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INTERESTS

Broader areas of fluid mechanics and thermal sciences with emphasis on multi-fidelity investigation of turbulent flows and multi-scale interaction of turbulence with other transport processes observed in atmospheric flows, naval and rotorcraft systems, rocket propulsion devices, energy conversion and swirl spray systems by use of high-performance computing.

EDUCATION

- **University of Illinois at Urbana-Champaign (UIUC)**, Urbana, IL, USA
Ph.D., Theoretical and Applied Mechanics *June 2009 – December 2012*
 - * *Adviser:* Professor Carlos Pantano
 - * *Dissertation:* “A novel state-space based method for direct numerical simulation of particle-laden turbulent flows”
 - * *Minor:* Computational Science and Engineering
- **M.S.**, Theoretical and Applied Mechanics *August 2007 – May 2009*
 - * *Adviser:* Professor Carlos Pantano
 - * *Research Topic:* “Direct numerical simulation of heat transfer in a turbulent swept flow over a wire in a channel”
- **Indian Institute of Technology Kanpur (IITK)**, Kanpur, India
B.Tech., Mechanical Engineering *July 2000 – May 2004*

EMPLOYMENT EXPERIENCE

- *August 2019 – Present:* **Assistant Professor**, Department of Mechanical Engineering, University of Tennessee at Chattanooga (UTC), USA.
- *July 2019:* **Senior Research Engineer** (Adviser: Professor Suresh Menon), School of Aerospace Engineering, Georgia Institute of Technology, Atlanta, USA.
- *July 2015 – June 2019:* **Research Engineer II** (Adviser: Professor Suresh Menon), School of Aerospace Engineering, Georgia Institute of Technology, Atlanta, USA.
- *Spring 2017, Spring 2018:* **Instructor**, School of Aerospace Engineering, Georgia Institute of Technology, Atlanta, USA.
- *January 2013 – June 2015:* **Post Doctoral Fellow** (Adviser: Professor Suresh Menon), School of Aerospace Engineering, Georgia Institute of Technology, Atlanta, USA.
- *Fall 2011:* **Teaching Assistant**, Mechanical Science and Engineering, UIUC, USA.
- *August 2007 – December 2012:* **Research Assistant** (Adviser: Professor Carlos Pantano), Mechanical Science and Engineering, UIUC, USA.
- *August 2004 – July 2007:* **Lead Application Engineer**, ANSYS, Pune, India.
- *May 2004 – July 2004:* **Research Associate**, IITK, India.

HONORS AND AWARDS

- **Stanley I. Weiss Outstanding Thesis Award** in Mechanical Science and Engineering, UIUC, USA, 2013.
- **Hassan Aref Memorial Award** for Theoretical and Applied Mechanics, UIUC, USA, 2012.
- **Louis J. Larson Fellowship** in Mechanical Science and Engineering, UIUC, USA, 2010 – 2011.
- **Fred B. Seely Fellowship** in Mechanical Science and Engineering, UIUC, USA, 2009 – 2010.
- **2nd rank** in the Department of Mechanical Engineering, IITK, India, 2004.
- **Notional Award for Academic Excellence**, IITK, India, 2002 – 2003 & 2001 – 2002.
- **Merit Scholarship**, IITK, India, 2001 – 2004.

RESEARCH UNDERTAKINGS

- **Computational investigation of regional aerosol deposition in realistic human airways**
 - * *Role: Principal Investigator*
 - * *Sponsor: BRIC grant program, UTC & UTCOM.*
 - * *Term: Januray 2020 -*
- **A multi-fidelity computational modeling strategy for large-eddy simulation of turbulent combustion**
 - * *Role: Principal Investigator*
 - * *Sponsor: Center of Excellence in Applied Computational Science & Engineering, UTC.*
 - * *Term: September 2019 -*
- **LES studies of high Reynolds number wall bounded and far-field stratified wake flows**
 - * *Role: Co-Investigator*
 - * *Principal Investigator: Professor Suresh Menon*
 - * *Sponsor: Office of Naval Research*
 - * *Term: May 2016 - August 2019*
- **PETTT special project: DNS-like interface problem**
 - * *Role: Principal Investigator*
 - * *Co-Investigator: Professor Suresh Menon*
 - * *Sponsor: Engility*
 - * *Term: September 2015 – February 2016*

RESEARCH EXPERIENCE

- **Georgia Institute of Technology, Atlanta, GA, USA**
Senior Research Engineer, Research Engineer II & Post Doctoral Fellow *January 2013 – July 2019*
Adviser: Professor Suresh Menon
 - * “High-fidelity modeling and simulation of supercritical combustion”, supported by the **Air Force Office of Scientific Research**, *June 2018 – July 2019.*
 - * “LES studies of high Reynolds number wall bounded and far-field stratified wake flows”, supported by the **Office of Naval Research**, *May 2016 – July 2019.*

- * “Multi-scale turbulence-chemistry closure in LES to account for sensitivity to fuel composition and properties”, supported by the **National Aeronautics and Space Administration**, *November 2015 – July 2018*.
 - * “High-pressure liquid-propellant rocket engine combustion instability: complex System, uncertainty quantification, and reduced basis modeling”, supported by the **Air Force Office of Scientific Research**, *May 2015 – May 2018*.
 - * “Physical based submodel development for turbulence combustion closure”, supported by the **Air Force** and in collaboration with **Computational Science & Engineering Inc.**, *April 2014 - September 2017*.
 - * “Advanced turbulence and transition simulation techniques for rotorcraft”, supported by the **Vertical Lift Research Center of Excellence**, *January 2013 – September 2017*.
 - * “Hybrid two-level large-eddy simulation methodology for high Reynolds number complex turbulent flows”, supported by the **Office of Naval Research**, *January 2013 – December 2015*.
 - * “Combustion model development and evaluation”, National Jet Fuels Combustion Program, supported by the **Federal Aviation Administration**, *December 2014 – December 2015*.
- **University of Illinois at Urbana-Champaign**, Urbana, IL, USA
Research Assistant, *August 2007 – December 2012*
Adviser: Professor Carlos Pantano
 - * “A novel state-space based method for direct numerical simulation of particle-laden turbulent flows”, supported by the **National Science Foundation**, *March 2010 - December 2012*.
 - * “Direct simulation of turbulent heat transfer in swept flow over a wire in a channel”, supported by the **Argonne National Laboratory** and the **Center for Simulation of Advanced Rockets**, *August 2007 - February 2010*.

TEACHING EXPERIENCE

- **University of Tennessee**, Chattanooga, TN, USA
 - * *Thermodynamics* *Fall 2019*
- **Georgia Institute of Technology**, Atlanta, GA, USA
 - * *Co-Instructor for graduate course on Computational Fluid Dynamics* *Spring 2018*
 - * *Co-Instructor for graduate course on Computational Fluid Dynamics* *Spring 2017*
 - * *Lectures in graduate course on Viscous Flow* *Fall 2018, Fall 2015*
 - * *Lectures in graduate course on Turbulent Flows* *Spring 2017, Spring 2015, Spring 2014*
- **University of Illinois at Urbana-Champaign**, Urbana, IL, USA
Teaching Assistant for Introductory Fluid Mechanics *Fall 2011*

BOOK CHAPTERS

1. S. Menon, **R. Ranjan** & J. Oeflein, “Reacting LES@2030: Near Diskless and Near Real-Time Computing For Design?” in “Whither Turbulence”, *Editor: A. Pollard, L. Castillo, L. Danaila, and M. Glauser*, **Springer**, 2017.
2. S. Menon & **R. Ranjan**, “Spray combustion in swirling flows” in “Coarse grained simulation and turbulent mixing”, *Editor: F. Grinstein*, **Cambridge University Press**, 2016.

JOURNAL PUBLICATIONS

1. **R. Ranjan**, & S. Menon, “Reduced-order modeling of chemically reacting turbulent flows”, **In Preparation**, 2020.
2. **R. Ranjan**, & S. Menon, “A dynamic one equation model for large-eddy simulation of stratified turbulent flows”, *Under Review*, **Physical Review Fluids**, 2019.
3. B. Ochs, **R. Ranjan**, D. Ranjan, & S. Menon, “Topology, Flame Speeds, and Scaling of Turbulent Premixed Flame Kernels in Supersonic Flows”, **Combustion & Flame**, **210**, 83–99 2019.
4. Y. Wei, **R. Ranjan**, U. Roy, J.-H. Shin, S. Menon, & M. Zhou, “Integrated Lagrangian and Eulerian 3D microstructure-explicit simulations for predicting macroscopic probabilistic SDT thresholds of energetic materials”, **Computational Mechanics**, **64**, 547–561, 2019.
5. A. Panchal, **R. Ranjan**, & S. Menon, “A comparison of finite-rate kinetics and Flamelet-Generated Manifold using a Multi-Scale Modeling Framework for Turbulent Premixed Combustion”, **Combustion Science & Technology**, **191**, 921–955, 2019.
6. **R. Ranjan**, & S. Menon, “Vorticity, backscatter and counter-gradient transport predictions using two-level simulation of highly turbulent flows”, **Journal of Turbulence**, **19**, 334–364, 2018.
7. P. Tudisco, **R. Ranjan**, & S. Menon, “Simulation of transverse combustion instability in a multi-Injector combustor using the time-domain impedance boundary conditions”, **Flow, Turbulence and Combustion**, **101**, 55–76, 2018.
8. S. Yang, **R. Ranjan**, W. Sun, S. Menon & V. Yang, “Extinction and re-ignition predictions of a time-evolving turbulent non-premixed flame: sensitivity to chemical kinetics models”, **Combustion and Flame**, **183**, 224–241, 2017.
9. P. Tudisco, **R. Ranjan**, S. Menon, S Jaensch, & W Polifke, “Application of the time-domain impedance boundary condition to large-eddy simulation of combustion instability in a shear-coaxial high pressure combustor”, **Flow, Turbulence and Combustion**, **99**, 185–207, 2017.
10. S. Yang, **R. Ranjan**, V. Yang, S. Menon & W. Sun, “Parallel on-the-fly adaptive kinetics in direct numerical simulation of turbulent premixed flame”, **Proceedings of Combustion Institute**, **36**, 2025–2032, 2017.
11. E. D. Gonzalez-Juez, A. R. Kerstein, **R. Ranjan** & S. Menon, “Turbulent-combustion models: Basic assumptions and formulations for high-speed flows”, **Progress in Energy and Combustion Science**, **60**, 26–67, 2017.
12. **R. Ranjan**, B. Muralidharan & S. Menon, “Subgrid-scale modeling of reaction-diffusion and scalar transport in turbulent premixed flames”, **Combustion Science and Technology**, **188**, 1496-1537, 2016.
13. **R. Ranjan** & S. Menon, “On the application of the two-level large-eddy simulation method to turbulent free-shear and wake flows”, **Journal of Turbulence**, **16**, 136-166, 2015.
14. S. Srinivasan, **R. Ranjan** & S. Menon, “Flame holding dynamics during combustion instability in a shear-coaxial injector combustor”, **Flow, Turbulence and Combustion**, **94**, 1–26, 2015.
15. **R. Ranjan** & S. Menon, “A multi-scale simulation method for high Reynolds number wall-bounded turbulent flows”, **Journal of Turbulence**, **14**, 1–38, 2013.
16. **R. Ranjan** & C. Pantano, “A collocated method for the incompressible Navier-Stokes equations inspired by the Box scheme”, **Journal of Computational Physics**, **232**, 346–382, 2013.
17. **R. Ranjan**, C. Pantano & P. Fischer, “Direct simulation of heat transfer in a turbulent swept flow over a wire in a channel”, **International Journal of Heat and Mass Transfer**, **54**, 4636 – 4654, 2011.
18. **R. Ranjan**, C. Pantano & P. Fischer, “Direct simulation of turbulent swept flow over a wire in a channel”, **Journal of Fluid Mechanics**, **651**, 165 – 209, 2010.

CONFERENCE PUBLICATIONS

1. **R. Ranjan**, M. Venkataswamy, & S. Menon, “Modeling of Transition to Turbulence in Large Eddy Simulation using the Two Level Simulation Approach”, *Under Review*, AIAA Aviation Forum and Exposition, 2020.
2. **R. Ranjan**, & S. Menon, “Nonlinear reduced order modeling for large eddy simulation of turbulent reacting flows”, **AIAA-2020-2140**, 2020.
3. **R. Ranjan**, S. Karpe, P. Patel & S. Menon, “Assessment of Surrogate Models for Inverse Uncertainty Quantification of Simulant Combustion”, **AIAA-2020-2137**, 2020.
4. S. Karpe, **S. Ranjan**, & S. Menon, “Large Eddy Simulation of Sooting Turbulent Non-Premixed Mixing Layers”, **AIAA-2020-2138**, 2020.
5. A. Panchal, **R. Ranjan**, & S. Menon, “Subgrid flamelet generated manifold multi-scale modeling for spray combustion”, 11th **US National Combustion Meeting**, 2019.
6. **R. Ranjan**, S. Menon, & R. Munipalli, “Reduced basis modeling of single-element subscale rocket combustors”, **AIAA-2018-4871**, 2018.
7. A. Panchal, **R. Ranjan**, & S. Menon, “Effect of chemistry modeling on flame stabilization of a swirl spray combustor”, **AIAA-2018-4684**, 2018.
8. A. Panchal, **R. Ranjan**, & S. Menon, “Subgrid-scale modeling for large eddy simulations of dense-to-dilute multiphase reacting flows”, **AIAA-2018-4733**, 2018.
9. **R. Ranjan**, & S. Menon, “Numerical investigation of structural and statistical features of premixed flame under Intense turbulence”, 10th **International Symposium on Turbulence and Shear Flow Phenomena**, **309**, 5B-4, 1–6, 2017.
10. **R. Ranjan**, A. Panchal, B. Muralidharan, & S. Menon, “Simulation of the evolution of premixed flame kernels in a turbulent channel flow”, 10th **US National Combustion Meeting**, **2H13**, 2017.
11. P. J. Milan, **R. Ranjan**, A. Panchal, & S. Menon, “Flame dynamics sensitivity to turbulent combustion models in a swirl spray combustor”, **AIAA-2017-5079**, 2017.
12. M. Reith, **R. Ranjan**, S. Menon, & A. Kempf, “On the comparison of finite-rate kinetics and flamelet based subgrid Models for LES of turbulent premixed flame”, 10th **US National Combustion Meeting**, **1H11**, 2017.
13. A. Panchal, **R. Ranjan**, & S. Menon, “Subgrid mixing and evaporation modeling in large eddy simulation of two-phase reacting flows”, 10th **US National Combustion Meeting**, **1C20**, 2017.
14. U. Ayachit, A. Bauer, E. P. N. Duque, G. Eisenhauer, N. Ferrier, J. Gu, K. Jansen, B. Loring, Z. Lukic, S. Menon, D. Morozov, P. ÓLeary, **R. Ranjan**, M. Rasquin, C. P. Stone, V. Vishwanath, G. Weber, B. J. Whitlock, M. Wolf, K. Wu, & E. W. Bethel, “Performance analysis, design considerations, and applications of extreme-scale in situ infrastructures”, **The International Conference for High Performance Computing, Networking, Storage and Analysis**, Salt Lake City, Utah, 2016.
15. **R. Ranjan**, A. Panchal, G. Hannebique, & S. Menon, “Towards numerical prediction of jet fuels sensitivity of flame dynamics in a swirl spray combustion system”, **AIAA-2016-4895**, 2016.
16. **R. Ranjan**, A. Panchal, & S. Menon, “On the effects of chemical kinetics and thermal conditions on the flow and flame features in a single-element GCH₄/GOX rocket combustor”, **AIAA-2016-4999**, 2016.
17. A. Panchal, **R. Ranjan**, G. Hannebique, M. Akiki, & S. Menon, “A hybrid Eulerian-Eulerian/Eulerian-Lagrangian method for dense-to-dilute dispersed multiphase reacting flows”, **AIAA-2016-4694**, 2016.

18. H. Müller, J. Zips, M. Pfitzner, D. Maestro, L. Selle, B. Cuenot, **R. Ranjan**, P. Tudisco, & S. Menon, “Numerical investigation of flow and combustion in a single-element GCH₄/GOX rocket combustor: a comparative LES study”, **AIAA-2016-4997**, 2016.
19. P. Tudisco, **R. Ranjan** & S. Menon, “Numerical investigation of transverse combustion instability in a multi-element, shear-coaxial, high pressure combustor”, **AIAA-2016-2155**, 2016.
20. E. P. N. Duque, B. J. Whitlock, C. Stone, **R. Ranjan** & S. Menon, “The impact of in-situ data processing and analytics upon scaling of CFD solvers and workflows”, **27th International Conference on Parallel Computational Fluid Dynamics**, 2015.
21. **R. Ranjan** & S. Menon, “Hybrid two-level large-eddy simulation of turbulent flow in a channel, past a bump and around an inclined prolate spheroid”, **AIAA-2015-1526**, 2015.
22. E. D. Gonzalez-Juez, A. R. Kerstein, S. Menon & **R. Ranjan**, “An analysis of the basic assumptions of turbulent combustion models with emphasis on high-speed flows”, **AIAA-2015-1380**, 2015.
23. M. P. Celano, S. Silvestri, G. Schlieben, C. Kirchberger, O. J. Haidn, T. Dawson, **R. Ranjan** & S. Menon, “Experimental and numerical investigation for a GOX-GCH₄ shear-coaxial injector element”, **SP-2969417**, 2014.
24. **R. Ranjan** & S. Menon, “Multi-scale simulation of high Reynolds number turbulent flows”, **AIAA-2014-1447**, 2014.

POSTER/BROCHURE PRESENTATION

1. M. Venkataswamy, **R. Ranjan**, & S. Menon, “Combustion Up Close”, **2020 Coalition for Academic Scientific Computation (CASC) brochure**, 2020.
2. S. Yang, **R. Ranjan**, W. Sun, & S. Menon, “Sensitivity of Extinction & Re-ignition Predictions to Finite-Rate Chemical Models in a Temporally Evolving Turbulent Non-premixed Syngas Flame”, **ASME GT Turbo Exposition**, 2017.
3. S. Yang, **R. Ranjan**, V. Yang, S. Menon & W. Sun, “Parallel On-the-fly Adaptive Kinetics in Direct Numerical Simulation of Turbulent Premixed Flame”, **University Turbine System Research Workshop**, National Energy Technology Laboratory, 2015.

PUBLISHED ABSTRACTS

1. **R. Ranjan**, A. Panchal, & S. Menon, “A novel hybrid two-level and kinetic-eddy simulation model for high Reynolds number wall-bounded turbulent flows”, **Bulletin of the American Physical Society**, November 2018.
2. M. K. Venkataswamy, **R. Ranjan**, & S. Menon, “Investigation of effects equation of state and differential diffusion on fully developed stratified turbulent channel flow”, **Bulletin of the American Physical Society**, November 2018.
3. B. Ochs, **R. Ranjan**, D. Ranjan, & S. Menon, “Experimental-Numerical Comparison of Premixed Turbulent Flame Kernels in Expanding Supersonic Channel Flow”, **Bulletin of the American Physical Society**, November 2018.
4. **R. Ranjan**, & S. Menon, “LES of stratified turbulent wake with temperature and salinity dependent density stratification”, **Bulletin of the American Physical Society**, **62**, No. 14, November 2017.
5. T. Smith, X. Lu, **R. Ranjan** & C. Pantano, “Modeling particle-laden turbulent flows with two-way coupling using a high-order kernel density function method”, **Bulletin of the American Physical Society**, **61**, No. 20, November 2016.
6. S. Menon & **R. Ranjan**, “A priori and a posteriori analysis of the hybrid two-level large-eddy simulation method for high Reynolds number complex Flows”, **15th European Turbulence Conference**, 2015.

7. T. Smith, **R. Ranjan** & C. Pantano, “An improved numerical method for the kernel density functional estimation of disperse flow”, **Bulletin of the American Physical Society**, **59**, No. 20, November 2014.
8. **R. Ranjan** & S. Menon, “A dynamic two-level large-eddy simulation method for high Reynolds number flows”, **Bulletin of the American Physical Society**, **58**, No. 18, November 2013.
9. **R. Ranjan** & C. Pantano, “A novel state-space based method for direct numerical simulation of particle-laden turbulent flows”, **Bulletin of the American Physical Society**, **57**, No. 17, November 2012.
10. **R. Ranjan** & C. Pantano, “Discretely conservative, non-dissipative, and stable collocated method for solving the incompressible Navier-Stokes equations”, **Bulletin of the American Physical Society**, **55**, No. 16, November 2010.
11. **R. Ranjan**, C. Pantano, P. Fischer & A. Siegel, “Direct simulation of heat transfer in a turbulent swept flow over a wire in a channel”, **Bulletin of the American Physical Society**, **54**, No. 19, November 2009.
12. **R. Ranjan**, C. Pantano, P. Fischer & A. Siegel, “Direct simulation of a turbulent channel with wire in cross flow”, **Bulletin of the American Physical Society**, **53**, No. 15, November 2008.

INVITED SEMINARS

“Direct simulation of turbulent swept flow over a wire in a channel,” **Fluid Mechanics Seminar Series**, UIUC, IL, USA, Oct 2, 2009.

CONTRIBUTED TALKS

1. **R. Ranjan**, & S. Menon, “Nonlinear Reduced Order Modeling for Large Eddy Simulation of Turbulent Reacting Flows”, **AIAA SciTech Forum & Exposition**, Orlando, FL, USA, January 10, 2020.
2. **R. Ranjan**, S. Karpe, P. Patel, & S. Menon, “Assessment of Surrogate Models for Inverse Uncertainty Quantification of Simulant Combustion”, **AIAA SciTech Forum & Exposition**, Orlando, FL, USA, January 10, 2020.
3. **R. Ranjan**, A. Panchal, & S. Menon, “A novel hybrid two-level and kinetic-eddy simulation model for high Reynolds number wall-bounded turbulent flows”, **71st Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, GA, USA, November 18, 2018.
4. M. K. Venkataswamy, **R. Ranjan**, & S. Menon, “Investigation of effects of equation of state and differential diffusion on fully developed stratified turbulent channel flow”, **71st Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, GA, USA, November 20, 2018.
5. B. Ochs, **R. Ranjan**, D. Ranjan, & 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, GA, USA, November 20, 2018.
6. **R. Ranjan**, R. Munipalli, & S. Menon, “Reduced Basis Modeling of Single-Element Subscale Rocket Combustors”, **AIAA Joint Propulsion Conference**, AIAA Propulsion Forum & Exposition, Cincinnati, OH, USA, July 11, 2018.
7. A. Panchal, **R. Ranjan**, & S. Menon, “Subgrid-scale Modeling for Large Eddy Simulations of Dense-to-Dilute Multiphase Reacting Flows”, **AIAA Joint Propulsion Conference**, AIAA Propulsion Forum & Exposition, Cincinnati, OH, USA, July 10, 2018.
8. A. Panchal, **R. Ranjan**, & S. Menon, “Effect of Chemistry Modeling on Flame Stabilization of a Swirl Spray Combustor”, **AIAA Joint Propulsion Conference**, AIAA Propulsion Forum & Exposition, Cincinnati, OH, USA, July 10, 2018.

9. **R. Ranjan**, & S. Menon, “Numerical investigation of structural and statistical features of premixed flame under Intense turbulence”, 10th **International Symposium on Turbulence and Shear Flow Phenomena**, Chicago, IL, USA, July 6, 2017.
10. **R. Ranjan**, A. Panchal, B. Muralidharan, & S. Menon, “Simulation of the evolution of premixed flame kernels in a turbulent channel flow”, 10th **US National Combustion Meeting**, College Park, MD, USA, April 25, 2017.
11. M. Reith, **R. Ranjan**, S. Menon, & A. Kempf, “On the comparison of finite-rate kinetics and flamelet based subgrid Models for LES of turbulent premixed flame”, 10th **US National Combustion Meeting**, College Park, MD, USA, April 24, 2017.
12. A. Panchal, **R. Ranjan**, & S. Menon, “Subgrid mixing and evaporation modeling in large eddy simulation of two-phase reacting flows”, 10th **US National Combustion Meeting**, College Park, MD, USA, April 24, 2017.
13. P. J. Milan, **R. Ranjan**, A. Panchal, & S. Menon, “Flame dynamics sensitivity to turbulent combustion models in a swirl spray combustor”, **53rd AIAA Joint Propulsion Conference**, AIAA Propulsion and Energy Forum, Atlanta, GA, USA, July 12, 2017.
14. **R. Ranjan**, A. Panchal, G. Hannebique, & S. Menon, “Towards numerical prediction of jet fuels sensitivity of flame dynamics in a swirl spray combustion system”, **52nd AIAA Joint Propulsion Conference**, AIAA Propulsion and Energy Forum, Salt Lake City, UT, USA, July 26, 2016.
15. **R. Ranjan**, A. Panchal, & S. Menon, “On the effects of chemical kinetics and thermal conditions on the flow and flame features in a single-element GCH₄/GOX rocket combustor”, **52nd AIAA Joint Propulsion Conference**, AIAA Propulsion and Energy Forum, Salt Lake City, UT, USA, July 27, 2016.
16. A. Panchal, **R. Ranjan**, G. Hannebique, M. Akiki, & S. Menon, “A hybrid Eulerian-Eulerian/Eulerian-Lagrangian method for dense-to-dilute dispersed multiphase reacting flows”, **52nd AIAA Joint Propulsion Conference**, AIAA Propulsion and Energy Forum, Salt Lake City, UT, USA, July 25, 2016.
17. H. Müller, J. Zips, M. Pfitzner, D. Maestro, L. Selle, B. Cuenot, **R. Ranjan**, P. Tudisco, & S. Menon, “Numerical investigation of flow and combustion in a single-element GCH₄/GOX rocket combustor: a comparative LES study”, **52nd AIAA Joint Propulsion Conference**, AIAA Propulsion and Energy Forum, Salt Lake City, UT, USA, July 27, 2016.
18. P. Tudisco, **R. Ranjan** & S. Menon, “Numerical investigation of transverse forcing in a multi-element, shear-coaxial, high pressure combustor”, **54th Aerospace Sciences Meeting**, AIAA SciTech, San Diego, CA, USA, January 8, 2016.
19. S. Menon & **R. Ranjan**, “A priori and a posteriori analysis of the hybrid two-level large-eddy simulation method for high Reynolds number complex flows”, **15th European Turbulence Conference**, Delft, Netherlands, August 28, 2015.
20. **R. Ranjan**, D. Thanki, & S. Menon, “Multi-scale simulation of flow past a hydrofoil at high Reynolds number”, **1st International Conference on Model Integration across Disparate Scales in Complex Turbulent Flow Simulation**, State College, PA, USA, June 16, 2015.
21. E. P. N. Duque, B. J. Whitlock, C. Stone, **R. Ranjan** & S. Menon, “The impact of in-situ data processing and analytics upon weak scaling of CFD solvers and workflows”, **27th International Conference on Parallel Computational Fluid Dynamics**, Montreal, Quebec, Canada, May 20, 2015.
22. **R. Ranjan** & S. Menon, “Hybrid two-level large-eddy simulation of turbulent flow in a channel, past a bump and around an inclined prolate spheroid”, **53rd Aerospace Sciences Meeting**, AIAA SciTech, Kissimmee, FL, USA, January 8, 2015.

23. E. Gonzalez, A. Kerstein, S. Menon & **R. Ranjan** “An analysis of the basic assumptions of turbulent combustion models with emphasis on high-speed flows”, **53rd Aerospace Sciences Meeting**, AIAA SciTech, Kissimmee, FL, USA, January 8, 2015.
24. T. Smith, **R. Ranjan**, & C. Pantano, “An improved numerical method for the kernel density functional estimation of disperse flow”, **67th Annual Meeting of the APS Division of Fluid Dynamics**, San Francisco, CA, USA, November 23, 2014.
25. S. Menon & **R. Ranjan**, “Hybrid two-level and large-eddy simulation of high Reynolds number flows”, Mini-symposium on Coarse Grained Simulations and Turbulent Mixing, **IACM-ECCOMAS 2014 World Congress**, Barcelona, July 21-25, 2014.
26. M. P. Celano, S. Silvestri, G. Schlieben, C. Kirchberger, O. J. Haidn, T. Dawson, **R. Ranjan**, & S. Menon, “Experimental and numerical investigation for a GOX-GCH4 shear-coaxial injector element”, **Space Propulsion Conference**, Cologne, Germany, May 2014.
27. **R. Ranjan** & S. Menon, “Multi-scale simulation of high Reynolds number turbulent flows”, **52nd Aerospace Sciences Meeting**, AIAA SciTech, National Harbor, MD, USA, January 17, 2014.
28. **R. Ranjan** & S. Menon, “A dynamic two-level large-eddy simulation method for high Reynolds number flows”, **66th Annual Meeting of the APS Division of Fluid Dynamics**, Pittsburgh, PA, USA, November 24, 2013.
29. C. Pantano & **R. Ranjan**, “An Efficient State-Space Based Method for Direct Simulation of Particle-Laden Turbulent Flows”, **SIAM Conference on Computational Science and Engineering**, Boston, MA, USA, February 26, 2013.
30. **R. Ranjan** & C. Pantano, “A novel state-space based method for direct numerical simulation of particle-laden turbulent flows”, **65th Annual Meeting of the APS Division of Fluid Dynamics**, San Diego, CA, USA, November 20, 2012.
31. **R. Ranjan** & C. Pantano, “Discretely conservative, non-dissipative, and stable collocated method for solving the incompressible Navier-Stokes equations”, **63rd Annual Meeting of the APS Division of Fluid Dynamics**, Long Beach, CA, USA, November 21, 2010.
32. **R. Ranjan**, C. Pantano & P. Fischer, “Direct simulation of heat transfer in a turbulent swept flow over a wire in a channel”, **62nd Annual Meeting of the APS Division of Fluid Dynamics**, Minneapolis, MN, USA, November 23, 2009.
33. **R. Ranjan**, C. Pantano, P. Fischer & A. Siegel, “Direct simulation of a turbulent channel with wire in cross flow”, **61st Annual Meeting of the APS Division of Fluid Dynamics**, San Antonio, TX, USA, November 25, 2008.
34. **R. Ranjan** and G. Biswas, “Development of unstructured grid & finite volume solver”, **Fluent India Pvt. Ltd.**, Pune, India, July 2004.
35. **R. Ranjan**, “Effect of magnetic field on semiconductor crystal growth”, **1st Winter Academy**, IIT Kanpur, India, December 2002.

WORKSHOPS

- “Fundamentals of Teaching and Learning in Higher Education”, Postdoc Teaching Course, Georgia Institute of Technology, Atlanta, USA, Spring 2016.
- “Colfax Research Hands on Workshop Series on Parallel Programming and Optimization for Intel Architecture”, Georgia Institute of Technology, Atlanta, USA, August 17 – September 4, 2015.
- “12th Symposium on Overset Composite Grids and Solution Technology”, Georgia Institute of Technology, Atlanta, USA, October 6 – 9, 2014.
- “Intel’s Big Data and Analytics Workshop”, Atlanta, USA, March 11, 2014.

- “Graduate College Teaching Academy”, Center for Innovation in Teaching & Excellence, UIUC, IL, USA, Aug 16 – 17, 2011.
- “Petascale Programming Environments and Tools”, Virtual School of Computational Sciences and Engineering, UIUC, IL, USA, July 6 – 9, 2010.
- “Scientific Data Analysis and Visualization for Petascale Computing”, CScADS Summer Workshops, Snowbird, UT, USA, July 28 – 31, 2008.

ADVISING AND MENTORSHIP EXPERIENCE

- **Current Research Advisees**
 - **Undergraduate students:** A. Sam, B. Troxel.
- **Past Research Advisees**
 - M. Groiss, M.S., Technical University of Munich, Germany, 2017.
- **Mentorship Experience at Georgia Tech**
 - **High-school students:** E. Hembree, M. Master
 - **Undergraduate students:** T. Cai, B. Frericks, M. Venkataswamy, K. Kolar, M. Spencer, M. Gil, J. Kuperman, A. Patel
 - **Graduate students:** S. Yang, Y. Nagaoka, P. Tudisco, A. Panchal, U. Unnikrishnan, M. Clay, D. L. Thanki, S. Mani, T. Gibis, S. Sengupta, P. J. Milan

MEDIA COVERAGE

- **AVF-LESLIE**, a combustion simulation code reached a major scalability milestone for *in situ* visualization to achieve “extreme scale knowledge discovery”. The accomplishment was credited to the expertise of the collaborators, which included **Intelligent Light**, **Georgia Institute of Technology** and **Lawrence Berkeley National Laboratory** with a funding from the Department of Energy. I was involved in code development and its maintenance, problem setup and the scaling studies.
 - <http://tinyurl.com/nh7y4a7>
 - <http://tinyurl.com/ju84kqg>
- **CoolSim**, a state-of-the-art tool for design, simulation and analysis of fluid flow and heat transfer in a data center facility. I was the chief architect of this code from its onset in January 2005 till July 2007. It was originally developed at **Fluent Inc.**, and is now being licensed by **Applied Math Modeling Inc.**
 - <http://tinyurl.com/p6zy7sg>
 - <http://tinyurl.com/nf2t1bx>

ACADEMIC & PROFESSIONAL SERVICE

- **Committees:**
 - **Departmental:** UG Curriculum, Software, Strategic Plan
- **Reviewer:**
 - Journal of Fluid Mechanics
 - Physical Review E
 - Flow Turbulence & Combustion
 - Combustion Theory & Modeling

- Computer & Fluids
- Journal of Propulsion and Power
- Physics of Fluids
- Shock Waves
- International Journal of Heat and Mass Transfer
- International Journal of Numerical Methods in Fluids
- The Aeronautical Journal
- Journal of Process in Mechanical Engineering
- ASME Turbo Expo
- DOE Advanced Scientific Computing Research Leadership Computing Challenge
- Bentham Science Publishers

- **Session Chair:**

- DNS, LES and Hybrid RANS Applications, Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, GA, USA, November 20, 2018.
- Modeling and Simulation of Gas Turbine Combustion, AIAA Propulsion and Energy Forum Exposition, Cincinnati, OH, July 11, 2018.
- Turbulence Modeling, 53rd Aerospace Sciences Meeting, AIAA SciTech, Kissimmee, FL, USA, January 8, 2015.
- Turbulence: Models and Simulations, 52nd Aerospace Sciences Meeting, AIAA SciTech, National Harbor, MD, USA, January 17, 2014.
- Turbulence Modeling, Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA, USA, November 24, 2013.

- **Judge:**

- 68th Georgia Science & Engineering Fair, 2016.
- Career, Research, & Innovation Development Conference at Georgia Institute of Technology, 2015.
- Capstone Design Exposition at Georgia Institute of Technology, 2013.

- **Volunteer:** Prospective graduate recruiting event organized by the Department of Mechanical Science & Engineering (UIUC), 2008 – 2011.