generated by an Impinging SBLI on a Thin Panel using Multivariate Imaging of Flow/Structural Properties", Under Review, Journal of Fluids and Structures, 2022.
4. Jenquin, C., Johnson, E., and Narayanaswamy, V., "Investigations of shock boundary layer interaction dynamics using high bandwidth pressure field imaging", Accepted for Publication, Journal of Fluid Mechanics, 2022
5. Johnson, E., Jenquin, C., McCreedy, J., Naryanaswamy, V., and Edwards, J.R., "Experimental Investigations of the Hypersonic Streamtraced Performance Inlet at Sub-design Mach number", Published online, AIAA Journal, 2022.
6. Sahoo, A., Narayanaswamy, V., Ramachandran, A., and Lyons, K.M., "Mixture Fraction Imaging of Distributed Regime Turbulent Jet Flame using Rayleigh Scattering", Applied Optics, Vol. 61 (9), 2338 – 2351, 2022.
7. Freydin, M., Dowell, E.H., Varigonda, S.V. and Narayanaswamy, V., "Response of a plate with piezoelectric elements to turbulent pressure fluctuation in supersonic flow", Journal of Fluids and Structures, 114, p.103696, 2022.

2021

8. Varigonda, V., Naryanaswamy, V., "Methodology to image the panel surface pressure power spectra in weakly coupled fluid/structure interactions", Experiments in Fluids, Vol. 62 (11), 1 - 17, 2021.
9. Leonard, M., Narayanaswamy, V., "Investigation of Shock Dynamics in an Axisymmetric Inlet Isolator with Attached Boundary Layers", Journal of Fluid Mechanics, Vol. 908, A42, 2021.
10. Freydin, M., Levin, D., Dowell, E.H., Varigonda, S.V. and Narayanaswamy, V., "Correction: Natural Frequencies of a Heated Plate: Theory and Experiment". AIAA Journal, 59(6), pp.AU2-AU2, 2021.

2020

11. Pickles, J.D., Narayanaswamy, V., "Control of Shock Induced Flow Separation Generated by a Sharp Fin using Vortex Generators", AIAA Journal, Vol. 58 (11), 4794-4806, 2020.
12. Freydin, M., Levin, D., Dowell, E., Varigonda, S. V., Narayanaswamy, V., "Natural Modes of a Heated Plate: Theory and Experiment", AIAA Journal, Vol. 58 (11), 4969-4973, 2020

13. Sahoo, A., Zelenak, D. C., Narayanaswamy, V., "Pressure Scaling of the Collisional Broadening Parameters of Kr  $4p^6S_0^1 \rightarrow 5p[3/2]_2$  Transition", Applied Optics, Vol. 59 (26), 7760-7769, 2020.
14. Pickles, J.D., Narayanaswamy, V., " Investigation of surface curvature effects on unseparated fin shock-wave/boundary-layer interactions", AIAA Journal, Vol. 58 (2), 770 – 778, 2020
15. Sahoo, A., and Narayanaswamy, V., Temperature Dependence of Collisional Broadening and Shift for the Kr  $4p S^1 \rightarrow 5p[3/2]$  Electronic Transition, Applied Optics, Vol. 59 (5), pp. 1438 - 1446, 2020.

#### 2019

16. Sahoo, A., and Narayanaswamy, V., "Two-dimensional Temperature Field Imaging in Laminar Sooting Flames using a two-line Kr PLIF Approach", Applied Physics B, vol. 125, no. 9 pp. 168 (9 pages), 2019.
17. Funderburk, M., and Narayanaswamy, V., Measurement of Unsteadiness in a Turbulent Shock Boundary Layer Interaction Using Fast Fluoro Isopropyl Butyl Polymer Pressure Sensitive Paint, Experiments in Fluids, vol. 60, no. 10, pp. 154 (20 pages), 2019.
18. Funderburk, M. L., and Narayanaswamy, V., "Experimental Investigation of Microramp Vortex Generator Application Upstream of an Axisymmetric Shock Boundary Layer Interaction", AIAA Journal, vol. 57, no. 8, pp. 3379-3394, 2019
19. Pickles, J.D., Mettu, B.R., Subbareddy, P.K., and Narayanaswamy, V., "Sharp-Fin Induced Shock Wave/Turbulent Boundary Layer Interactions in an Axisymmetric Configuration", Journal of Fluid Mechanics, Vol. 865, pp. 212 – 246, 2019
20. Zelenak, D., and Narayanaswamy, V., "Demonstration of a 2-line Kr PLIF thermometry technique for gaseous combustion applications", Optics Letters, Vol. 44, no. 2, 2019
21. Funderburk, M. L., and Narayanaswamy, V., "Investigation of Negative Surface Curvature Effects in an Axisymmetric Shock Boundary Layer Interaction", AIAA Journal, Vol. 57 (4), 1594-1607, 2019.
22. Ramachandran, A., Narayanaswamy, V., and Lyons, K.M., "Observations on the Role of Autoignition in Flame Stabilization in Turbulent Non-premixed Jet Flames in Vitiated Coflow," ASME Journal of Gas Turbines, vol. 151, no. 6, pp. 061018, 2019

#### 2015 - 2018

23. Pickles, J.D., Mettu, B.R., Subbareddy, P.K., and Narayanaswamy, V., "Gas density field measurements of shock dominated flows using planar laser scattering technique", Experiments in Fluids, vol. 59, no. 7, pp. 112(15 pages) 2018
24. Pham, H.T., Gianikos, Z., and Narayanaswamy, V., "Compression Ramp Induced Shock Wave/Turbulent Boundary Layer Interactions on a Compliant Material", AIAA Journal, vol. 56, no. 7 pp. 2925 – 2929. 2018.
25. Zelenak, D., and Narayanaswamy, V., "Composition-independent mean temperature measurements in laminar diffusion flames using spectral lineshape information," Experiments in Fluids, Vol. 58:147, 16 pages, 2017.

26. Funderburk, M., and Narayanaswamy, V., "Experimental Investigation of Primary and Corner Shock Boundary Layer Interactions at Mild Back Pressure Ratios", *Physics of Fluids*, Vol. 28, 086102, 2016.
27. Zelenak, D., Sealy, W. and Narayanaswamy, V., "Collisional broadening of Kr transition with combustion species as collision partners," *Journal of Quantitative Spectroscopy and Radiative Transfer*, Vol. 174, pp. 28-38, 2016.

*Before 2015*

28. Clemens, N. T., and Narayanaswamy, V., "Low-Frequency Unsteadiness of Shock Wave/Turbulent Boundary Layer Interactions," *Annual Review of Fluid Mechanics*, Vol. 46, pp. 469 – 492, 2014.
29. Gampert, M., Narayanaswamy, V., and Peters, N. Scalar gradient trajectory measurements using high-frequency cinematographic planar Rayleigh scattering. *Experiments in Fluids*, 54, 12 (2013), 1 - 15.
30. Gampert, M., Narayanaswamy, V., Schaefer, P., and Peters, N., "Conditional statistics of the turbulent/non-turbulent interface in a jet flow," *Journal of Fluid Mechanics* Vol. 731, pp. 615-638, 2013.
31. Gampert, M., Schaefer, P., Narayanaswamy, V. and Peters, N., "Gradient trajectory analysis in a jet flow for turbulent combustion modelling," *Journal of Turbulence* Vol. 14, pp. 147-164, 2013.
32. Narayanaswamy, V. and Clemens, N.T., "Simultaneous LII and PIV measurements in the soot formation region of turbulent non-premixed flames," *Proceedings of Combustion Symposium* Vol. 34, pp. 1455-1463, 2013.
33. Narayanaswamy, V., Raja, L. L., and Clemens, N.T., "Control of Unsteadiness of a Shock Wave / Turbulent Boundary layer Interaction by using a Pulsed-Plasma Jet Actuator," *Physics of Fluids* Vol. 24, 076101-22, 2012.
34. Narayanaswamy, V., Raja, L. L., and Clemens, N.T., "Control of a shock/ boundary layer interaction by using a pulsed-plasma jet actuator," *AIAA Journal* Vol. 50, No. 1, pp. 246-249, 2012.
35. X. Guo, H. Zhao, H. Song, Q. Chen, K.K. Li, Y.K. Zou, H. Jiang, C. S. Combs, V. Narayanaswamy, and N. T. Clemens, "Upconverting Nanophosphors for High Temperature Sensing Applications," *Nanotech* 2011, Vol. 1, 2011, pp. 429-433.
36. Narayanaswamy, V., Raja, L. L., and Clemens, N.T., "Method for acquiring pressure measurements in presence of plasma-induced interference for supersonic flow control applications," *Measurement Science and Technology* Vol. 22, p. 125107 (11 pages), 2011.
37. Narayanaswamy, V. and Clemens, N.T., "Kr-PLIF for scalar imaging in supersonic flows," *Optics Letters*, Vol. 36, Issue 21, pp. 4185-4188, 2011.
38. Hsu, A., Narayanaswamy, V., Clemens, N. T. and Frank, J.H., "Mixture fraction imaging in turbulent non-premixed flames with two-photon LIF of krypton," *Proceedings of Combustion Symposium* Vol. 33, pp. 759-766, 2011.

39. Narayanaswamy, V., Raja, L. L., and Clemens, N.T., "Characterization of a high-frequency pulsed plasma jet actuator," AIAA Journal Vol. 48, No. 2, pp. 297-305, 2010.
40. Shin, J., Narayanaswamy, V., Raja, L. L., and Clemens, N.T., "Characterization of a Direct-Current Glow Discharge Plasma Actuator in Low-Pressure Supersonic Flow," AIAA Journal Vol. 45, No. 7, pp. 1596-1605, 2007.

## **PEER REVIEWED CONFERENCE PUBLICATIONS**

### 2023 (to appear)

41. Ghosh, S., and Narayanaswamy, V., "Computational and Experimental Investigations of Shock Boundary Layer Interactions in Axisymmetric Inlets" AIAA SCITECH 2023
42. Schwandt, J., Vasile, J., and Narayanaswamy, V., "Control of Shock Induced Separation from Shock-Shock Interactions Using Vortex Generators" AIAA SCITECH FORUM 2023
43. Jenquin, C., and Narayanaswamy, V., "Half-Isolator Shock Dynamics Due to the Presence of Pressure-Sensitive Paint and Microramp Vortex Generators" AIAA SCITECH FORUM 2023
44. Sahoo, A., and Narayanaswamy, V., "Simultaneous Imaging of CH<sub>2</sub>O, Mixture Fraction, and Temperature in a Turbulent Non-Premixed Jet Flame" AIAA SCITECH FORUM 2023
45. Stephen, S., Wood, S., Stumbar, L., and Naryanaswamy, V., "Development and Testing of High-Temperature Fast Response Pressure Sensitive Paint", AIAA SCITECH FORUM 2023
46. Walz, J., and Naryanaswamy, V., "Experimental Investigation of Shock Boundary Layer Interactions Over Rubbers of Varying Storage and Loss Moduli, and Hardness", AIAA SCITECH FORUM 2023

### 2022

47. Johnson, E.C., Jenquin, C., and Naryanaswamy, V., "Experimental Studies of Unstart Shock Dynamics within a Streamtraced Scramjet Inlet", AIAA AVIATION FORUM 2022
48. Acharya, R., Hartman, K., and Naryanaswamy, V., "Multifidelity Reduced-Dimensional Modeling for Shock-fin Interaction", AIAA AVIATION FORUM 2022
49. Johnson, E.C., Jenquin, C., Walz, J., Narayanaswamy, V., and Edwards, J.R. "Mach 4 Performance of a Hypersonic Streamtraced Inlet - Part 1: Experimental Investigations" AIAA SCITECH Forum 2022.
50. McCreedy, J., Hoppe, C., Johnson, E.C., Edwards, J.R., and Narayanaswamy, V., "Mach 4 Performance of a Hypersonic Streamtraced Inlet – Part 2: Computational Results", AIAA SCITECH Forum 2022.
51. Walz, J., and Narayanaswamy, V. "Investigations of Shock Boundary Layer Interactions Over a Soft Material for Separated Control". AIAA SCITECH Forum 2022.
52. Jenquin, C., Johnson, E.C., and Narayanaswamy, V., "Effects of Pressure Sensitive Paint on the Dynamics of Half-Inlet Shock Dynamics", AIAA SCITECH Forum 2022.
53. DeBoskey, R., Kessler, D., Johnson, R.F., Sahoo, A., and Narayanaswamy, V., "2D Numerical Investigation of Conventional and Distributed Regime Turbulent Jet", AIAA SCITECH Forum 2022.

## 2021

54. Varigonda, S.V., Jenquin, C. and Narayanaswamy, V., "Impact of Panel Vibrations on the Dynamic Field Properties in Supersonic flow" AIAA Aviation Forum 2021.
55. Sahoo, A., DeBoskey, R., Narayanaswamy, V. and Lyons, K.M., "2D Velocity Field Measurement of Conventional and Distributed Regime Turbulent Jet Flame using Particle Image Velocimetry". AIAA Propulsion and Energy Forum 2021.
56. Peltier, S., Rice, B., Johnson, E., and Narayanaswamy, V., "Effects of Three-Dimensional Pressure Gradients on High-Speed Turbulent Boundary Layers", AIAA Scitech 2021
57. Bharadwaj, A., Ghosh, S., and Narayanaswamy, V., "Numerical Investigation of Passive Flow Control Using Porous Region in Oblique Shock Wave Boundary Layer Interaction", AIAA Scitech 2021
58. Boles, J., Caleb, T., Salazaar, G., Narayanaswamy, V., and Edwards, J.R., "Flow Distortion Computational Modeling and Design Optimization for Supersonic Inlet", AIAA Scitech 2021

## 2020

59. Varigonda, S., Narayanaswamy, V., and Boxx, I. "Simultaneous Measurement of Pressure and Velocity Fields of an Oblique SBLI on a Flexible Panel using PIV and PSP", AIAA Aviation Conference 2020.
60. Sahoo, A., Ramachandran, A., Narayanaswamy, V., and Lyons, K.M., "Mixture Fraction Imaging of Distributed Regime Turbulent Jet Flame using Rayleigh Scattering", AIAA Aviation Conference 2020.
61. Pickles, J.D., Mettu, B., Subbareddy, P.K., Vasile, J.D., DeSpirito, J., and Narayanaswamy, V., "Analysis of turbulence models to predict fin-on-cylinder shock boundary layer interactions", AIAA Scitech 2020
62. Sahoo, A., Ramachandran, A., Narayanaswamy, V., Lyons, K.M., and Johnson, R.F., "Investigations of mixed conventional and MILD combustion flames" AIAA Scitech 2020

## 2019

63. Sahoo, A., and Narayanaswamy, V., "2D temperature field measurement in a sooting flame using the 2-line Kr PLIF thermometry technique" AIAA Aviation 2019
64. Varigonda, S., and Narayanaswamy, V., "Investigation of Shock Wave Oscillations over a Flexible Panel in Supersonic Flows", AIAA Aviation 2019
65. Pickles, J.D., and Narayanaswamy, V., "Achieving high maneuverability and precision in munitions using non-linear flow interactions", International Ballistics Symposium, 2019

## 2018

66. Narayanaswamy, V., and Zelenak, D. "Two-line Kr PLIF technique for composition independent temperature imaging in gaseous combustion", Laser Applications to Chemical, Security and Environmental Analysis, 2018
67. Pham, H.T., and Narayanaswamy, V., "Compression Ramp Induced Shock Wave/Turbulent Boundary Layer Interactions on a Compliant Material", AIAA Scitech 2018.

68. Leonard, M.D., and Narayanaswamy, V., "Preliminary Investigation of Unstart Physics and Dynamics in an Axisymmetric Isolator", AIAA Scitech 2018
69. Pickles, J.D., Mettu, B.R., Subbareddy, P.K., and Narayanaswamy, V., "Effect of boundary layer distortions on Sharp fin-on-cylinder SBLI", AIAA Aviation, 2018
70. Funderburk, M.L., and Narayanaswamy, V., "Experimental Investigation of Shock Boundary Layer Interactions with inflow distortions in axisymmetric isolator geometries", AIAA Joint Propulsion Conference, 2018

2017

71. Ley, K.M., and Narayanaswamy, V., "Effects of Low Temperature on the Ignition Processes of Laminar and Turbulent Methane Jets", AIAA Joint Propulsion Conference, 2017
72. Funderburk, M.L., and Narayanaswamy, V., "Experimental Investigation of Shock Boundary Layer Interactions in axisymmetric isolator geometries", AIAA Joint Propulsion Conference, 2017
73. Pickles, J.D., Mettu, B.R., Subbareddy, P.K., and Narayanaswamy, V., "Sharp-Fin Induced Shock Wave/Turbulent Boundary Layer Interactions in an Axisymmetric Configuration", AIAA Aviation, 2017
74. Lam, K.-Y., Pickles, J.D., Narayanaswamy, V., Carter, C.D., and Kimmel, R.L., "High-Speed Schlieren and 10-Hz Kr PLIF for the new AFRL Mach-6 Ludwieg Tube Hypersonic Wind Tunnel", AIAA Scitech, 2017

2016

75. Pickles, J. D., Subbareddy, P. K., Narayanaswamy, V., "Sharp-Fin Induced Shock Wave/Turbulent Boundary Layer Interactions in an Axisymmetric Configuration", AIAA Aviation Meeting, June 2016.
76. Funderburk, M., Narayanaswamy, V., "Experimental Investigation of Shock Boundary Layer Interactions to unravel inlet unstart physics", AIAA Aviation Meeting, June 2016.

2015

77. Zenelak, D., Sealy, W., Narayanaswamy, V., "Composition-independent thermometry technique for gaseous mixtures", AIAA Aviation Summer Meeting, June, 2015, Dallas, TX.
78. Ramachandran, A., Patel, P., Tyler, D., Narayanaswamy, V., "Experimental investigation into turbulent autoignition regimes in fuels with complex chemistry", AIAA Aviation Summer Meeting, June, 2015, Dallas, TX.
79. Hegde, A., Funderburk, M. A., Hill, J., Narayanaswamy, V., "Experimental investigation into shock-induced corner separation", AIAA Aviation Summer Meeting, June, 2015, Dallas, TX.

2014

80. Kidd III, F. G., Narayanaswamy, V., Danehy, P. M., Inman, J. A., Bathel, B. F., Cabell, K. F., Hass, N. E., Capriotti, D. P., "Characterization of the NASA Langley Arc Heated Scramjet Test Facility using NO PLIF", AIAA Aviation Summer Meeting, June, 2014, Atlanta, GA.

2006 - 2014

81. Narayanaswamy, V. and Clemens, N. T., "Simultaneous LII and PIV measurements in the soot formation region of turbulent non-premixed jet flames", 34th Proceedings of Combustion Symposium, 2012, Warsaw, Poland.
82. Narayanaswamy, V., Hsu, A., Clemens, N. T., and Frank, J. H., "Conserved Scalar Imaging by Using Two-Photon PLIF of Krypton", 49<sup>th</sup> AIAA Aerospace Sciences Meeting, 2011, Kissesemi FL. (Invited)
83. Narayanaswamy, V., Clemens, N. T., and Raja, L. L., "Application of Pulsed-plasma jet actuators for shock/boundary layer interaction control", 49<sup>th</sup> AIAA Aerospace Sciences Meeting, 2011, Kissesemi FL. (Invited)
84. Narayanaswamy, V., Shin, J., Clemens, N., and Raja, L., "Investigation of Pulsed-Plasma Jet for Shock / Boundary Layer Control," 48<sup>th</sup> AIAA Aerospace Sciences Meeting, 2010, Kissesemi FL.
85. Lochman, B. J., Murphree, Z. R., Narayanaswamy, V. and Clemens, N. T., "PLIF imaging of naphthalene-ablation products in a Mach 5 turbulent boundary layer", AIAA 40<sup>th</sup> Fluid Dynamics Conference and Exhibit, 2010, Kissesemi FL.
86. Clemens, N. T., and Narayanaswamy, V., "Shock/Turbulent Boundary Layer Interactions: Review of Recent Work on Sources of Unsteadiness" 38<sup>th</sup> AIAA Fluid Dynamics Conference, 2009, San Antonio TX. (Invited)
87. Narayanaswamy, V., Shin, J., Clemens, N., and Raja, L., "Investigation of Plasma-Generated Jets for Supersonic Flow Control," 46<sup>th</sup> AIAA Aerospace Sciences Meeting, 2008,, Seattle, WA.
88. Shin, J., Narayanaswamy, V., Raja, L. L., and Clemens, N. T., "Characteristics of a Plasma Actuator in Mach 3 Flow" 45<sup>th</sup> AIAA Aerospace Sciences Meeting, 2007, Reno NV.
89. Shin, J., Mahadevan, S., Narayanaswamy, V., Raja, L. L., and Clemens, N. T., "Forcing mechanisms in a direct-current surface plasma actuator in a supersonic flow," 18th International Symposium on Plasma Chemistry, Kyoto Japan, Aug. 29, 2007.
90. Shin, J., Narayanaswamy, V., Raja, L. L., and Clemens, N. T., "Generation of Plasma Induced Flow Actuation by DC Glow- like Discharge in a Supersonic Flow", 44<sup>th</sup> AIAA Aerospace Sciences Meeting, 2006, Reno NV.

## **INVITED TALKS AND LECTURES**

### **INVITED RESEARCH PRESENTATIONS IN CONFERENCES**

1. Narayanaswamy, V., "'Flameless Combustion for Clean Energy Technology: Science, Application, and Opportunities", 27th National Conference on IC Engines and Combustion 2022
2. Narayanaswamy, V., "Fluid Structure Interactions in Hypersonic Platforms", AIAA Scitech 2019.
3. Narayanaswamy, V., Hsu, A., Clemens, N. T., and Frank, J. H., "Conserved Scalar Imaging by Using Two-Photon PLIF of Krypton", 49<sup>th</sup> AIAA Aerospace Sciences Meeting, 2011, Kissesemi FL.
4. Narayanaswamy, V., Clemens, N. T., and Raja, L. L., "Application of Pulsed-plasma jet actuators for shock/boundary layer interaction control", 49<sup>th</sup> AIAA Aerospace Sciences Meeting, 2011, Kissesemi FL.



### **HONORARY INVITED SPEAKER**

5. Narayanaswamy, V.. "Thermal aspects of scramjet air intakes" Workshop on Thermal Management of Scramjets, India 2022
6. Narayanaswamy, V., "Investigation of Self Starting Streamtraced Inlet Performance at Sub Design Mach numbers", High Speed Propulsion Workshop, India, 2021
7. Narayanaswamy, V., "Adopting the Organizational Structures of Academic Testing Facilities to Create Realistic Hypersonic Testing Environments", Hypersonics Weapons Summit, Washington DC, Oct 2019.
8. Narayanaswamy, V., "Compression Ramp Induced Shock Wave/Turbulent Boundary Layer Interactions on a Compliant Material", International Workshop on Fluid Structure Interactions, UNSW Canberra Australia, 2018.

### **NON-HONORARY INVITED SEMINAR SPEAKER**

9. Department of Aerospace Engineering, Penn State University, 2022
10. Department of Mechanical and Aerospace Engineering, Arizona State University, 2022.
11. Department of Mechanical and Aerospace Engineering, The Ohio State University, 2020.
12. Department of Aerospace Engineering, Georgia Tech, 2019.
13. Materials Division, WPAFB, 2019
14. NASA LaRC, May 2019
15. Florida State Univ., Sep 2018.
16. NASA LaRC, Nov 2018
17. ARL APG, Nov 2018
18. NRL, Sep 2018
19. Auburn University, Sept 2017.
20. Aerospace Systems Directorate, WPAFB, May 2017
21. Shock Wave Boundary Layer Interactions Workshop, May 2017
22. CREATE Colloquium, Virginia Tech, March 2017
23. Department of Aerospace Engineering, Indian Institute of Science, May 2016.
24. Department of Aerospace Engineering, Indian Institute of Technology, May 2016.
25. Department of Mechanical and Aerospace Engineering, Cornell University, Dec. 2013.
26. Flow Physics Branch, NASA Langley Research Center, Jul. 2013.
27. AFOSR/NASA Workshop on Shock/Boundary layer Interactions, Mar. 2013.
28. Advanced Sensing and Optical Measurements Branch, NASA Langley Research Center, Nov. 2012.
29. National Center for Combustion Research and Development, India, Aug., 2012.
30. Department of Mechanical Engineering, Indian Institute of Science, India, Aug., 2012.

31. Department of Mechanical Engineering, University of Minnesota, Apr. 2012
32. Department of Mechanical and Aerospace Engineering, Rensselaer Polytechnic Institute, 2011.
33. Aerodynamic Measurements Conference, AIAA Aerospace Sciences Meeting, 2011.