

Devesh Ranjan
Associate Chair for Research and Ring Family Chair Professor,
GWW School of Mechanical Engineering,
Georgia Institute of Technology

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I. Earned Degrees

University of Wisconsin-Madison Advisor-Prof. Riccardo Bonazza	Mechanical Engineering	Ph.D., 2007
University of Wisconsin-Madison Advisor-Prof. Riccardo Bonazza	Mechanical Engineering	M.S., 2005
National Institute of Technology-Trichy	Mechanical Engineering	B. E., 2003

II. Employment History

Associate Chair-Research	Georgia Institute of Technology, GA	1/1/2019-Present
Ring Family Chair	Georgia Institute of Technology, GA	1/1/2021-Present
Interim VPIR	Georgia Institute of Technology, GA	2/1/2021-6/30/2021
J. Erskine Love Jr. Professor	Georgia Institute of Technology, GA	1/1/2016-12/31/2021
Professor	Georgia Institute of Technology, GA	7/1/2020-Present
Associate Professor	Georgia Institute of Technology, GA	7/1/2014-6/30/2020
Morris E. Foster Faculty Fellow	Texas A&M University, TX	9/1/2013 – 6/30/2014
Assistant Professor	Texas A&M University, TX	1/7/2009 – 6/30/2014
Director's Research Fellow	Los Alamos National Laboratory, NM	08/2008 - 1/6/2009
Postdoctoral Research Associate (Supervisor-Dr. Kathy Prestridge)	Los Alamos National Laboratory, NM	01/2008 - 07/2008
Instructor	University of Wisconsin-Madison, WI	06/2007 -08/2007
Graduate Research Assistant	University of Wisconsin-Madison, WI	06/2003 -12/2007
Research Fellow	JNCASR-Bangalore, India	01/2003 - 04/2003
Summer Intern	JNCASR-Bangalore, India	06/2002 - 08/2002
Summer Intern	National Chem. Lab. Pune, India	05/2001 - 06/2001

III. Honors and Awards

A. International or National Awards

- Fellow, American Society of Mechanical Engineers (**ASME**)
- Fellow, **Governor' Teaching Fellows Program**
- **US National Academy of Engineering** Invitee to the 2019 Global Grand Challenges Summit in London, UK. [Summit hosted by Royal Academy of Engineering]
- **George H. Markstein** Best Paper Award, 2018 by Eastern States Section of Combustion Institute (ESSCI)
- **Department of Energy-Early Career Award, 2016**

- Invited participant to **National Academy of Engineering’s 2016 US Frontiers of Engineering Symposium**
- US Air Force Office of Scientific Research (**AFOSR**) **Young Investigator Award**, 2013
- National Science Foundation (**NSF**) **CAREER Award**, 2013
- Alexander von Humboldt Fellowship for Postdoctoral Research, August 2007
- Director’s Research Fellow, Los Alamos National Laboratory, 2008
- Article selected as cover page in Journal of Fluid Mechanics-Vol. 594
- Best Poster, International Conference on Advances in Fluid Mechanics, Bangalore, India, July 2003.
- Best Student Contribution, 16th American Nuclear Society Topical Meeting on the Technology of Fusion Energy, September 2004.

B. Institute or School Awards

- Inaugural Ring Family Chair, [(based on “sponsored research, scholarly publications, and student advising)] (2021-2026)
- **Diversity and Inclusion Fellow, 2020-2021**
- **2020 Faces of Inclusive Excellence**
- **Provost Emerging Leaders Program, 2018-2019**
- **Provost Teaching and Learning Fellow, 2018-2020**
- J. Erskine Love Jr. Faculty Fellow, [(based on “sponsored research, scholarly publications, and student advising)] (2015-2020)
- Sigma Xi Georgia Tech Chapter, Best M.S. Thesis Award (for Mr. David Reilly in 2016)
- Georgia Tech nominee to attend 2016 NAE-Frontiers in Engineering Education
- Woodruff School Teaching Fellow, 2015
- Texas A&M University Nominee for 2014 Blavatnik Awards for Young Scientists (Category- Physical Sciences and Engineering)[**Sole nominee from the Institute**]
- Morris E. Foster Faculty Fellow in Mechanical Engineering (Awarded by College of Engineering), 2013
- 2013 Texas A&M ASME Professor Mentorship Award
- Caterpillar Teaching Excellence Award 2012-2013 (Awarded by College of Engineering)
- TEES Select Young Faculty Award, 2012-2013
- Morris E. Foster Faculty Fellowship, Department of Mechanical Engineering, TAMU, 2010
- TAMU Student Led Award for Teaching Excellence (SLATE), 2009

IV. Research, Scholarship, and Creative Activities

A star (*) indicates publications while at Georgia Tech and **bold fonts** indicate researchers including graduate, undergraduate students and postdoctoral fellows supervised by Dr. Ranjan.

A. Published Books, Book Chapters, and Edited Volumes

A1. Books

- No data

A2. Refereed Book Chapters

BC3: Thanapal, S., Eseltine, D., Annamalai, K., and Ranjan, D., "Biomass Fuel Quality Enhancement and Respiratory Quotient (RQ) for Ranking Fossil and Biomass Fuels Based on CO₂ Emissions," *Novel Combustion Concepts for Sustainable Energy Development*, Springer India, 2014 pp 45-73

BC2: Ranjan, D., Niederhaus, J.H.J., Oakley, J.G., Anderson, M.H., and Bonazza, R., "Experimental investigation of shock-induced distortion of a light spherical gas inhomogeneity," *Shock Waves*, Part XV111- Richtmyer-Meshkov, Springer Berlin Heidelberg, 2009. (DOI - 10.1007/978-3-540-85181-3_61)

BC1: Niederhaus, J.H.J., Ranjan, D., Oakley, J.G., Anderson, M.H., ., Greenough, J. A., and Bonazza, R., "Computations in 3D for shock-induced distortion of a light spherical gas inhomogeneity," *Shock Waves Part XV111- Richtmyer-Meshkov*, Springer Berlin Heidelberg, 2009. (DOI - 10.1007/978-3-540-85181-3_60)

A3. Edited Volumes

EV1: Bonazza, R. and Ranjan D., "29th International Symposium on Shock Waves Vol. I and II" Springer International Publishing Switzerland, (2015) [DOI: Vol I- 10.1007/978-3-319-16835-7 and Vol II--10.1007/978-3-319-16838-78]

B. Refereed Publications and Submitted Articles

B1. Published and Accepted Journal Articles

J63: (*) Mikhaeil, M., Suchandra, P., Ranjan, D., and Pathikonda, G., "Simultaneous velocity and density measurements of fully developed Rayleigh-Taylor mixing," *Physical Review Fluids*, Volume 6, Issue 7, pp 073902 (2021).

J62: (*) Katz, A., Aakre, S. R., Anderson, M. H., and Ranjan, D., "Experimental investigation of pressure drop and heat transfer in high temperature supercritical CO₂ and helium in a printed-circuit heat exchanger," *International Journal of Heat and Mass Transfer*, Volume 171, pp 121089 (2021).

J61: (*) Lim, Chang Hyeon., Pathikonda, G., Johnston, S. R., and Ranjan, D., "Experimental investigation of supercritical carbon dioxide non-equilibrium condensation in a highly unsteady environment" *Experimental Thermal and Fluid Sciences*, Volume 127, pp 110417 (2021).

J60: (*) Fries, D, Ranjan, D., and Menon, S., "Turbulent Mixing and Trajectories of Jets in a Supersonic Crossflow with Different Injectants," *Journal of Fluid Mechanics*, Vol. 911, pp. A45 1-40 (2021).

- J59:** (*) Yarrington, J. D., Bagepalli, M. V., Pathikonda, G., Schrader, A., Zhang, Z. M., Ranjan, D., and Loutzenhiser, P. G., "Numerical analyses of high temperature dense, granular flows coupled to high temperature flow property measurements for solar thermal energy storage," *Solar Energy*, Vol. 213, pp 350-360 (2021)
- J58:** (*) Pathikonda, G., Usta, M., Ahmad, M. C., Khan, I., Gillis, P., Dhodapkar, S., Jain, P., Ranjan, D., and Aidun, C. K., "Mixing behavior in a confined jet with disparate viscosity and implications for complex reactions," *Chemical Engineering Journal*, volume 403, 1 Jan. 2021, 126300.
- J57:** (*) Shan, S., Chen, C., Loutzenhiser, P. G., Ranjan, D., Zhou, Z., and Zhang, Z. M., "Spectral emittance measurements of micro/nanostructures in energy conversion: a review," *Frontiers in Energy*, Vol. 14, pp. 482–509 (2020)
- J56:** (*) Chuyang Chen, Chiyu Yang, Ranjan, D., Loutzenhiser, P. G., and Zhang, Z. M., "Spectral Radiative Properties of Ceramic Particles for Concentrated Solar Thermal Energy Storage Applications," *International Journal of Thermophysics*, Vol. 41, Issue 11, pp 1-25 (2020).
- J55:** (*) Karimi, M., Ochs, B., Wenting, S., and Ranjan, D., "High Pressure Ignition Delay Times of H₂/CO mixture in Carbon Dioxide and Argon Diluent", *Proceedings of Combustion Institute*, accepted for publication (2020).
- J54:** (*) Musci, B., Petter, S., Pathikonda, G., Ochs, B., and Ranjan, D., "Supernova Hydrodynamics: A Lab-Scale Study of the Blast-Driven Instability Using high-Speed Flows," *The Astrophysical Journal*, volume 896, number 2, May 2020.
- J53:** (*) Bagepalli, M. V., Yarrington, J. D., Schrader, A., Zhang, Z. M., Ranjan, D., and Loutzenhiser, P. G., "Measurement of flow properties coupled to experimental and numerical analyses of dense, granular flows for solar thermal energy storage dataset," *Solar Energy*, Vol. 207, pp. 77-90 (2020).
- J52:** (*) Schrader, A. J., Bush, H. E., Ranjan, D., and Loutzenhiser, P. G., "Aluminum-doped calcium manganite particles for solar thermochemical energy storage: Reactor design, particle characterization, and heat and mass transfer modeling," *International Journal of Heat and Mass Transfer*, volume 152, page 199462, May 2020.
- J51:** (*) Carter, J., Pathikonda, G., Jiang, N., Felver, J., Roy, S., and Ranjan, D., "Time-Resolved Measurements of Turbulent Mixing in Shock-Driven Variable-Density Flows," *Scientific Reports* 9, Article number: 20315 (2019)
- J50:** (*) Ochs, B., Ranjan, R., Ranjan, D., and Menon, S., "Topology and Flame Speeds of Turbulent Premixed Flame Kernels in Supersonic Flows," *Combustion and Flame*, Vol 210, pp. 83-99, (2019) .
- J49:** (*) Mohaghar, M., Carter, J., Pathikonda, G., Ranjan, D., "The transition to turbulence in shock-driven mixing: effects of Mach number and initial conditions", *Journal of Fluid Mechanics*, Vol. 871, pp. 595-635 (2019).

- J48:** (*) **Pidaparti, S.**, Anderson, M., and Ranjan, D., “Experimental Investigation of thermal-hydraulic performance of discontinuous fin printed circuit heat exchangers for Supercritical CO₂ power cycles,” *Experimental Thermal and Fluid Science*, Vol 106, pp. 119-129, (2019).
- J47:** (*) **Karimi, M., Ochs, B.**, Zefang. L., Ranjan, D., Wenting, S., “Measurement of methane autoignition delays in carbon dioxide and argon diluents at high pressure conditions”, *Combustion and Flame*, Vol 204, pp. 304-319, (2019).
- J46:** (*) **Fries, D., Ochs, B.**, Saha, A., Ranjan, D., and Menon, S., “Flame speed characteristics of turbulent expanding flames in a rectangular channel,” *Combustion and Flame*, Vol 199 pp. 1-13, (2019).
- J45:** (*) M. Caccia, M. Tabandeh-Khorshid, G. Itskos, A. R. Strayer, A. S. Caldwell, **S. Pidaparti**, S. Singnisai, A. D. Rohskopf, A. M. Schroeder, **D. Jarrahbashi, T. Kang**, S. Sahoo, N. R. Kadasala, A. Marquez-Rossy, M. H. Anderson, E. Lara-Curzio, D. Ranjan, A. Henry & K. H. Sandhage, “Ceramic-metal composites for heat exchangers in concentrated solar power plants,” *Nature*, Vol 562, Issue 7727, pg 406, (2018).
- J44:** (*) **Ochs, B., Fries, D.**, Ranjan, D., and Menon, S., “Turbulent flame speed of premixed supersonic flame kernels,” *Flow, Turbulence and Combustion*, Vol. 101, Issue 3, pp.928-951 (2018).
- J43:** (*) Annamalai, K., **Siva Sankar, T.**, and Ranjan, D., “Ranking Renewable and Fossil Fuels on Global Warming Potential Using Respiratory Quotient (RQ) concept”, *Journal of Combustion*, Vol. 2018, Article ID 1270708, (2018).
- J42:** (*) **Mohaghar, M., Carter, J., Musci, B., Reilly, D., McFarland, J.**, and Ranjan, D., “Evaluation of turbulent mixing transition in a shock-driven variable-density flow”, *Journal of Fluid Mechanics*, Vol. 831, pp. 779-825 (2017).
- J41:** (*) **Akula, B., Suchandra, P., Mikhaeil, M.**, and Ranjan, D., “Dynamics of unstably stratified free shear flows: an experimental investigation of coupled Kelvin–Helmholtz and Rayleigh–Taylor instability”, *Journal of Fluid Mechanics*, Vol. 816, pp. 619-660 (2017).
- J40:** (*) **Fries, D., Ochs, B.**, Ranjan, D., and Menon, S., “Hot-wire and PIV characterisation of a novel small-scale turbulent channel flow facility developed to study premixed expanding flames”, *Journal of Turbulence*, Vol. 18, Issue 11, pp. 1081-1103 (2017).
- J39:** (*) **Akula, B.**, and Ranjan, D., “Dynamics of buoyancy driven flows at moderately high Atwood numbers”, *Journal of Fluid Mechanics*, Vol. 795, pp. 313-355 (2016).
- J38:** (*) **Jarrahbashi, D., Pidaparti, S. R.**, and Ranjan, D., “Nucleation of Super-critical carbon-dioxide in a venturi nozzle”, *Nuclear Engineering and Design*, Vol. 310, pp. 69-82 (2016).
- J37:** **Sekhran, A.**, Morrison, G., and Ranjan, D., “An enquiry of the friction factor ‘jump’ phenomenon in hole-pattern seals,” *Journal of Fluids Engineering*, vol. 138, Issue 8, pp. 081102 (2016).
- J36:** (*) **Reilly, D., McFarland, J. A., Mohaghar, M.**, and Ranjan, D., “The effect of initial conditions and circulation deposition on the inclined-interface reshocked Richtmyer-Meshkov instability,” *Experiments in Fluids*, 56 (8), 1-16, (2015).
- J35:** (*) **McFarland, J. A., Reilly, D.**, Black, W., Greenough, J. A., and Ranjan, D., “Modal interactions between a large-wavelength inclined interface and small wave-length

multimode perturbations in a Richtmyer-Meshkov Instability,” *Physical Review E*, Vol. 92, 013023 (2015).

- J34:** (*) **Pidaparti, S. R, McFarland, J. A., Mikhaeil, M. M.,** Anderson, M.H., and Ranjan, D., “Investigation of buoyancy effects on heat transfer characteristics of Supercritical Carbon Dioxide in Heating Mode,” *ASME Journal of Nuclear Engineering Radiation Science*, 1(3): 031001-031001-10. (2015) doi:10.1115/1.4029592.
- J33:** (*) **Pidaparti, S. R,** Moisseytsev, A., Sienicki, J. J., and Ranjan, D., “Counter flow induced draft cooling tower option for Supercritical Carbon Dioxide Brayton Cycle,” *Nuclear Engineering and Design*, Volume 295, Pages 549–558, (2015).
- J32:** (*) **Martin, M. A.,** Chen, C., Mukherjee, P. P., Pannala, S., Dietiker, J-F., Turner, J. A., and Ranjan, D., “Morphological Influence in Lithium-Ion Battery 3-D Electrode Architectures,” *Journal of the Electrochemical Society*, 2015, volume 162, issue 6, A991-A1002.
- J31:** (*) **Thanapal, S.,** Annamalai, K., Ansley, J. and Ranjan, D., “Cofiring Carbon Dioxide torrefied woody biomass with coal on emission characteristics,” *Biomass Conversion and Biorefinery*, March 2016, Volume 6, Issue 1, pp 91-104.
- J30:** **Tang, Y.,** Guo, B., and Ranjan, D., “Numerical simulation of aerosol deposition from turbulent flows using three-dimensional RANS and LES turbulence models,” *Engineering Applications of Computational Fluid Mechanics*, 9:1, 174-186, (2015).
- J29:** **McFarland, J. A., Reilly, D., Creel, S., McDonald, C., Finn, T.,** and Ranjan, D., “Experimental Investigation of Inclined Interface Richtmyer-Meshkov Instability Before and After Reshock,” *Experiments in Fluids*, Vol. 55, Issue 1, pp 1640 (2014).
- J28:** Siwatch, V., Lawrence, B., **Kuchibhatla, S.,** Annamalai, K., and Ranjan, D., “Excess air, Schmidt number and NO_x formation in laminar jet flames,” *Combustion Science and Technology*, 186 (12), 1936-1953 (2014).

*** The journal articles above here were published after joining Georgia Tech. **

- J27:** **McFarland, J. A.,** Greenough, J. A., and Ranjan, D., “Simulations and Analysis of the Reshocked Inclined Interface Richtmyer-Meshkov Instability for Linear and Non-linear Interface Perturbations,” *Journal of Fluids Engineering*, Vol. 136 (7), 071203, (2014).
- J26:** **Thanapal, S.,** Chen, W., Annamalai, K., Carlin, N., Ansley, J. and Ranjan, D., “Carbon Dioxide torrefaction of woody biomass,” *Energy and Fuels*, 28 (2), 1147-1157 (2014).
- J25:** **Matsuo, B.,** Anderson, M., and Ranjan, D., “Numerical Study of Compact Heat Exchanger design for GEN-IV Supercritical Carbon Dioxide Power Conversion Cycles,” *Nuclear Science and Engineering*, Vol 176, Issue 2, pp 138-153, (2014).
- J24:** Akula, B., Andrews, M. J., and Ranjan, D., “Effect of shear on Rayleigh-Taylor mixing at low Atwood number”, *Physical Review E*, Vol. 87, 033013 (2013).
- J23:** Stanic, M., **McFarland, J.,** Stellingwerf, R.F., Cassibry, J. T., Ranjan, D., Bonazza, R., Greenough, J. A., and, Abarzhi, S. I., “Non-uniform structures in Richtmyer-Meshkov Flows,” *Physics of Fluids*, 25, 106107 (2013).
- J22:** **Kuchibhatla, S.** and Ranjan, D., “Effect of initial conditions on Rayleigh-Taylor mixing: Modal interaction”, *Physica Scripta*, T155, 014057 (2013).

- J21: McFarland, J. A.,** Greenough, J. A., and Ranjan, D., "Investigation of the Initial Perturbation Amplitude for the Inclined Interface Richtmyer-Meshkov Instability," *Physica Scripta*, T155, 014014 (2013).
- J20: Eseltine, D., Thanapal, S.,** Annamalai, K., and Ranjan, D., "Torrefaction of Woody Biomass (Juniper and Mesquite) using inert and non-inert gases," *Fuel*, Vol. 113, pp 379-388, 2013.
- J19: Haehn, N.,** Ranjan, D., Weber, C., Oakley, J., Rothamer, D., and Bonazza, R., "Reacting Shock Bubble Interaction," *Combustion and Flame*, Vol. 153, Issue 3, pp1339-1350 (2012).
- J18: Bailie, C., McFarland, J. A.,** Greenough, J. A., and Ranjan, D., "Effect of incident shock wave strength on the decay of Richtmyer-Meshkov instability-introduced perturbations in the refracted shock wave," *Shock Waves*, Vol. 22, Issue 6, pp 511-519, 2012.
- J17: Amini, N., Sekaran, A., Schwaenen, M., Vijaykumar, A.,** and Ranjan, D., "An experimental investigation of the free jet flow from a radially lobed nozzle using hot wire anemometry," *International Journal of Mechanical Engineering Education*, Vol. 40, Number 4, October 2012.
- J16: McFarland, J. A.,** Greenough, J. A., and Ranjan, D., "Computational parametric study of a Richtmyer-Meshkov instability for an inclined interface," *Physical Review E*, Vol. 84, 026303 (2011).
- J15:** Ranjan, D., Oakley, J., and Bonazza, R., "Shock-Bubble Interactions," *Annual Rev. Fluid Mech.*, 43, pp117-140 (2011) [Invited Article].
- J14:** Tillman, S. T., **Kuchibhatla, S.,** Annamalai, K., Caton, J., and Ranjan, D., "Interactive Combustion in a Linear Array of 2D Laminar Isolated & Triple Burner Jets," *Journal of Combustion*, Article ID 716050, 2012, DOI:10.1155/2012/716050.
- J13:** Kurizenga, A., Anderson, M., **Fatima, R.,** Corradini, M., Towne, A., and Ranjan, D., "Heat Transfer of supercritical carbon-dioxide in printed circuit heat exchanger geometries," *Journal of Thermal Science and Engineering Application*, Vol.3, September 2011.
- J12: Haehn, N.,** Weber, C., Oakley, J., Anderson, M., Ranjan, D., and Bonazza, R., "Experimental investigation of twice-shocked spherical inhomogeneity with Particle Image Velocimetry," *Shock Waves*, Vol. 21, No. 3 (2011).
- J11:** Singh, O. P., Ranjan, D., Srinivasan, J., and Sreenivas, K. R., " A study of basalt fingers using experiments and numerical simulations in double-diffusive systems," *Journal of Geography and Geology*, 3, 1 (2011).
- J10: Haehn, N.,** Weber, C., Oakley, J., Anderson, M., Ranjan, D., and Bonazza, R., "Experimental study of shock-bubble interaction with reshock," *Shock Waves*, Vol. 22, No. 1 (2011).
- J9: Haehn, N.,** Ranjan, D., Weber, C., Oakley, J. G., Anderson, M. H., and Bonazza, R., "Experimental investigation of of twice-shocked spherical inhomogeneity," *Physica Scripta*, T142 (2010).
- J8:** Motl, B., Oakley, J.G., Ranjan, D., Weber, C., Anderson, M.H., and Bonazza, R., "Experimental validation of a Richtmyer-Meshkov scaling law over large density ratio and shock strength ranges," *Physics of Fluids*, 21, 126102 (2009).

*** The journal articles above here were published after joining Texas A&M University. **

- J7:** Ranjan, D., Niederhaus, J. H. J., Oakley, J., Anderson, M., Greenough, J. A, and Bonazza, R., “Experimental and numerical investigation of shock-induced distortion of a spherical gas inhomogeneity,” *Physica Scripta*, T132 (2008).
- J6:** Ranjan, D., Niederhaus, J., Oakley, J., Anderson, M., Bonazza, R., and Greenough, J., “Shock-bubble interactions: features of divergent refraction geometry observed in experiments and simulations,” *Physics of Fluids*, 20, 036101 (2008).
- J5:** Niederhaus, J. H. J., Greenough, J. A, Oakley, J., Ranjan, D., Anderson, M., and Bonazza, R., “A computational parameter study for the three-dimensional shock-bubble interaction,” *Journal of Fluid Mechanics*, 594, 85 (2008).
- J4:** Motl, B., Niederhaus, J., Ranjan, D., Oakley, J., Anderson, M., and Bonazza, R., “Experimental Study for ICF-Related Richtmyer-Meshkov Instabilities,” *Fusion Science and Technology*, 52, 4 (2007).
- J3:** Ranjan, D., Niederhaus, J., Motl, B., Anderson, M., Oakley, J., and Bonazza, R., “Experimental investigation of primary and secondary features in high Mach number shock-bubble interaction,” *Physical Review Letters*, 98, 024502 (2007).
- J2:** Niederhaus, J., Ranjan, D., Oakley, J., Anderson, M., and Bonazza, R., “Inertial-Fusion-Related Hydrodynamic Instabilities in a Spherical Gas Bubble Accelerated by a Planar Shock Wave,” *Fusion Science and Technology*, 47, 4 (2005), pp. 1160-1164.
- J1:** Ranjan, D., Anderson, M., Oakley, J., and Bonazza, R., “Experimental Investigation of a Strongly Shocked Gas bubble,” *Physical Review Letters*, 94, 184507 (2005).

B2. Conference Presentation with Proceedings (Refereed)

- C46:** (*) **H. Ballance, B. A. Ochs**, B. Oleksander, D. Ranjan, and S. Menon, “Evaluation of Air-Blast Atomizers for Mixing and Combustion in Supersonic Flows”, *AIAA Propulsion and Energy 2019 Forum*, 4370, 2019.
- C45:** (*) **A Katz** and D. Ranjan, “Advances towards elastic-perfectly plastic simulation of the core of printed circuit heat exchangers”, *ASME 2019 Pressure Vessel and Piping Conference, Paper No: PVP2019-93807, V003T03A093; 12 pages*
- C44:** (*) **C. Lim, G. Pathikonda, S. Pidaparti**, D. Ranjan, “Visualization of supercritical carbon dioxide flow through a converging-diverging nozzle”, *Proc. ASME Turbo Expo 2019, Paper No: GT2019-91691*
- C43:** (*) **B. Musci, S. Petter, G. Pathikonda**, and D. Ranjan, “Blast-driven Richtmyer-Meshkov instability growth in a cylindrical geometry”, *accepted, Proceedings of 32th International Symposium on Shock Waves, Singapore, July 14th-19th, 2019*
- C42:** (*) **G. Pathikonda, J. Carter, M. Mohaghar** and D. Ranjan, “Temporal Evolution of Richtmyer-Meshkov-Induced Mixing Using Simultaneous High-speed PIV-PLIF”, *accepted, Proceedings of 32th International Symposium on Shock Waves, Singapore, July 14th-19th, 2019*
- C41:** (*) **M. Karimi, B. Ochs**, W. Sun, and D. Ranjan. “Investigation of Autoignition Delays in A Shock Tube Under Supercritical Carbon Dioxide Conditions”, 6th International Supercritical CO2 Power Cycles Symposium, March 27-29, 2018. Pittsburgh, PA

- C40:** (*) **M. Karimi, B. Ochs,** W. Sun, and D. Ranjan. "Measurement of Methane Autoignition Delays in a Shock Tube under Supercritical Carbon Dioxide Conditions", Spring Technical Meeting Eastern States Section of the Combustion Institute, March 4-7, 2018. State College, PA [**Awarded George Markstein Best Paper Award**]
- C39:** (*) **B. Musci, S. Petter, G. Pathikonda,** D. Ranjan and N. Denissen, "An Experimental study of the blast driven Rayleigh-Taylor and Richtmyer-Meshkov instabilities: Preliminary results", *16th International Workshop on the Physics of Compressible Turbulent Mixing*, Marseille, 2018
- C38:** (*) **J. Carter, M. Mohaghar, B. Ochs, G. Pathikonda,** D. Ranjan, N. Jiang and S. Roy, "A study of vorticity evolution in Richtmyer-Meshkov instability using high-resolution and high-speed measurements", *16th International Workshop on the Physics of Compressible Turbulent Mixing*, Marseille, 2018
- C37:** (*) **P. Suchandra, M. Mikhaeil, G. Pathikonda** and D. Ranjan, "Dynamics of the Rayleigh-Taylor instability in the self-similar regime", *16th International Workshop on the Physics of Compressible Turbulent Mixing*, Marseille, 2018
- C36:** (*) **Pidaparti, S.,** Anderson, M., and Ranjan, D., "Thermal-hydraulic performance of discontinuous fin heat exchanger geometries using Supercritical CO₂ as the working fluid," *Proceedings of The 6th International Symposium- Supercritical CO₂ Power Cycles*, March 27-29, 2018, Pittsburgh, Pennsylvania.
- C35:** (*) **Jarrahbashi, D., Pidaparti, S., Kang, T.,** and Ranjan, D., "Nucleation of Supercritical CO₂ Flow in a Converging-Diverging Nozzle," *Proceedings of The 5th International Symposium- Supercritical CO₂ Power Cycles*, March 28-31, 2016 San Antonio, Texas [**won the best poster presentation award at the conference**]
- C34:** (*) **Pidaparti, S.,** Hruska, P., Moisseytsev, A., Sienicki, J., and Ranjan, D., "Technical and economic feasibility of dry air cooling for the supercritical CO₂ Brayton Cycle using existing technology," *Proceedings of The 5th International Symposium- Supercritical CO₂ Power Cycles*, March 28-31, 2016 San Antonio, Texas
- C33:** **Pidaparti, S., McFarland, J., Umrigar, E.,** Ranjan, D. and Anderson, M., "Effect of buoyancy on heat transfer characteristics of Supercritical Carbon Dioxide in the Heating Mode," *11th AIAA/ASME joint Thermophysics and Heat Transfer Conference*, AIAA 2014-3359.
- C32:**(*) **Reilly, D., McFarland, J., Carter, J.,** and Ranjan, D., "Shock-Driven Variable-Density Turbulence: New Insight," *14th International Workshop on the Physics of Compressible Turbulent Mixing*, San Francisco, CA, September 3, 2014.
- C31:** Chen, W., **Thanapal, S.,** Annamalai, K., Ranjan, D., B. Lawrence, and Ansley, J. "Kinetics of Pyrolysis of Mesquite Fuel-Comparison of Different Methods," *Proceeding of ASME Turbo Expo 2014: Turbine Technical Conference and Exposition*, paper no. GT2014-27349, doi:10.1115/GT2014-27349.
- C30:** **McFarland, J. A., Creel, S., Finn, T., McDonald, C.,** Greenough, J. and Ranjan, D., "Simulations and Experimental Work on the Inclined Interface Richtmyer-Meshkov Instability," *Proceedings of 29th International Symposium on Shock Waves, Madison, Wisconsin*, July 14th-19th, 2013.

- C29: McFarland, J. A., Creel, S., Finn, T., McDonald, C.,** Greenough, J. and Ranjan, D., “Inclined Interface Richtmyer-Meshkov Instability: Reshock Study,” *Proceedings of 29th International Symposium on Shock Waves*, Madison, Wisconsin, July 14th-19th, 2013.
- C28: Kuchibhatla, S,** and Ranjan, D., “Rayleigh-Taylor Experiments,” Paper # IMECE 2012-93087, *Proceedings of 2012 IMECE meeting*, Houston, Texas, Nov 2012.
- C27: McFarland, J. A.,** Greenough, J. A., and Ranjan, D., “An investigation of the inclined interface Richtmyer-Meshkov instability: simulations and progress on students,” *Proceedings of 13th International Workshop on Physics of Compressible and Turbulent Mixing*, July 2012.
- C26: Akula, B.** and Ranjan, D., “A study of combined KH and RT instabilities at low Atwood numbers,” *Proceedings of 13th International Workshop on Physics of Compressible and Turbulent Mixing*, July 2012.
- C25: McFarland, J. A.,** Greenough, J. A., and Ranjan, D., “Simulations and analysis of shock accelerated inhomogeneous flows with and without reshock,” *Proceedings of 2012 ASME Fluids Engineering Division Summer Meeting*, Puerto Rico, July 8th-12th, 2012.
- C24: Matsuo, B.,** Anderson, M., and Ranjan, D. and “Numerical investigation of the geometric effects on the performance of printed circuit heat exchangers,” *Proceedings of 2012 ASME Heat Transfer Summer Conference, Puerto Rico*, July 8th-12th, 2012.
- C23: Akula, B., McFarland, J., Kuchibhatla, S.,** and Ranjan, D., “Effect of shear on RT mixing at low Atwood numbers,” *Proceedings of Turbulent Mixing and Beyond: 3rd International Conference*, Trieste, Italy, August 21st -28th 2011.
- C22: McFarland, J. A.,** Greenough, J. A., and Ranjan, D., “A computational parametric study of a Richtmyer-Meshkov instability for an inclined interface,” *Proceedings of Turbulent Mixing and Beyond: 3rd International Conference*, Trieste, Italy, August 21st -28th 2011.
- C21: Kuchibhatla, S, McFarland, J. A., Akula, B,** and Ranjan, D., “Effect of initial conditions on Rayleigh-Taylor mixing: wavelength interaction,” *Proceedings of Turbulent Mixing and Beyond: 3rd International Conference*, Trieste, Italy, August 21st -28th 2011.
- C20: Fatima, R.,** Kurizenga, A., Anderson, M., and Ranjan, D., “Numerical Investigation of Thermal Hydraulic behavior of Supercritical Carbon-dioxide in Compact Heat exchangers,” *Proceedings of 2011 Supercritical CO2 Power Cycle Symposium*, 2011
- C19: Kuchibhatla, S., Koppenberger, P., Akula, B., McFarland, J.,** and Ranjan, D., “Rayleigh-Taylor experiments for low Atwood numbers with multimodal initial conditions,” *Proceedings of 12th International Workshop on Physics of Compressible and Turbulent Mixing*, July 2010.
- C18: Akula, B.,** Andrews, M., and Ranjan, D., “Rayleigh-Taylor experiments for low Atwood numbers with multimodal initial conditions,” *Proceedings of 12th International Workshop on Physics of Compressible and Turbulent Mixing*, July 2010.
- C17: Mukherjee, P. P.,** Ranjan, D., Mukundan, R., and Borup, R. L., “Heat and water transport in a polymer electrolyte fuel cell electrode,” *14th International Heat Transfer Conference*, Paper-22703, August 2010
- C16: Ranjan, D.,** Prestridge, K. P., Andrews, M., Gore, R., Marr-Lyon, M., and Merrill, F., “ICF related Richtmyer-Meshkov instability: Mach 10 experiments,” *Proceedings of 2nd*

International Conference and Advanced School "Turbulent Mixing and Beyond", July-August 2009.

- C15:** Ranjan, D., Balakumar, B. J., Orlicz, G., Prestridge, K. P., and Tomkins, C. D., "Richtmyer-Meshkov Instability: Reshock Study," *27th International Symposium on Shock Waves*, Paper 30519, July 2009.
- C14:** Ranjan, D., Prestridge, K. P., Andrews, M., Gore, R., Marr-Lyon, M., and Merrill, F., "Richtmyer-Meshkov Instability at a gas interface accelerated by a Mach 10 Shock wave," *27th International Symposium on Shock Waves*, Paper 30604, July 2009.
- C13:** Balakumar, B. J., Zoldi-Sood, C., Orlicz, G., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Experimental and computational investigation of Richtmyer-Meshkov turbulence in fluid layers after reshock," *27th International Symposium on Shock Waves*, Paper 30672, July 2009.
- C12:** Ranjan, D., Balakumar, B. J., Orlicz, G., Tomkins, C. D., and Prestridge, K. P., "Experimental analysis of the physics of the reshock in the case of a shock-accelerated thin fluid layer," *11th International Workshop on the Physics of Compressible Turbulent Mixing*, Santa Fe, NM, July 14-18, 2008.
- C11:** Balakumar, B. J., Orlicz, G., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Richtmyer-Meshkov instability induced by a Mach 1.2 shock in a varicose curtain," *11th International Workshop on the Physics of Compressible Turbulent Mixing*, Santa Fe, NM, July 14-18, 2008.
- C10:** Orlicz, G., Balakumar, B. J., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Shock driven instabilities in a varicose, heavy-gas curtain: Mach number effects," *11th International Workshop on the Physics of Compressible Turbulent Mixing*, Santa Fe, NM, July 14-18, 2008.
- C9:** Ranjan, D., Niederhaus, J., Oakley, J., Anderson, M., and Bonazza, R., "Experimental investigation of shock-induced distortion of a light spherical gas inhomogeneity," *26th International Symposium on Shock Waves*, Paper 2960, Gottingen, Germany, July 15-20, 2007.
- C8:** Niederhaus, J., Ranjan, D., Oakley, J., Anderson, M., Greenough, J., and Bonazza, R., "Computations in 3D for shock-induced distortion of a light spherical gas inhomogeneity," *26th International Symposium on Shock Waves*, Paper 2961, Gottingen, Germany, July 15-20, 2007.
- C7:** Ranjan, D., Niederhaus, J., Anderson, M., Motl, B., Oakley, J., Bonazza, R., and Greenough, J., "Experimental Study of the Interaction of a Planar Shock with a Free-Rising Bubble," *10th International Workshop on the Physics of Compressible Turbulent Mixing*, Paris, France, July 17-21, 2006.
- C6:** Niederhaus, J., Greenough, J., Oakley, J., Ranjan, D., Anderson, M., and Bonazza, R., "A Computational Parameter Study for the Shock-Bubble Interaction in 3D, with and without Modeled Soap Film," *10th International Workshop on the Physics of Compressible Turbulent Mixing*, Paris, France, July 17-21, 2006.
- C5:** Motl, B., Niederhaus, J., Oakley, J., Ranjan, D., Anderson, M., Bonazza, R., and Greenough, J., "Shock Accelerated Two-Dimensional Interface," *10th International Workshop on the Physics of Compressible Turbulent Mixing*, Paris, France, July 17-21, 2006.

- C4:** Ranjan, D., Niederhaus, J., Anderson, M., Oakley, J., and Bonazza, R., "Shock-induced instabilities on a spherical gas bubble," *25th International Symposium on Shock Waves*, Paper 1197-2, Bangalore, India, July 17-22, 2005.
- C3:** Ranjan, D., Sreenivas, R. K., Singh, P. O., and Srinivasan, J., "Laboratory Study of Scale Transitions in Oceanic Double-x Diffusive Finger," *International Conference on Environmental Fluid Mechanics*, pp. 178-182, Guwahati, India, 2005.
- C2:** Ranjan, D., Niederhaus, J., Anderson, M., Oakley, J., and Bonazza, R., "Measurements of mixing induced at a gas interface by the Richtmyer-Meshkov Instability," Paper 2691, Z.L. Jiang (Ed.), *Shock Waves, Proceeding, 24th International Symposium on Shock Waves Beijing, China, July 2004*.
- C1:** Ranjan, D., Niederhaus, J., Bauer, T., Oakley, J., Anderson, M., Smith, L., Greenough, J., and Bonazza, R., "Experimental and Computational Investigations of Shock-Accelerated Gas Bubbles," *9th International Workshop on the Physics of Compressible Turbulent Mixing, Cambridge, UK, July 19-23, 2004*.

B3. Other Refereed Material

"No Data"

B4. Submitted Journal Articles

- 1. Salvadori, M.,** Tudisco, P., Ranjan, D., and Menon, S., "Numerical investigation of mass flow rate effects on multiplicity of detonation waves within a H₂/Air rotating detonation combustor," submitted to *International Journal of Hydrogen Energy*.

C. Other Publications and Creative Products

1. Ranjan, D., "Fundamental Study of Key Issues related to advanced sCO₂ Brayton Cycle: Prototypic HX development and Cavitation" DOI: 10.2172/1417033; Publication date 2018-01-08

D. Presentations

D1. Keynote Addresses and Plenary Lectures

1. (*) **Plenary Speaker** at 16th International Workshop on Physics of Compressible Turbulent Mixing (IWPCTM) Meeting at Marseille, France in 2018, titled "Turbulent mixing in shock-driven variable-density flow"
2. (*) PG Loutzenhiser, D Ranjan, Z Zhang, "Advanced Characterization of Particulate Flows for Concentrating Solar Power Applications," Solar Energy Technologies Office CSP Program Summit 2019, March 18-19 (Technical Plenary Speaker, talk given by Dr. Loutzenhiser)
3. (*) **Plenary Speaker** at 14th International Workshop on Physics of Compressible Turbulent Mixing (IWPCTM) Meeting at San Francisco, 2014, titled "Progress with Experiments on Understanding the Rayleigh-Taylor Driven Flows for Complex Environments"
4. **Plenary Speaker** "Mechanical Engineering Perspective on Energy Research: from Turbulence Mixing to Nuclear Fusion" at SYNERGY 2013, Mechanical Engineering Department, National Institute of Technology-Trichy, March 17th, 2013.

D2. Invited Conference and Workshop Presentations

5. "High-Speed Measurements of Shock-and Blast-Wave-Driven Instabilities and Mixing", at Innovative Hydrodynamics Diagnostics for High Energy Density Physics Experiments, at Santa Fe, March 18-19th, 2019.
6. "Thermal Energy Storage- Collaborative Activities at Georgia Tech", at Thermal-Mechanical-Chemical Electricity Storage Workshop, organized by DOE, Jan 9th, 2019.
7. "Turbulent mixing transition in shock-driven variable-density flows," at **Frontiers in Turbulence: KRS70 at Denver**, Nov. 17-18, 2017.
8. "Thermal-Hydraulic & Structural testing and modeling of compact diffusion-bonded heat exchangers for supercritical CO2 Brayton Cycles", at Advanced Reactor Technologies-Advanced Materials Program, organized by DOE-Nuclear Engineering Division, June 6-7th, 2017.
9. "Experimental measurements of velocity and density statistics in turbulent Rayleigh-Taylor mixing layers with and without shear", at 17th USNCTAM Meeting, June 18th, 2014.
10. "Fluid Instabilities and Mixing in Variable Density Flows at Extreme Conditions," at **Fluids Days 2013**, IISc Bangalore, India, July 19th 2013. (*Special Conference in honor of 80th birthday of Prof. Roddam Narasimha*)
11. "Velocity, density and mixing growth measurements in turbulent Rayleigh-Taylor mixing layers with and without shear" at Stewardship Science Academic Alliance (SSAA) Symposium, Albuquerque, June 28th, 2013.

D3. Conference and Workshop Presentations

57. (*) **B. Ochs**, R. Ranjan, D. Ranjan, and S. Menon "Experimental-Numerical Comparison of Premixed Turbulent Flame Kernels in Expanding Supersonic Channel Flow", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
56. (*) **S. Roth, B. Ochs**, D. Ranjan, and S. Menon "Turbulent Premixed Flame Acceleration in Duct Flows", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
55. (*) **S. Johnston, J. Imgrund**, E. Fonda, K. Sreenivasan and D. Ranjan, "New Cryogenic nitrogen facility for Rayleigh-Benard convection at high Rayleigh number Part 2: Validation and Initial Data", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
54. (*) **J. Imgrund, S. Johnston**, E. Fonda, **J. McFarland** K. Sreenivasan and D. Ranjan, "New Cryogenic nitrogen facility for Rayleigh-Benard convection at high Rayleigh number Part 1: Facility Design and Capabilities", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
53. (*) **M. Karimi, B. Ochs**, W. Sun and D. Ranjan, "High Pressure Methane Ignition Delay Measurements under Supercritical Carbon-dioxide Condition", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
52. (*) **M. Ahmad, G. Pathikonda**, I. Khan, C. Aidun, D. Ranjan, "Experimental investigation of turbulent mixing between liquids of disparate viscosity in a co-axial jet mixer", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018

- 51 (*) **J. Carter, G. Pathikonda**, N. Jiang, S. Roy, D. Ranjan, "Spatio-temporal investigation of Richtmyer-Meshkov instability by simultaneous velocity-density measurements at high frame rates", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, 2018
- 50 (*) **M. Mohaghar, J. Carter, J. Rubio, G. Pathikonda**, D. Ranjan, "Experimental Investigation of the effects of Mach number and initial condition on mixing transition in shock-driven flow", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, November 18-20, 2018
- 49 (*) **M. Usta, V. Lee**, D. Ozketin, **G. Pathikonda, M. Ahmad**, D. Ranjan, C. Aidun, I. Khan, "Mixing of confined reacting co-axial jets with disparate viscosity", 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, November 18-20, 2018
- 48 (*) **Mikhaeil, M., Suchandra, P., Pathikonda, G.**, and Ranjan, D., "Self-similarity in high Atwood number Rayleigh-Taylor experiments" 70th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.
- 47 (*) **Mohaghar, M., Carter, J., Pathikonda, G.**, and Ranjan, D., "Investigation of Atwood ratio influence on turbulent mixing transition of a shock-driven variable density flow after reshock". 70th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.
- 46 Fonda, E., R Luke Dubois, Sara Camnasio, Maurizio Porfiri, Katepalli R Sreenivasan, Daniel P Lathrop, Daniel Serrano, Devesh Ranjan "Creative Turbulence: Experiments in Art and Physics". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 45 (*) **Suchandra, P., Mikhaeil, M.**, and Ranjan, D., "Experimental investigation of late time Rayleigh-Taylor mixing at high Atwood number". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 44 (*) **Musci, B.**, and Ranjan, D., "An Experimental investigation of blast wave turbulence". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 43 (*) **Johnston, S., Fonda, E.**, Sreenivasan, K. R., Ranjan, D., "Experimental container shape dependence and heat transport scaling of Rayleigh-Bénard convection of high-Prandtl-number fluids". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 42 (*) **Fries, D., Ochs, B.**, Ranjan, D., and Menon, S., "Flame speeds and curvature of premixed, spherically expanding flames advecting in a turbulent channel flow". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 41 (*) **Mohaghar, M., Carter, J., Musci, B.**, and Ranjan, D., "Experimental investigation of the effect of multimodal inclined interface on Richtmyer-Meshkov instability evolution". 69th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.
- 40 (*) **Reilly, D., Mohaghar, M., Carter, J., McFarland, J.**, and Ranjan, D., "Progress on simultaneous PLIF/PIV Measurements for a Turbulent Complex Fluid Interface". 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.

- 39 (*) **Mohaghar, M., Reilly, D., Carter, J., McFarland, J.,** and Ranjan, D., “simultaneous PLIF/PIV Measurements for a single-mode inclined interface”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 38 (*) **Mikhaeil, M.,** Dennissen, N., and Ranjan, D., “Understanding the Rayleigh-Taylor instability through 1D and 3D simulations”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 37 (*) **Carter, J.,** Gore, R., and Ranjan, D., “Evaluation of a two-length scale turbulence model with experiments on shock-driven turbulent mixing”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 36 (*) **Johnston, S.,** Fonda, E., Sreenivasan, K. R., and Ranjan, D., “Rayleigh-Benard convection at high Prandtl numbers in circular and square geometry”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 35 (*) Fonda, E., **Johnston, S.,** Ranjan, D., and Sreenivasan, K. R., “Photochromic flow visualization in silicone oil for demonstrations and experiments”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 34 (*) **Jarrahbashi, D., Pidaparti, S.,** and Ranjan, D., “Nucleation of super-critical carbon Dioxide in a venturi Nozzle”. 68th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Boston, MA, November 22-24, 2015.
- 33 (*) **Reilly, D., Carter, J., Mohaghar, M., Jarrahbashi, D., McFarland, J.,** and Ranjan, D., “Observations of Variable-Density Turbulence From a Complex Fluid Interface” APS Topical Conference on the Shock Compression of Matter, Tampa, FL, June 14-19, 2015.
- 32 (*) **Kuchibhatla, S.** and Ranjan, D., “Nonlinear Evolution of Rayleigh-Taylor Mixing” ASME IMECE Meeting, Houston, TX, 2015 [Paper ID-IMECE 2015-50995]
- 31 (*) **Pidaparti, S., Jarrahbashi, D.,** Anderson, M., and Ranjan, D., “Unusual heat transfer characteristics of supercritical carbon dioxide” ASME IMECE Meeting, Houston, TX, 2015 [Paper ID-IMECE 2015-51225]
- 30 (*) **Reilly, D., Carter, J., McFarland, J.,** and Ranjan, D., “Shock-Driven Variable-Density Turbulence: New Insights”. 67th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Francisco, CA, November 24, 2014.
- 29 (*) **McFarland, J., Reilly, D.,** Greenough, J., and Ranjan, D., “Computational study of the Richtmyer-Meshkov instability with a Complex initial condition”. 67th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Francisco, CA, November 24, 2014.
- 28 (*) **Mikhaeil, M., Akula, B., Finn, T.,** and Ranjan, D., “Dynamics of Rayleigh-Taylor driven flows at high Atwood numbers”. 67th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Francisco, CA, November 23, 2014.
- 27 **McDonald, C., McFarland, J., Reiley, D., Reid, B.,** and Ranjan, D., “Experimental investigation of Richtmyer-Meshkov instability on inclined interface,” 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, Nov. 2012
- 26 **Akula, B.,** and Ranjan, D., “Progress on experimental investigation of RT instability at high Atwood numbers,” 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, Nov. 2012

- 25 **Kuchibhatla, S.**, and Ranjan, D., "Understanding the impact of initial conditions on low Atwood number Rayleigh-Taylor driven flows," 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, Nov. 2012
- 24 **McFarland, J., McDonald, C., Reiley, D.**, Greenough, J., and Ranjan, D., "Progress with incline-interface Richtmyer-Meshkov experiments," 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, Nov. 2012
- 23 Cassibry, J. T., Stanic, M., Stellingverf, R. F., **McFarland, J.**, Ranjan, D., Bonazza, R., and Abarzhi, S. I., "Integrated study of non-uniform structures in Richtmyer-Meshkov unstable flows by means of theoretical analysis, Lagrangian and Eulerian numerical simulations, and experiments," 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, Nov. 2012
- 22 **Akula, B.**, and Ranjan, D., "Effect of shear on R-T mixing at low and medium Atwood numbers," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 21 **Kuchibhatla, S.**, and Ranjan, D., "Experiments on Rayleigh-Taylor instability with Multimodal initial conditions at low Atwood numbers," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 20 Tanimizu, K., Sadr, R., and Ranjan, D., "Thermal-hydraulic behavior of Sc-CO₂ in a horizontal circular straight tube," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 19 **Haehn, N.**, Weber, C., Oakley, J., Rothamer, D., Ranjan, D., and Bonazza, R., "Shock-initiated combustion with new insights into the nature of the shock-focusing phenomenon," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 18 **Placette, B., Akula, B.**, Andrews, M., and Ranjan, D., "On Buoyancy and Shear Mixing," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 17 **McFarland, J. A.**, Greenough, J. A., and Ranjan, D., "A Computational study of a Richtmyer-Meshkov instability for an inclined interface," 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, Nov. 2011
- 16 **Tang, Y.**, Guo, B., and Ranjan, D., "Computational Fluid Dynamics Simulation of Aerosol Deposition from Turbulent Flow in a Vertical Straight Pipe," AAAR 30th Annual Conference, Orlando, FL, Oct. 2011.
- 15 **Haehn, N.**, Oakley, J., Rothamer, D., Anderson, M., Ranjan, D., and Bonazza, R., "Shock-initiated combustion of a spherical density inhomogeneity," 63rd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Long Beach, CA, Nov. 2010
- 14 **Fatima, R.**, Kurizenga, A., Anderson, M., and Ranjan, D., "Experimental and Numerical Investigation of Supercritical Carbon-dioxide Compact Heat exchangers," 62nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Minneapolis, MN, Nov. 2009

- 13 Ranjan, D., Balakumar, B. J., Orlicz, G., Tomkins, C. D., and Prestridge, K. P., "Experimental analysis of re-shocked gas curtain", 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23-25, 2008
- 12 Balakumar, B. J., Orlicz, G., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Turbulence Statistics in a Richtmyer-Meshkov Unstable Thin Fluid Layer after Reshock," 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23-25, 2008
- 11 Tomkins, C. D., Balakumar, B. J., Orlicz, G., Ranjan, D., and Prestridge, K. P., "Memory of Initial Conditions in Shocked and Re-shocked Heavy-Gas Curtains," 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23-25, 2008
- 10 Zoldi-Sood, C. A., Gore, R. A., Balakumar, B. J., Orlicz, G., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Simulations of a Reshocked Varicose Gas Curtain," 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23-25, 2008
- 9 Orlicz, G., Balakumar, B. J., Ranjan, D., Tomkins, C. D., and Prestridge, K. P., "Richtmyer-Meshkov Instability in Thin Fluid Layers: Turbulent Mixing, Mach Number and Reshock Effects," 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23-25, 2008
- 8 Motl, B., Ranjan, D., Oakley, J., Anderson, M., Bonazza, R., "Experimental Study of Richtmyer-Meshkov Instability for a He-SF₆ Interface," 60th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Salt Lake City, UT, November 18-20, 2007.
- 7 Ranjan, D., Motl, B., Niederhaus, J., Oakley, J., Anderson, M., Bonazza, R., "Experimental Study of Shock-Induced Compression and Vortex Generation in the Shock-Bubble Interaction," 59th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Tampa Bay, FL, November 19-21, 2006.
- 6 Niederhaus, J., Ranjan, D., Motl, B., Oakley, J., Anderson, M., Bonazza, R., and Greenough, J., "Computational Analysis for Secondary Vorticity and Non-Axisymmetric Features in the Shock-Bubble Interaction," 59th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Tampa Bay, FL, November 19-21, 2006.
- 5 Ranjan, D., Niederhaus, J., Oakley, J., Anderson, M., Bonazza, R., and Greenough, J., "Interaction of a Planar Shock with a Spherical Gas Inhomogeneity – Part I: Experiments," 58th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Chicago, IL, November 20-22, 2005.
- 4 Niederhaus, J., Ranjan, D., Oakley, J., Anderson, M., Bonazza, R., and Greenough, J., "Interaction of a Planar Shock with a Spherical Gas Inhomogeneity– Part II: Calculations," 58th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Chicago, IL, November 20-22, 2005.
- 3 Ranjan, D., Niederhaus, J., Oakley, J., Anderson, M., and Bonazza, R., "Experimental Study of a Strongly Shocked Gas Bubble," 57th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Seattle, WA, November 21-23, 2005.
- 2 Niederhaus, J., Ranjan, D., Oakley, J., Anderson, M., Bonazza, R., and Greenough, J., "Numerical Simulation of a Strongly Shocked Gas Bubble" (poster), 46th Annual Meeting of

the American Physical Society Division of Plasma Physics, Savannah, GA, November 15-19, 2004.

1. Ranjan, D., Niederhaus, J., Anderson, M., Oakley, J., Bonazza, R., and Greenough, J., "IFE-Related Instabilities in a Spherical Gas Bubble Accelerated by a Planar Shock Wave," 16th American Nuclear Society Topical Meeting on the Technology of Fusion Energy, Madison, WI, September 14-16, 2004

D4. Invited Seminar Presentations

1. "Variable-Density Mixing and Turbulence at Extreme Conditions", Mechanical Engineering, Massachusetts Institute of Technology (**MIT**), on October 25th, 2019.
2. "Variable-Density Mixing and Turbulence at Extreme Conditions", Mechanical Engineering, Michigan State University (**MSU**), on October 22nd, 2019.
3. "Variable Density Mixing and Turbulence at Extreme Conditions," Department of Mechanical Engineering, **Florida State University**, on September 10th, 2019.
4. "Turbulent mixing in shock-driven variable-density flow", Mechanical Engineering and Mechanics, **UNC Charlotte**, on September 5th, 2019.
5. "Turbulent mixing in shock-driven variable-density flow", Department of Aerospace and Mechanical Engineering, **University of Notre Dame**, on April 23rd, 2019.
6. **Lindberg Lecture**, "Variable Density Mixing and Turbulence at Extreme Conditions," **University of Wisconsin-Madison**, on April 11th 2019.
7. "Turbulent mixing in shock-driven variable-density flow", **University of British-Columbia (UBC)** on March 18th, 2019. [Hosted by the Institute of Applied Mathematics and the UBC Faculty of Engineering]
8. "Turbulent mixing in variable-density flow," **Lawrence Livermore National Laboratory (LLNL)**, on June 1st, 2018.
9. "Turbulent mixing in shock-driven variable-density flow," Department of Aeronautics and Astronautics, **Stanford University**, on May 31st, 2018.
10. "Techno-Economic Development for Supercritical CO2 Advanced Energy Conversion," Energy Technologies Area, **Lawrence Berkeley National Laboratory (LBNL)**, on May 30th, 2018.
11. "Turbulent mixing in shock-driven variable-density flow," Mechanical Engineering Seminar, **University of California-Berkeley**, on May 30th, 2018.
12. "Techno-Economic Development for Supercritical CO2 Advanced Energy Conversion," Mechanical Engineering Seminar, **Carnegie Mellon University**, on Nov. 6th, 2015.
13. "Understanding the dynamics of shock-and buoyancy-driven flows at Extreme Conditions," Environmental Fluid Mechanics and Water Resources Seminar, **Georgia Institute of Technology**, on Nov. 14th 2014.
14. "Fluid Instabilities and Mixing in Variable Density Flows at Extreme Conditions," at Center for Environmental and Applied Fluid Mechanics (CEAFM), **John Hopkins University**, on Oct 25th, 2013.
15. "Fluid Instabilities and Mixing at Extreme Conditions," at Department of Mechanical Engineering, **University of Florida**, on Oct 1st, 2013.

16. "Fluid Instabilities and Mixing in Variable Density Flows at Extreme Conditions," at George W. Woodruff School of Mechanical Engineering, **Georgia Institute of Technology**, on May 1st, 2013
17. "Fluid Instabilities and Mixing in Variable Density Flows at Extreme Conditions," Mechanical Engineering Seminar, **University of Maryland-College Park**, April 17th, 2013
18. "Fluid Instabilities and Mixing in Variable Density Flows at Extreme Conditions," at College Colloquium, College of Science, Mathematics & Technology, The **University of Texas at Brownsville**, April 12th, 2013
19. "Fluid instabilities and mixing in Variable Density Flows at Extreme Conditions," at Graduate Seminar, Department of Aerospace Engineering, **Texas A&M Univ.**, Feb. 21st, 2013.
20. "Putting design into Turbulence," at REU Site: Energy and Combustion-College Station, June 8th, 2012.
21. "Fluid instabilities and mixing at Extreme Conditions," at Graduate Seminar, Department of Mechanical Engineering, **Texas A&M University**, April 18th, 2012.
22. "Transition, Turbulence and Mixing in Shock and Buoyancy-Accelerated Variable Density Flows at Extreme Conditions," Department of Atmospheric, Oceanic and Space Sciences, **University of Michigan**, August 29, 2011.
23. "Experimental Investigation of Shock-Induced Interfacial Instability, Mixing, and Turbulence," at Mechanical Engineering Department, **Indian Institute of Technology-Bombay**, June 19, 2009.
24. "Experimental Investigation of Shock-Induced Distortion of a Spherical Gas Inhomogeneity" at Mechanical Engineering Department, **California Institute of Technology**, May 29, 2007
25. "Experimental Investigation of Richtmyer-Meshkov Instability for a three-dimensional interface" at **Los Alamos National Laboratory**, May 15, 2007
26. "Richtmyer-Meshkov Instability" at **Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR)**, July, 2004.

E. Grants and Contracts

Total Share of Ranjan as PI/or Co-PI : >\$11M (33 Funded Projects)

E1. As Principal Investigator

Funded Projects:

1. Title of Project: Detailed Measurements of Turbulent Rayleigh-Taylor and Richtmyer-Meshkov Mixing at Extreme Conditions
 Agency/Company: Department of Energy-National Nuclear Security Administration
 Total Dollar Amount: **\$750,000**
 Role: **PI**
 Collaborators: **none**
 Period of Contract: 07/31/2019-07/30/2022
 Candidate's Share: 100%

2. Title of Project: Deep Learning and Natural Language Processing for Accelerated Inverse Design of Optical Metamaterials
Agency/Company: Department of Energy- ARPA-E
Total Dollar Amount: **\$180,000**
Role: **PI**
Collaborators: A. Federov (co-PI)
Period of Contract: 3/25/2020-03/24/2022
Candidate's Share: 50% (\$90,000)
3. Title of Project: Discoveries in blast-wave-driven turbulence of astrophysical relevance
Agency/Company: Department of Energy-Office of Science (Early Career Program)
Total Dollar Amount: **\$750,000**
Role: **PI**
Collaborators: none
Period of Contract: 08/01/2016-07/31/2021
Candidate's Share: 100%
4. Title of Project: Collaborative Research: Turbulent-convection experiments at extreme conditions using cryogenic nitrogen
Agency/Company: National Science Foundation (NSF)
Total Dollar Amount: **\$332,545**
Role: **PI**
Collaborators: **K. R. Sreenivasan-NYU (co-PI), Enrico Fonda-NYU (co-PI)**
Period of Contract: 9/1/2016-8/31/2021
Candidate's Share: 80% (**\$272,145**)
5. Title of Project: Advancements Towards ASME Nuclear code case for compact heat exchangers
Agency/Company: Subcontract through UW Madison (Prime- Department of Energy- Nuclear Energy University Program)
Total Dollar Amount: **\$300,000**
Role: **PI**
Collaborators: **None**
Period of Contract: 10/1/2017-12/30/2020
Candidate's Share: ~100% (**\$300K**)
6. Title of Project: Thermal Hydraulic & Structural Testing and modeling of Compact diffusion-bonded heat exchangers for Supercritical CO2 Brayton Cycles
Agency/Company: Department of Energy-Nuclear Energy University Program (**DOE-NEUP**)
Total Dollar Amount: **\$800,000**
Role: **PI**
Collaborators: Mark Anderson-UW Madison (co-PI), Matthew Carlson-SNL (co-PI), James Sienicki-ANL (co-PI)
Period of Contract: 10/1/2016-9/30/2019
Candidate's Share: ~50% (\$400K)

7. Title of Project: Robust, Cost-Effective Heat Exchangers for 800°C Operation with Supercritical CO₂
 Agency/Company: Department of Energy- Office of Energy Efficiency and Renewable Energy (**DOE-EERE**) [Subcontract through Purdue University]
 Total Dollar Amount: **\$1,645,316** (Direct-\$1,325,993 Cost-share \$319,323)
 Role: **PI**
 Collaborators: Asegun Henry-GT (co-PI) (moved to MIT since July 2018)
 Period of Contract: 10/1/2015-12/31/2019
 Candidate's Share: 75% (\$1,233,987)

8. Title of Project: Detailed Measurements of Turbulent Rayleigh-Taylor Mixing at Large Atwood Numbers
 Agency/Company: Department of Energy-National Nuclear Security Administration
 Total Dollar Amount: **\$600,000**
 Role: **PI**
 Collaborators: **none**
 Period of Contract: 7/1/2016-6/30/2019
 Candidate's Share: 100% (**\$600,000**)

9. Title of Project: Investigation of Shock-induced turbulent mixing at a Gaseous Interface
 Agency/Company: Los Alamos National Laboratory
 Total Dollar Amount: **\$180,038**
 Role: **PI**
 Collaborators: **none**
 Period of Contract: 03/1/2019-9/30/2020
 Candidate's Share: 100%

10. Title of Project: Turbulent Rayleigh-Taylor Parametric Study
 Agency/Company: Los Alamos National Lab
 Total Dollar Amount: **\$320,000**
 Role: **PI**
 Collaborators: **none**
 Period of Contract: 3/7/2016-02/28/2019
 Candidate's Share: 100%

11. Title of Project: Investigation of Shock-induced turbulent mixing at a Gaseous Interface
 Agency/Company: Los Alamos National Laboratory
 Total Dollar Amount: **\$270,000**
 Role: **PI**
 Collaborators: **none**
 Period of Contract: 12/1/2015-9/30/2018
 Candidate's Share: 100%

12. Title of Project: Fundamental study of key issues related to advanced S-CO₂ Brayton Cycle: prototypic HX development and Cavitation
 Agency/Company: Department of Energy-Nuclear Energy University Program
 Total Dollar Amount: **\$799,000**

Role: **PI**
Collaborators: Mark Anderson-UW Madison (co-PI), Michael Corradini-UW (co-PI)
Period of Contract: 10/1/2014-9/30/2017
Candidate's Share: ~50% (**\$400k**)

13. Title of Project: CAREER: Transition, Turbulence and Mixing in Shock-Accelerated Variable Density Flows at Extreme Conditions
Agency/Company: National Science Foundation (NSF)
Total Dollar Amount: **\$375,628**

Role: **PI**
Collaborators: **none**
Period of Contract: 7/1/2014-4/30/2019
Candidate's Share: 100% (**\$375,628**)

[Note: This project was transferred from Texas A&M to Georgia Tech, Initial Performance Period-05/1/2013-04/30/2018, \$416,352]

14. Title of Project: YIP Award: "Breaking with Tradition: Turbulence with Memory"
Agency/Company: Department of Defense-Air Force Office of Scientific Research (AFOSR)
Total Dollar Amount: **\$242,572**

Role: **PI**
Collaborators: **none**
Period of Contract: 9/1/2014-8/31/2016
Candidate's Share: 100% (**\$242,572**)

[Note: This project has been subcontracted from Texas A&M to Georgia Tech, Initial Performance Period-09/1/2013-08/31/2016, \$360,000]

15. Title of Project: A Parametric study to understand the evolution of density self-correlation in Turbulent Rayleigh-Taylor driven mixing with and without shear
Agency/Company: Los Alamos National Laboratory
Total Dollar Amount: **\$75,000**

Role: **PI**
Collaborators: **none**
Period of Contract: 10/1/2014-10/30/2015
Candidate's Share: 100% (**\$75K**)

16. Title of Project: Detailed Measurements of Turbulent Rayleigh-Taylor Mixing at Large and Small Atwood Numbers
Agency/Company: Department of Energy-National Nuclear Security Administration
Total Dollar Amount: **\$240,663**

Role: **PI**
Collaborators: **none**
Period of Contract: 9/19/2014-9/18/2015 – No cost extension until 9/18/2016
Candidate's Share: 100% (**\$240,663**)

[Note: The original proposal awarded to PI at Texas A&M, Initial Performance Period-09/19/2012-09/18/2015, \$438,000]

17. Title of Project: Technical Development for S-CO₂ Advanced Energy Conversion

Agency/Company: Department of Energy-Nuclear Energy University Program
(Subcontract through UW-Madison)

Total Dollar Amount: **\$80,250**

Role: **PI**

Collaborators: **none**

Period of Contract: 12/15/2013-11/10/2014

Candidate's Share: 100% (**\$80,250**)

[Note: This is the year 3 funds transferred from the original proposal awarded to PI at Texas A&M, Initial Performance Period-10/26/2011-09/30/2014, \$213,361.]

Successful Grants at Texas A&M University (2009-2014) Prior to Joining GT in July 2014 which had either remained or completed at that institution (Served as PI).

18. Title of Project: Study of Supercritical Fluid Thermal Hydraulics,"
Agency/Company: Qatar National Research Fund
Total Dollar Amount: **\$1,018,324**
Role: **PI**
Collaborators: **Devesh Ranjan (PI), Reza Sadr-TAMUQ (co-PI), Mark Anderson (co-PI)**
Period of Contract: 09/01/2009-06/30/2013
Candidate's Share: 50% (**\$509,162**)

19. Title of Project: Turbulent Rayleigh-Taylor Parametric Study
Agency/Company: Los Alamos National Laboratory
Total Dollar Amount: **\$240,000**
Role: **PI**
Collaborators: **none**
Period of Contract: 02/10/2011-02/09/2014
Candidate's Share: 100%

20. Title of Project: Detailed Measurements of Turbulent Rayleigh-Taylor Mixing at Large and Small Atwood Numbers
Agency/Company: Department of Energy-National Nuclear Security Administration
Total Dollar Amount: **\$376,981**
Role: **PI**
Collaborators: **none**
Period of Contract: 9/01/2009-8/31/2013
Candidate's Share: 100%

21. Title of Project: Detailed Measurements of Initial Conditions Effects on Rayleigh-Taylor Mixing Development by Implementing a "Flapper" Type System
Agency/Company: Los Alamos National Laboratory
Total Dollar Amount: **\$90,000**
Role: **PI**
Collaborators: **none**
Period of Contract: 10/01/2010-09/30/2011
Candidate's Share: 100%

22. Title of Project: Experimental Component of LDRD-DR20090058DR –Turbulence by Design

Agency/Company: Los Alamos National Laboratory
Total Dollar Amount: **\$90,000**
Role: **PI**
Collaborators: **none**
Period of Contract: 10/01/2009-09/30/2010
Candidate's Share: 100%

E2. As Co-Principal Investigator

Funded Projects:

23. Title of Project: Advanced Multiphase (MP) forming for enhanced efficiency of drying paper, tissue and other fiber composite products
Agency/Company: DOE-EERE
Total Dollar Amount: \$3,749,592
Role: co- PI
Collaborators: Cyrus Aidun (PI), R. Rao, C. Roberts, E. Quintana, B. Halls (Sandia National Lab), M. Baldwin (Kimberly Clarke Corp.), T. Bliss, T. Patterson (Solenis Corp.)
Period of Contract: 6/1/2021-5/31/24
Candidate's Share: 15% (**\$562,000**)
24. Title of Project: Ignition, Turbulent Flame Speeds, and Emissions from High Hydrogen Blended Fuels
Agency/Company: DOE-UTSR
Total Dollar Amount: **\$1,000,000 (Direct-\$799,999 Cost-share \$200,001)**
Role: **co- PI**
Collaborators: **Wenting Sun (PI), Timothy Lieuwen (co-PI)**
Period of Contract:10/1/2021-9/30/2024
Candidate's Share: 30% [**\$250,000**]
25. Title of Project: The Effect of Mixing of Miscible Liquids with Disparate Viscosity
Agency/Company: DOW Chemical
Total Dollar Amount: **\$1,340,000**
Role: **co-PI**
Collaborators: **Cyrus Aidun (PI)**
Period of Contract: 07/15/2017-07/14/2021
Candidate's Share: 50% (**\$670,000**)
26. Title of Project: Advanced model development for LES of Oxy-combustion and Supercritical Carbon Dioxide Power Cycles
Agency/Company: Department of Energy
Total Dollar Amount: **\$1,004,687 (including cost-share)**
Role: **co-PI**
Collaborators: **Joseph Oefelein (PI), Adam Steinberg**
Period of Contract: 8/15/2019-08/14/2022
Candidate's Share: 25% (**\$250k excluding cost share**)

27. Title of Project: Advanced Characterization of particulate flows for concentrating solar power applications
 Agency/Company: Department of Energy- Office of Energy Efficiency and Renewable Energy (DOE-EERE)
 Total Dollar Amount: **\$1,641,326**
 Role: **co-PI**
 Collaborators: **Peter Loutzenhiser (PI), Zhoumin Zhang (co-PI)**
 Period of Contract: 08/1/2018-07/30/2021
 Candidate's Share: 30%
28. Title of Project: Investigation of Autoignition and combustion stability of high pressure supercritical carbon-dioxide oxy-combustion
 Agency/Company: DOE-UTSR
 Total Dollar Amount: **\$1,201,265 (Direct-\$880,498 Cost-share \$320,767)**
 Role: **co-PI**
 Collaborators: **Wenting Sun (PI), Timothy Lieuwen (co-PI), Suresh Menon (co-PI)**
 Period of Contract: 8/1/2015-9/30/2019
 Candidate's Share: 40% (**\$327,402 excluding cost share**)

Successful Grants at Texas A&M University (2009-2014) Prior to Joining GT in July 2014 which had either remained or completed at that institution (Served as Co-PI).

29. Title of Project: NSF REU Site: Texas Center for Undergraduate Research in Energy and Propulsion
 Agency/Company: National Science Foundation
 Total Dollar Amount: **\$403,921**
 Role: **co-PI**
 Collaborators: **Eric Petersen (PI), Devesh Ranjan (co-PI)**
 Period of Contract: 04/1/2013-3/31/2016
 Candidate's Share: 50% (\$201,960)
30. Title of Project: Quantitative Assessments of Shock-Driven Variable Density flows (Task A) and Radiation Diffusion Model Error (Task B)
 Agency/Company: DOE (Subcontract through Univ. of Michigan Crash Center)
 Total Dollar Amount: **\$150,000**
 Role: **co-PI**
 Collaborators: **Marvin Adams (PI), Devesh Ranjan (co-PI), Ryan McClarren (co-PI)**
 Period of Contract: 12/15/11-8/31/13
 Candidate's Share: 68% (\$100,133)
31. Title of Project: TGA/DSC and Torrefaction studies on Agricultural Biomass Fuels
 Agency/Company: Agni Corporation
 Total Dollar Amount: **\$55,000**
 Role: **co-PI**
 Collaborators: **Kalyan Annamalai (PI), Devesh Ranjan (co-PI)**
 Period of Contract: 05/18/2010-11/30/2010
 Candidate's Share: 50% (\$27,500)

32. Title of Project: Combustion and Ash Fouling Studies on a 100,000 BTU/h Burner Facility for Coal and Coal-Torrefied Biomass Blends
Agency/Company: Agni Corporation
Total Dollar Amount: **\$16,000**
Role: **co- PI**
Collaborators: **Kalyan Annamalai (PI), Devesh Ranjan (co-PI)**
Period of Contract: 04/1/2012-3/31/2013
Candidate's Share: 50% (\$8,000)
Note: The project was negotiated for total amount of \$116,267. However, due to the financial trouble within the company it was discontinued. The amount shown is the total amount received from the company.

E3. As Senior Personnel or Contributor

33. Title of Project: Creative Turbulence: Experiments in Art and Physics
Agency/Company: APS-2015 Public Outreach and Informing the Public Grants
Total Dollar Amount: **\$10K**
Role: **Contributor**
Collaborators: **Enrico Fonda-NYU (PI), R. Luke DuBois (NYU), Maurizio Porfiri (NYU), K. R. Sreenivasan (NYU), Devesh Ranjan (GT), Daniel Lathrop (UMD), Daniel Serrano (UMD)**
Period of Contract: 11/1/2015-10/30/2018

E4. Pending Proposals

Title of Project: Detailed Measurements of Turbulent Rayleigh-Taylor and Richtmyer-Meshkov Mixing at Extreme Conditions
Agency/Company: DOE-NNSA
Total Dollar Amount: **\$900,000**
Role: **PI**
Collaborators: **NA**
Period of Contract: 8/1/2022-7/31/2025
Candidate's Share: 100%

F. Other Scholarly and Creative Accomplishments

- No Data

G. Societal and Policy Impacts

- COVID 19 Effort—Dr. Ranjan is currently part of a 10-member Technical Screening Committee of the NAE's COVID-19 Call for Engineering Action taskforce, an initiative to help fight the coronavirus pandemic.
- COVID 19 Effort-Dr. Ranjan and his team was instrumental in developing a robust ventilator design (open-AirVentGT) and made it available for companies to build upon their design during the pandemic. Dr. Ranjan was invited by the World Economic Forum

to present their design to stakeholders in Asia and Africa for broader adoption in those affected by COVID. (<https://news.gatech.edu/2020/04/27/open-airventgt-emergency-ventilator-provides-patient-monitoring-feedback-control>)

- Dr. Ranjan worked with renowned artist (Rafael Lozano-Hemmer-Montreal Canada) and performed flow visualization experiments that facilitated development of an artwork titled “Atmospheric memory”(<http://microsites.engineering.nyu.edu/creative-turbulence>), which was displayed during the art exhibit at New York Psychoanalytic Society & Institute from June 9th-June 16th 2018. This work was supported by American Physical Society’s public outreach and informing the public grants program.
- Dr. Ranjan and his team have collaborated with Guerilla Science, a professional outreach organization based in New York City (NYC) and London, with which they developed and ran a fluid dynamics-inspired competition. The obstacles/demonstrations part of the National Math Festival in Washington DC were covered in a news section by Science, and were then part of the Figment Festival, a participatory art festival with approximately 25,000 participants in Governors Island in NYC, as well as part of the NYU Tandon School of Engineering Research Expo. (<http://guerillascience.org/olympics/>)
- Dr. Ranjan’s research featured in the 2016 Stewardship Science Academic Programs Annual produced by the DOE-National Nuclear Security Administration Office of Research (DOE-NA0038) [http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/SSAP%20Annual%20Book_Final_Feb%202016_0.pdf] [page#19]
- Dr. Ranjan featured in the 2012 Stewardship Science Academic Alliance Annual as the success story of the program. The annual is widely distributed to the congressman and senators on the hill. [<http://nnsa.energy.gov/sites/default/files/nnsa/01-13-inlinefiles/2012%20SSAA%20Annual.pdf>] [page# 43]

H. Other Professional Activities

- Participant (2rd Cohort) of the Emerging Leaders Program run by the Provost’s Office, Georgia Institute of Technology, 2018-2019

V. Education

A. Courses Taught

Courses Taught at Georgia Institute of Technology:

Semester, Year	Course Number	Course Title	Number of Students
Undergraduate			
Spring 2020	ME3345	Heat Transfer	57
Spring 2019	ME3345	Heat Transfer	54
Spring 2016	ME3345	Heat Transfer	52
Fall 2014	ME3345	Heat Transfer	46
Graduate			

Fall 2020	ME6601-A, Q	Introduction to Fluid Mechanics	62[46+16]
Fall 2018	ME6601-A, Q	Introduction to Fluid Mechanics	42[33+9]
Fall 2017	ME 6601-A,Q	Introduction to Fluid Mechanics	53[46+7]
Fall 2016	ME 6601-A,Q	Introduction to Fluid Mechanics	61[50+11]
Fall 2015	ME6601-A,Q	Introduction to Fluid Mechanics	52[38+14]

Note: A represents "On Campus" Section; Q represents "Distance Learning" Section.

Courses Taught at Texas A&M University:

Semester, Year	Course Number	Course Title	Number of Students (mean student evaluation score)
Undergraduate			
Spring 2014	MEEN 421	Thermal-Fluid Analysis and Design	NA
Spring 2014	ENGR 402	Interdisciplinary Design II	NA
Fall 2013	MEEN 461	Heat Transfer	59
Fall 2012	MEEN421-502	Thermal-Fluid Analysis and Design	34(4.41)
Fall 2012	MEEN421-501	Thermal-Fluid Analysis and Design	40(4.26)
Spring 2012	MEEN 461	Heat Transfer	47(4.25)
Spring 2012	MEEN 421	Thermal-Fluid Analysis and Design	44(4.53)
Spring 2011	MEEN 421	Thermal-Fluid Analysis and Design	44 (3.49)
Fall 2010	MEEN 421	Thermal-Fluid Analysis and Design	37 (4.51)
Fall 2009	MEEN 461	Heat Transfer	58 (4.74)
Spring 2009	MEEN 461	Heat Transfer	79 (4.37)
Graduate			
Spring 2013	MEEN 628	Heat Transfer-Convection	13 (4.99)
Fall 2011	MEEN 637	Turbulence Measurement and Analysis	12(4.97)
Spring 2010	MEEN 637	Turbulence Measurement and Analysis	25(4.41)

B. Individual Student Guidance

B1. Ph.D. Students

B1.a. Graduated Ph.D. Students [Total-14 (6 co-advised)]

1. Student Name: Mr. Sandeep Pidaparti
Major: Mechanical Engineering
Current Position- **Scientist at NETL (Systems Engineering and Analysis Group) since April 2018**

Dissertation/Project Title: Heat Transfer and Fluid Flow Characteristics of Supercritical Carbondioxide Flow

Graduation: **Summer 2019 [thesis defended on July 11th, 2019]**

2. Student Name: Mr. Miad Karimi (co-advised with Prof. Wenting Sun)
Major: Aerospace Engineering
Current Position- **Postdoctoral Fellow, Air Force Research Lab [Awarded Prestigious National Research Council Postdoctoral Fellow Award]**
Dissertation/Project Title: Investigation of High Pressure Methane and Syngas Autoignition delay times

Graduation: **Fall 2019 [thesis defended on August 15th, 2019]**

3. Student Name: Mr. Mohammad Mohaghar
Major: Mechanical Engineering
Current Position- **Postdoctoral Fellow, School of Civil Engineering (Supervisor- Prof. Donald Webster)**
Dissertation/Project Title: Effects of Initial Conditions and Mach number on Turbulent Mixing Transition of Shock-driven Variable-density Flow
Graduation: **Spring 2019**

4. Student Name: Mr. Mark Mikhaeil (**DOE-NEUP Fellowship recipient, President's Fellowship, ARCS Fellowship**)
Major: Mechanical Engineering
Current Position- ExxonMobil Upstream Research, Houston since Dec 2019
Dissertation/Project Title: "Simultaneous Velocity and Density Measurements of Fully-Developed Rayleigh-Taylor Turbulent Mixing"
Graduation: Spring 2020

Note: Mark worked with me during the summer of 2013 as a NSF-USRG Fellow. I worked closely with him on the application process for the DOE-NEUP Fellowship. **Mark was awarded the outstanding poster presentation award at the 2015 SSAP symposium.** Mark also worked at LANL in summer 2015 and the work was highlighted in the SSAA magazine. **Mark was selected to participate in a joint workshop between the DOE-NNSA and CEA-France in summer 2018. It is an effort to promote a postdoctoral exchange program between the two organizations a workshop is being organized to support the development of early career scientists who are interested in research areas relevant to the CEA and NNSA.**

5. Student Name: Mr. Dan Fries (co-advised with Prof. Suresh Menon, AE)
Major: Aerospace Engineering
Current Position- **Postdoctoral Fellow, Aerospace Department, UT-Austin (Supervisor- Prof. Noel Clemens)**
Dissertation/Project Title: "Entrainment, Mixing and Ignition in Single and Multiple Jets in Supersonic Crossflow"
Graduation: **Summer 2020**

6. Student Name: Mr. John Carter
Major: Mechanical Engineering
Current Position- Delta Airlines (TechOps Division)
Dissertation/Project Title: "Statistical and Temporal Analysis of Shock-Driven-Instability through Simultaneous Density and Velocity Measurements"
Graduation: **Summer 2020**

7. Student Name: Mr. Alon Katz
Major: Mechanical Engineering
Current Position: TerraPower, Seattle
Dissertation/Project Title: On the Suitability of Printed Circuit Heat Exchanger for High Temperature Nuclear Service
Graduation: **Summer 2021**

Ph. D. Students Graduated at Texas A&M University

8. Student Name: Dr. Bhanesh Akula
Current Position- **Intel Corporation, Portland-Oregon**
Major: Mechanical Engineering
Dissertation/Project Title: Experimental Investigation of Buoyancy Driven Mixing with and without Shear at Different Atwood Numbers
Graduation: **December 2014**

9. Student Name: Dr. Sarat Kuchibhatla
Current Position- **Dow Chemical Company, Midland, MI**
Major: Mechanical Engineering
Dissertation/Project Title: On the Effect of Initial Conditions on Rayleigh-Taylor Mixing
Graduation: **December 2014**

10. Student Name: Dr. Jacob McFarland
Current Position- **Assistant Professor, Mechanical and Aerospace Engineering Department, University of Missouri-Columbia**; moving to Texas A&M as an Associate Professor in Fall 2020.
Major: Mechanical Engineering
Dissertation/Project Title: Experimental and Computational Study of the Inclined Interface Richtmyer-Meshkov Instability
Graduation: **Summer 2013**
Note: Awarded NSF CAREER Award in 2019 from NSF-Fluid Dynamics Program, and ONR Young Investigator in 2020.

11. Student Name: Dr. Siva Sankar (**co-advised with Prof. Kalyan Annamalai**)
Current Position- **Trinity Consultants**
Major: Mechanical Engineering
Dissertation/Project Title Effect of Co-firing torrefied biomass with sub-bituminous coal in a 30 kWt downfired burner
Graduation: **August 2014**

12. Student Name: Dr. Mona Karimi (**co-advised with Prof. Sharath Girimaji**)
Current Position- **Research Associate, NASA Ames research center**
Major: Mechanical Engineering
Dissertation/Project Title Compressibility Effects on the Kelvin-Helmholtz Instability and Mixing Layer Flows
Graduation: **December 2014**

13. Student Name: Dr. Yingjie Tang (**co-advised with Prof. Bing Guo**)
Current Position- **Post Doc at University of Houston**
Major: Mechanical Engineering
Dissertation/Project Title Computational fluid dynamics study of aerosol transport and deposition mechanisms
Graduation: **Summer 2012**

Ph. D. Students Graduated at University of Wisconsin-Madison

14. Student Name: Dr. Nicholas Haehn (**co-advised with Prof. Riccardo Bonazza**)
Current Position- **Senior Packaging Engineer at Intel Corporation-Arizona**
Major: Mechanical Engineering
Dissertation/Project Title: Reacting Shock-Bubble Interactions
Graduation: **Summer 2012**

B1.b. In Process Ph.D. Students [Total: 11 (4 co-advised)]

15. Student Name: Mr. Stephen Johnston (**President's Fellowship**)
Major: Mechanical Engineering
Semester Advisement Began: Fall 2014
Current Progress: Worked on the design of the setup and making excellent progress towards his thesis, Passed Qualifying Exam, Proposal defense in summer 2019
Dissertation/Project Title: "Convection at Extreme Conditions"
Expected Graduation: Fall 2021
Note: Stephen won the 1st prize for the poster presentation at the 2015 APS-DFD meeting.

16. Student Name: Mr. Benjamin Musci (**DOE-NNSA SSGF Fellowship, LLNL HEDP Fellowship**)
Major: Mechanical Engineering
Semester Advisement Began: Fall 2015
Current Progress: Passed qualifying exam, and expected to defend the proposal in summer 2019. Ben also spent one summer at Los Alamos and another one at Lawrence Livermore National Lab working on computational modeling of the blast-driven flows. Earlier this year, Ben participated with another colleague of mine on performing experiments at the OMEGA laser in Rochester.
Dissertation/Project Title: "Blast-wave driven turbulence"
Expected Graduation: Fall 2021
Ben was selected to participate in a joint workshop between the DOE-NNSA and CEA-France in summer 2018.

17. Student Name: Mr. Prasoon Suchandra
Major: Mechanical Engineering
Semester Advisement Began: Fall 2015
Current Progress: Prasoon has hit the ground running, co-authored a JFM publication and passed his qualifying exam with flying colors. Proposal defense-Fall 2020
Dissertation/Project Title: "Multi-Layer Rayleigh-Taylor flow"
Expected Graduation: Spring 2022

18. Student Name: Mr. Samuel Petter
Major: Mechanical Engineering
Semester Advisement Began: Fall 2016
Current Progress: Passed Qualifying exam, Designed and built the new blast-wave facility to study BW interaction with particle-laden flows. He worked at the Sandia's Shock-tube facility in 2018 and during the summer 2019 again at Sandia National Lab. Sam successfully defended his proposal during Fall 2020.
Dissertation/Project Title: "Blast-wave driven Turbulence in particle-laden flows"
Expected Graduation: Spring 2022

19. Student Name: Mr. M. R. Cameron Ahmad
Major: Mechanical Engineering
Semester Advisement Began: Fall 2017
Current Progress: Passed qualifying exam, successfully defended proposal in Fall 2019. He designed and built the new refractive index matched facility for studying variable viscosity mixing problem. This year he published a paper in Chemical Engineering Journal.
Dissertation/Project Title: Variable-viscosity mixing at extreme conditions
Expected Graduation: Fall 2021 (Starting as Postdoctoral Fellow at Sandia National Lab in October, 2021)

20. Student Name: Ms. Malavika Bagepalli
Major: Mechanical Engineering
Semester Advisement Began: Fall 2018
Current Progress: Passed Qualifying Exam, working on Experimental study of Solar Receiver, Passed Prelim in spring 2021
Dissertation/Project Title: "Granular flow experiments and models coupled with measured properties for thermal energy storage"
Expected Graduation: Fall 2022

Note-Co-advised with Dr. Peter Loutzenhiser (ME)

21. Student Name: Ms. Angelica Connor (**SMART Fellowship**)
Major: Mechanical Engineering
Semester Advisement Began: Fall 2017
Current Progress: Passed Qualifying Exam, Defended Proposal in summer 2020.
Dissertation/Project Title: "Free swimming multi-limb aquatic locomotion at intermediate Reynolds number"
Expected Graduation: Fall 2022

Note-Co-advised with Dr. Donald Webster (CEE)

22. Student Name: Mr. Marc Salvadori
Major: Mechanical Engineering
Semester Advisement Began: Spring 2017
Current Progress: Passed Qualifying Exam in spring 2017
Dissertation/Project Title: Detonation interaction with dense cloud of reactive particles
Expected Graduation: Spring 2022

Note-Co-advised with Dr. Suresh Menon (AE)

23. Student Name: Mr. Dogukan Karahan [**PSE Fellowship**]
Major: Mechanical Engineering
Semester Advisement Began: Fall 2019
Current Progress: Passed Qualifying Exam in Fall 2019
Dissertation/Project Title: Foam Forming and its application in Paper Manufacturing
Expected Graduation: Fall 2023

Note-Co-advised with Dr. Cyrus Aidun (ME)

24. Student Name: Mr. Chang-Hyeon Lim
Major: Mechanical Engineering
Semester Advisement Began: Summer 2019
Current Progress: Passed Qualifying Exam in Fall 2019
Dissertation/Project Title: Oxy-Combustion Supercritical Carbon-dioxide cycle
Graduation: Fall 2022

B2. M.S. Students (Indicate Thesis Option for Each Student)

B2.a. Graduated M.S. Students [Total- 13 (4 co-advised)]

1. Student Name: Mr. David Reilly
Current Position- Pipeline Engineer, Projects & Technology-Pipelines, Flowlines & Risers at **Shell International Exploration & Production Inc.**
Major: Mechanical Engineering
Semester Advisement Began: Summer 2014 at GT, Fall 2013 at TAMU
Dissertation/Project Title: "Experimental Study of Shock-Driven, Variable-density Turbulence using a complex interface"
Graduation: Fall 2015
Note: **David received the 2016 Sigma Xi Best M.S. Thesis award.**
2. Student Name: Mr. Chang-Hyeon Lim
Major: Mechanical Engineering
Semester Advisement Began: Fall 2017
Dissertation/Project Title: Visualization of Nucleation of Supercritical carbondioxide flow through a nozzle
Graduation: Spring 2019
Note: **Chang-Hyeon Plans to continue his doctoral study under my supervision starting fall 2019.**

3. Student Name: Mr. Justin Yarrington
 Major: Mechanical Engineering
 Semester Advisement Began: Fall 2018
 Dissertation/Project Title: "NUMERICAL AND EXPERIMENTAL ANALYSES OF ROOM AND HIGH TEMPERATURE DENSE, GRANULAR FLOWS COUPLED TO FLOW PROPERTY MEASUREMENTS FOR SOLAR THERMAL ENERGY STORAGE"
 Graduation: Summer 2020
Note-Co-advised with Dr. Peter Loutzenhiser

4. Student Name: Mr. Jacob Cloward [part of GT-Stuttgart Program]
 Major: Mechanical Engineering
 Dissertation/Project Title: "Development and implementation of a workflow for measurement of surface temperature by means of infrared thermography and Thermodynamic and economic analysis of the incorporation of the supercritical carbon dioxide Brayton cycle into combined cycle power plants"
 Graduation: Summer 2020

M.S Students Graduated at Texas A&M University (Total -9)

5. Mr. Sarat Kuchibhatla (2010) (PhD at TAMU),
6. Ms. Roma Fatima (2010) (Apple)
7. Mr. Dustin Eseltine (co-advised) (2011) (PhD at TAMU),
8. Mr. Michael Martin (co-advised)(2012) (Boeing Corp.),
9. Ms. Beth Placette (2012) (Cameron),
10. Mr. Thomas Finn (2014) (ExxonMobil)
11. Mr. Bryce Matsuo (2013) (Exelon Nuclear),
12. Mr. Skylar Creel (2014)(Airstreams Renewable),
13. Mr. Sandeep Pidaparti (2013) (PhD Georgia Tech)

B3. Undergraduate Students [Total-26]

1. Student Name: Mr. Y asas Wajindra Jayalath Don Simon Kankanamge
 Major: Mechanical Engineering
 Semester-Spring 2019
2. Student Name: Mr. Lachlan G Suter
 Major: Mechanical Engineering
 Semester-Spring 2019
3. Student Name: Mr. Hamed Ammar
 Major: Mechanical Engineering
 Semester-Fall 2018, Summer 2018, Fall 2017
4. Student Name: Mr. Saroosh Majidi
 Major: Mechanical Engineering
 Semester- Fall 2017
5. Student Name: Mr. Juan Silva [**SURE Scholar**] [Starting at **Johns Hopkins University in Fall 2019**]
 Major: Mechanical Engineering
 Semester- Summer 2016, Fall 2016
6. Student Name: Mr. Chang Hyeon Lim [**Joined my group for MS/PhD in Fall 2017**]
 Major: Mechanical Engineering

- Semester- Fall 2016
7. Student Name: Mr. Nicholar Frye
Major: Mechanical Engineering
Semester-Spring 2016
 8. Student Name: Mr. Seiichiro Takeuchi
Major: Mechanical Engineering
Semester-Spring 2016
 9. Student Name: Ms. Tasnim Rafiya
Major: Aerospace Engineering
Semester-Spring 2016, Fall 2016
 10. Student Name: Mr. Won Sup Song [PURA Awardee][**joining Stanford University for graduate study**]
Major: Mechanical Engineering
Semester-Spring 2016
 11. Student Name: Ms. Debapriya Bhattacharjee [**PhD Student at Penn State Univ.**]
Major: Mechanical Engineering
Semester-Fall 2015
 12. Student Name: Mr. Brandon Conner
Major: Mechanical Engineering
Semester-Fall 2015, Spring 2016
 13. Student Name: Mr. Terrence Sanzo
Major: Mechanical Engineering
Semester-Fall 2015
 14. Student Name: Mr. Alex Dunfee
Major: Mechanical Engineering
Semester-Spring 2015
 15. Student Name: Mr. Ismail Brewish
Major: Mechanical Engineering
Semester-Spring 2015
 16. Student Name: Mr. Himanshu Dedge
Major: Mechanical Engineering
Semester-Spring 2015
 17. Student Name: Mr. Cody Huggins
Major: Mechanical Engineering
Semester-Spring 2015
 18. Student Name: Mr. Karamjit Singh
Major: Mechanical Engineering
Semester-Spring 2015, Fall 2014
 19. Student Name: Mr. Adam R. Jensen
Major: Mechanical Engineering
Semester-Fall 2014

Undergraduate Students advised at Texas A&M University (thesis option) (Total -7)

20. Mr. Peter Koppenberger (Currently working at Idaho National Lab.),
21. Mr. Colin Bailie (currently pursuing PhD at Stanford University),
22. Mr. Adam Martin (Graduated with MS from TAMU),
23. Mr. Jonathan Paschel,
24. Mr. Sterling Debner,

25. Mr. David Nicholson Jr. (NSF REU supported),
26. Mr. Chris McDonald (undergraduate research scholar program supported).

B4. Service on Thesis or Dissertation Committees

B4.a. Internal

1. Student Name: Mr. Hagan Evan Bush (PhD proposal, PhD Dissertation defense)
Major: Mechanical Engineering
Thesis Advisor: Peter Loutzenhiser
Graduation Date: Summer 2019 [Dissertation defense-May 2nd 2019]
Dissertation/Thesis Title: Development and Characterization of Novel Reduction-Oxidation Active Materials for Two-Step Solar Thermochemical Cycles
2. Student Name: Mr. Sampath Adusumilli (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: Jerry Seitzman
Graduation Date: Summer 2019 [Dissertation defense-May 1st 2019]
Dissertation/Thesis Title: Effect of Preheat Temperature and vitiation on reaction Kinetics of higher hydrocarbon fuels
3. Student Name: Ms. Jung Yun Lee (PhD Proposal defense)
Major: Mechanical Engineering
Thesis Advisor: Andrei Fedorov
Graduation Date: Fall 2020 [Proposal defense-April 15th 2019]
Dissertation/Thesis Title: Electrohydrodynamics of electrosprayed charged droplets in a vertical flows.
4. Student Name: Mr. Sheng Wei (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: Jerry Seitzman
Graduation Date: Spring 2019 [Dissertation defense-Jan 4th 2019]
Dissertation/Thesis Title: Effect of Jet Fuel Composition on Forced Ignition in Gas Turbine Combustors
5. Student Name: Mr. Xiaomeng Zhai (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: P.K. Yeung
Graduation Date: Spring 2019 [Dissertation defense-Dec 10th 2018]
Dissertation/Thesis Title: Studies of Turbulence Structure using Well-resolved simulations with and without wall effects of a magnetic field
6. Student Name: Ms. Gabrielle Martinez (MS Dissertation defense)
Major: Mechanical Engineering
Thesis Advisor: Caroline Genzale
Graduation Date: Fall 2018 [Dissertation defense-Nov. 12th 2018]

Dissertation/Thesis Title: Extinction droplet sizing measurements in diesel relevant sprays

7. Student Name: Mr. Christopher Douglas (PhD proposal defense)
Major: Mechanical Engineering
Thesis Advisor: Tim Lieuwen
Graduation Date: Spring 2020 [Proposal defense-April 14th 2018]
Dissertation/Thesis Title: Dynamics of reacting swirling jets
8. Student Name: Mr. Travis Smith (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: Tim Lieuwen
Graduation Date: Fall 2017 [Dissertation defense-October 30th 2017]
Dissertation/Thesis Title: Experimental Investigator of Transverse Acoustic Instabilities
9. Student Name: Mr. Matthew Clay (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: P.K. Yeung
Graduation Date: Summer 2017 [Dissertation defense-July 25th 2017]
Dissertation/Thesis Title: Strained turbulence and low-diffusivity turbulent mixing
10. Student Name: Mr. Alex Muroyama (PhD proposal. PhD Dissertation Defense)
Major: Mechanical Engineering
Thesis Advisor: Peter Loutzenhiser
Graduation Date: Summer 2017 [Dissertation defense-May 2017]
Dissertation/Thesis Title: Design, Modeling, and Testing of a Hybrid Solar/Autothermal Steam Gasification Process
11. Student Name: Mr. Luke Humphrey (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: Tim Lieuwen
Graduation Date: Spring 2017 [Dissertation defense-march 29th 2017]
Dissertation/Thesis Title: Ensemble-Averaged Dynamics of Premixed, Turbulent, harmonically excited flames
12. Student Name: Mr. Ianko Chterevev (PhD Dissertation defense)
Major: Aerospace Engineering
Thesis Advisor: Tim Lieuwen
Graduation Date: Spring 2017 [Dissertation defense-April 17th 2017]
Dissertation/Thesis Title: Flow Characterization of Lifted Flames in Swirling, reacting flows
13. Student Name: Mr. Xingjian Wang (PhD proposal, PhD Dissertation defense)
Major: Mechanical Engineering
Thesis Advisor: Vigor Yang (co-advisor), Tim Lieuwen (co-advisor),
Graduation Date: Spring 2016 [Defense Date-March 4th, 2016]

Dissertation/Thesis Title: Swirling Fluid Mixing and Combustion Dynamics at Supercritical Conditions

14. Student Name: Mr. Nicholas Magina (Ph.D. Dissertation defense)
Major: Mechanical Engineering
Thesis Advisor: Timothy Lieuwen
Graduation Date: Spring 2016 [Defense date: April 2016]
Dissertation/Thesis Title: Dynamics of Forced Non-premixed Flames

15. Student Name: Mr. Bradley A. Ochs (PhD proposal)
Major: Aerospace Engineering
Thesis Advisor: Suresh Menon
Graduation Date: Fall 2019 [Proposal defense-March 2016]
Dissertation/Thesis Title: TURBULENT PREMIXED FLAMES IN COMPRESSIBLE FLOWS

16. Student Name: Mr. Benjamin Knox (PhD proposal)
Major: Mechanical Engineering
Thesis Advisor: Caroline Genzale
Graduation Date: Summer 2016 [Proposal defense-April 9th, 2015]
Dissertation/Thesis Title: Injection Rate Shaping for Control of Unburned Hydrocarbon Emissions in Diesel Spray Combustion

B5. Mentorship of Postdoctoral Fellows or Visiting Scholars

B5.a. Postdoctoral Fellows

1. Postdoctoral Name: Dr. Gokul Pathikonda
Major: Mechanical Engineering
Project Title: Variable-viscosity Driven mixing
Period Advised—8/2017-12/2020
Current Position: Assistant Professor, Department of Mechanical Engineering at Arizona State University
2. Postdoctoral Name: Dr. Dorrin Jarrahbashi
Major: Mechanical Engineering
Project Title: Cavitation in supercritical fluids driven systems
Period Advised—1/2015-6/2017
Current Position: Assistant Professor, Department of Mechanical Engineering at Texas A&M University

3. Postdoctoral Name: Dr. Vladimer Tsiklashvili
Major: Mechanical Engineering
Project Title: Shock-tube Turbulent Mixing
Period Advised—8/2015-8/2016
Current Position: Content Developer, Udacity.

Postdoctoral Fellow mentored at Texas A&M University

4. Postdoctoral Name: Dr. Jacob McFarland

Current Position- Associate Professor, Department of Mechanical Engineering, Texas A&M (NSF Career Award 2019, ONR YIP 2020)
Major: Mechanical Engineering
Project Title: “Turbulent Convection at Extreme-Design Analysis”
Period Advised—09/2013-06/2014

C. Educational Innovations and Other Contributions

C1. Course Improvement

- Blended Teaching/learning in ME 3345 Class. Developed several class demonstrations and incorporated in the class discussions. Some of the experimental demonstrations are used by other instructors teaching the different sections of this course.
- As part of the Provost Teaching and Learning Fellows Program, developing AR/VR platform for applications in laboratory courses (ME4056)

Activity at Texas A&M University

- Transformed the graduate course “Turbulence Measurements and Analysis” to include 4 different experiments to provide students hands-on experience in making these measurements. The article based on this work was published in 2012 [J17 in the journal list]. *I plan to offer this course at Georgia Tech in spring 2022.*
- Modified the senior elective “Thermal-Fluids Analysis and Design” to include a final project which was a significant part of the course. It is a project-based course in the catalog now.

C2. Other Teaching Activities

- **Frontiers in Mechanical Engineering and Sciences (Multi-institute Webinar Series):** . In Fall 2020, I championed a new initiative to start a multi-institute Frontiers in Mechanical Engineering and Sciences webinar series to give a platform to two pre-tenured faculty members to present their work to the broader mechanical engineering community (<https://sites.google.com/view/frontiersmes/>). In just one year, this has become a very successful webinar series and has participation from over 30 institutions. This series provides a platform for junior faculty, who could not travel to another institution to share their work during the pandemic time, and an opportunity for mentorship from senior faculty members at the end of the webinar. The moderator for each week is a leader in the thematic area of the presentation and provides a brief perspective on the field. The webinars are recorded and uploaded on the YouTube channel of the series, which has been viewed over 3000 times.
- **Fluids Colloquium:** After arriving at GT in July 2014, I initiated and currently coordinate a campus wide **Fluids Colloquium** to enhance the international visibility of our Fluid mechanics and Energy research at Georgia Tech. As part of this series, we have had 3-4 speakers every semester since its inception. This is enabling our students to interact with and hear from international leaders in Thermal systems area ranging from nanoscales to

geophysical scales, in simple and complex fluids. This series have had a great impact on our graduate student development as well as led to conversation between faculty members from different units regarding potential collaboration.

- **EES Hands-on Training Session:** Developed and offered a new three-session seminar series to give hands-on training on Engineering Equation Solver (EES) package. Students pair up and complete a set of example problems during the evening class sessions. In the last five years, I have offered this seminar series three times and it has been a great success. The seminar series has been widely attended by more than 300 students. These students were enrolled in undergraduate heat transfer and thermodynamics course.

VI. Service

A. Professional Contributions

A1. Editorial Board Memberships

- Editorial Board of Shock Waves (Publisher-Springer & Verlag) (April 2016 – Present)
- Editorial Board of ASME-Journal of Fluids Engineering (October 2017-2020)
- Invited Co-Editor, Proceedings of the 29th International Symposium on Shock Waves - Madison, Wisconsin, USA, July 14-19, 2013 - Volume I and II, Springer

A2. Society Offices, Activities, and Membership

- **Co-Director**, University Consortium for Applied Hypersonics, Oct 2020-Present
- Member, Educational & Career Outreach Committee, APS-DFD (1/19-12/20)
- Member, External Affairs Committee, APS-DFD (1/18-12/18)
- Joint-Secretary for the International Shock Wave Institute (ISWI) (Aug. 2015- Dec 2020)
- American Society of Mechanical Engineers (ASME), Member, 2007-present
- American Physical Society (APS), Member, 2003-present
- Vice-President, Los Alamos Postdoctoral Association, 2008.

A3. Organization and Chairmanship of Technical Sessions, Workshops, and Conferences

- Conference Co-Chair of 17th International Workshop on Physics of Compressible Turbulent Mixing (IWPCTM) to be held at Atlanta, Georgia from July 13th –July 20th, 2022.
- Session Chair, Richtmyer-Meshkov Instabilities, 2017 APS-DFD Meeting, Denver, CO.
- Organizing Committee Member, 2018 APS-DFD meeting, Atlanta, GA.
- Conference Co-Organizer of 29th International Shock Wave Symposium (ISSW) held at Madison, Wisconsin from July 14th –July 19, 2013.
- Session Chair, Richtmyer-Meshkov Instabilities, 2013 APS-DFD Meeting, Pittsburgh, PA.
- ASME-IMECE 2009, Topic Organizer- Gasification, Fuel Sprays, and Microscale Combustion
- Session Chair, Richtmyer-Meshkov Instabilities, 2008 APS-DFD Meeting, San Antonio, Texas
- Session Chair, Fusion Science, 2004 ANS Student Conference, Madison, Wisconsin

A4. Technical Journal or Conference Referee Activities

- Reviewer for various Archival Journals (Physical Review Letters, Physical Review E, Journal of Fluid Mechanics, Physical Review Fluids, Physics of Fluids, Journal of Heat Transfer, Fuel,

Combustion and Flame, Shock Waves, Journal of Fluids Engineering, Nature Scientific Reports, Experiments in Fluids)

A5. Proposal Panels and Reviews

- NSF Panelist (CBET Program, Combustion, Fire, & Plasma Systems; Fluid Dynamics Panel, EPSCOR) 2008, 2010, 2011, 2013, 2015, 2016, 2017, 2018, 2020, 2021
- DOE-SBIR Reviewer—2015, 2016, 2017, 2018, 2019, 2020
- Invited Panelist-2012 SMART Fellowship Evaluation Panel- Jan. 19th -21st , 2012 Washington DC
- SMART Fellowship Program-Panelist 2009
- Invited Panelist-2012 NDSEG Fellowship Evaluation Panel- Feb 25th , 2012 Washington DC
- Invited Reviewer for proposal submitted to Maryland Industrial Partnership 12/2011

A6. Other Involvement

- Invited Panelist – Workshop: “Thermal-Mechanical-Chemical Electricity Storage Workshop and Roadmapping”, organized by DOE and SWRI, Jan 9-10, 2019
- Invited Panelist – Workshop: “Research Needs for Material Mixing at Extremes” organized by Los Alamos National Laboratory, 2011
- Invited Panelist – Workshop: “Thermal Energy Storage Workshop” organized by DOE ARPA-E, 2011
- Invited Member- Workshop: “Atmospheric Pressure Weakly Ionized Plasmas for Energy Technologies, Flow Control and Materials Processing” organized by Princeton University on behalf of DARPA, 2011

B. Public and Community Service

- No Data

C. Institute Contributions

C1. Institute Committee Service

- Chair, Hypersonics at GT Task Force (EVPR Initiative on Campus), Summer 2019-Present
- Co-Chair, Research That Matters, Commission on Research Next, March 2020-Present
- Member, Research Continuity Task Force (COVID Response), March 2020-Present
- Member, Research Re-start Task-force (COVID Response), April 2020-Present
- Steering Committee Member, EVPR’s Seed Grant Program for GT and GTRI, Fall 2019-Present
- Member, Faculty Senate, Fall 2017-Spring 2019
- Member, Institute Graduate Curriculum Committee, August 2017-August 2018
- Co-Chair, Faculty Advisory Council, Strategic Energy Institute (SEI), Sep 2018- Present

C2. College Committee Service

- Core Team Member, College of Engineering Strategic Planning Committee, Since July 2018 [Developed COE Strategic Plan and Action Plan to be rolled out in Spring 2020]
- RPT II Committee, 2020-2023

C3. School Committee Service

- Associate Chair for Research, Jan 2019-Present

- Ex-officio member of Woodruff School Strategic Planning Committee
- Ex-officio member of Faculty Advisory Committee
- Ex-Officio member of Faculty Development Committee
- Co-Chair, Faculty Research Council, Fall 2019-Now
- Chair, Faculty Advisory Committee, Aug. 2018-Feb 2019
- Member, GWW Graduate Committee, Aug. 2017- Dec. 2018
- Member, Faculty Advisory Committee, Aug. 2015-Aug. 2017
- Member, GWW Graduate Development Committee (ad hoc), Aug. 2015- Aug. 2016
- Member, GWW Undergraduate Committee, Aug. 2014-Aug 2015
- Member, Fluids Qualifying Exam Committee, Since Fall 2014
- Member, Heat Transfer Exam Committee, Spring 2019
- Faculty Advisor- Pi Tau Sigma Chapter, Georgia Tech, Sep 2014-Present

Department Service at Texas A&M [2009-2014]

- Faculty Advisor- Pi Tau Sigma Chapter, Texas A&M University, Jan. 2013-July 2014
- Member & Chair of Ph.D. Qualifying Examination Committee (Fluid Mechanics)- Fall 2009, Spring 2010, Fall 2010
- Member & Chair Ph.D. Qualifying Examination Committee (Thermodynamics) – Fall 2011, Spring 2012, Fall 2012
- Member of Graduate Studies and Research Committee (Elected)
- Member of Honors and Awards Committee (Appointed),
- Member of Scholarship Committee
- Member Faculty Search Committee in the area of “New Energy”-2013