CURRICULUM VITAE

Shankar Subramaniam

Personal Statement: Trusted leader with broad leadership experience in building a shared vision, strategic planning, pioneering diversity efforts, developing talent through mentoring, and accelerating knowledge transfer through academic-industry partnerships. Passionate about growing with others to accomplish shared organizational goals. Participant in the 2022-23 Columbia Coaching Certification Program.

Title: President, Dr. Shankar Coaching and Consulting, LLC
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I. ACADEMIC AND EMPLOYMENT HISTORY

A. Education

Name of Institution	Degree	Field of Study	Date of degree
Cornell University	Ph.D.	Aerospace Engineering	1997
University of Notre Dame	M.S.	Aerospace Engineering	1990
Indian Institute of Technology (Bombay)	B.Tech.	Aeronautical Engineering	1988

B. Academic Appointments

Name of Institution	Position	Dates
Iowa State University Ames, IA 50011	Director, *CoMFRE* **C**enter f**or** **M**ultiphase **F**low **R**esearch & **E**ducation	2014-2018
	Professor	2014-present
	Associate Professor	2008-2014
	Assistant Professor Department of Mechanical Engineering	2002-2008
Rutgers, The State University of New Jersey,	Assistant Professor (tenure-track)* Department of Mechanical and Aerospace Engineering	1999-2002

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* Successfully reappointed in 2002.

Piscataway, NJ 08854

C. Other Professional Employment

Organization	Position	Dates
Los Alamos National Laboratory Los Alamos, NM 87544	Postdoctoral Research Associate Fluid Dynamics Group T-3 Theoretical Division	1997-1999
General Motors R&D R&D Center Warren, MI Scholarship	Research Intern	1996

II. LEADERSHIP EXPERIENCE, ACCOMPLISHMENTS & IMPACT

Position	Activity	Accomplishments & Impact	Dates
Vision & Strategic Planning: Founding Director, *Center for Multiphase Flow Research and Education* (CoMFRE)	o Developing a shared vision for the group o Strategic planning o Obtaining funding to meet growth targets o Accelerating knowledge transfer to industry	o Doubled CoMFRE's annual research expenditures from ~$1 MM in 2014 to $2 MM in 2017 o Record growth at more than $200K p.a. o Positively impacted knowledge transfer to 5 member companies	2014-2018
Diversity, Equity & Inclusivity: First faculty director of the *Women in Mechanical Engineering* (WiME) program	Creating a nurturing environment that supports a positive experience for women in mechanical engineering	o Increased the enrollment of women from 7% to 10%, exceeding the College of Engineering average in 3 years o Model for community building to support other diversity efforts	2008-2012
Mentoring: Founder of the *Faculty Forum:* a group mentoring program for early-career faculty	Effective mentoring of a large cohort of early-career faculty to facilitate their success in promotion and tenure	o 12/13 earned tenure and promotion o Provost's *Exemplary Faculty Mentor* award	2014-2016
Student Learning: Initiated and led the *Preparedness and Competency Assessments*	Uniform assessment of student preparedness and competency in a sequence of four thermal-fluids courses	o Insights into learning effectiveness, and retention of student learning between courses; addresses ABET criterion for continuous improvement	2020-2021

III. PROFESSIONAL HONORS

Name of Honor/Award	Granting Group	Date
Exemplary Faculty Mentor	Office of the Provost, Iowa State University	2016
Outstanding Conference Paper Award at the *International Conference on Multiphase Flow*	Awards Committee of the *International Conference on Multiphase Flow*	2010
DOE Early Career Principal Investigator Award	Department of Energy	2002
President's Silver Medal	Indian Institute of Technology, Mumbai (Bombay)	1988
National Talent Search	Government of India	1982

IV. PRINCIPAL PUBLICATIONS

1. Books

1. **S**. **Subramaniam** and S. Balachandar (Eds.)**,** "*Modelling Approaches and Computational Methods for Turbulent Particle-laden Flows,*" Academic Press, Elsevier Inc., a volume in the series on *Advances in Turbulence,* (series editor Paul Durbin)

2. Book Chapters

1. **S. Subramaniam** and S. Balachandar, Chapter 2, "Towards Combined Deterministic and Statistical Approaches to Modeling Dispersed Multiphase Flows," in: Saptarshi Basu, Avinash Kumar Agarwal, Achintya Mukhopadhyay and Chetankumar Patel (Eds.), *Droplets and Sprays Applications for Combustion and Propulsion* 7-44 (2018)

2. Garg, R., Tenneti, S., Mohd.-Yusof, J. and **Subramaniam, S.**, Chapter 8, "Direct Numerical Simulation of Gas-Solids Flow Based on the Immersed Boundary Method," in: Pannala, S., Syamlal, M., O'Brien, T. J. (Eds.), *Computational Gas-Solids Flows and Reacting Systems: Theory, Methods and Practice* 245-276 (2011)

3. Refereed Journal Publications

1. B. R. Nagawkar, V. P. Kotrike, A. Passalacqua, and **S. Subramaniam**, "An index to characterize gas-solid and solid-solid mixing from average volume fraction fields," AIChE Journal, accepted (2022)

2.   * A. M. Lattanzi, V. Tavanashad, **S. Subramaniam**, and J. Capecelatro, "Stochastic model for the hydrodynamic force in Euler–Lagrange simulations of particle-laden flows," *Phys. Rev. Fluids* **7**, pp 014301, (2022)

3.   R. Li, M. Zhang, Y. Wu, P. Tang, G. Sun, L. Wang, S. Mandal, L. Wang, J. Lang, A. Passalacqua, **S. Subramaniam**, G. Song, "What We Are Learning from COVID-19 for Respiratory Protection: Contemporary and Emerging Issues," *Polymers*, **13**(23), 4165; https://doi.org/10.3390/polym13234165, (2021)

4.   M. Zhang, R. Li, J. Li, F. Wang, **S. Subramaniam**, J. Lang A. Passalacqua, and G. Song, "A 3D multi-segment thermoregulation model of the hand with realistic anatomy: Development, validation, and parametric analysis," *Building & Environment,* **201**, 107964, (2021)

5.   O. Olafasakin, Y. Chang, A. Passalacqua, **S. Subramaniam**, R. C. Brown, and M. M. Wright, "Machine Learning Reduced Order Model for Cost and Emission Assessment of a Pyrolysis System," *Energy & Fuels*, **35**, 9950-9960, (2021)

6.   H. Nadeem, **S. Subramaniam**, and T. J. Heindel, "Characterization of intruder particle motion in a bladed mixer," *Powder Technology,* **381**, 440-450, (2021)

7.   V. Tavanashad, A. Passalacqua, and **S. Subramaniam**, "Particle-resolved simulation of freely evolving particle suspensions: Flow physics and modeling," *International Journal of Multiphase Flow*, **135**,103533, (2021)

8.   S. Barkley, J. Lynch, E. Miklaszewski, J. Dilger, W. Crespo, J. Michael, **S. Subramaniam**, T. Sippel, "Microwave-assisted modulation of light emission intensity in alkali-pyrotechnic plumes," *Combustion and Flame*, **225**, pp. 406-416, (2021)

9.   **S. Subramaniam**, "Multiphase flows: Rich physics, challenging theory, and big simulations," *Physical Review Fluids* **5**, 110520(36), (2020)

10.   A. M. Lattanzi, V. Tavanashad, **S. Subramaniam**, and J. Capecelatro, "Stochastic models for capturing dispersion in particle-laden flows," *J. Fluid Mech.* **903**, pp A7-1—A7-29, (2020)

11.   V. Tavanashad and **S. Subramaniam,** "Fully resolved simulation of dense suspensions of freely evolving buoyant particles using an improved immersed boundary method," *International Journal of Multiphase Flow* **103**, 103396, (2020)

12.   D. Minglani, A. Sharma, H. Pandey, R. Dayal, J. B. Joshi and **S. Subramaniam**, "A review of granular flow in screw feeders and conveyors," *Powder Technol.* **366**, pp 369-381, (2020)

13.   C. Peng, B. Kong, J. Zhou, B. Sun, A. Passalacqua, **S. Subramaniam**, R. O. Fox, "Implementation of pseudo-turbulence closures in an Eulerian–Eulerian two-fluid model for non-isothermal gas–solid flow," (2019) *Chemical Engineering Science*, **207**, pp 663-671

14.   V. Tavanashad, A. Passalacqua, R. O. Fox, and **S. Subramaniam,** "Effect of density ratio on velocity fluctuations in dispersed multiphase flow from simulations of finite-size particles," (2019). *Acta Mechanica,* **230** (2), pp. 469-484

15.   E. Murphy, G. Lomboy, K. Wang, S. Sundararajan, and **S. Subramaniam**, "The rheology of slurries of athermal cohesive micro-particles immersed in fluid: A computational and experimental comparison." (2019) *Chemical Engineering Science*, **193**, pp 411-420

16.   Z. Hosseinzadeh-Nik, **S. Subramaniam** and J. D. Regele, "Investigation and quantification of flow unsteadiness in shock-particle cloud interaction," (2018) *International Journal of Multiphase Flow*, **101**, pp 186-201

17.   M. Ramezani, B. Sun, **S. Subramaniam** and M. G. Olsen, "Detailed experimental and numerical investigation of fluid-particle interactions of a fixed train of spherical particles inside a square duct," (2018) *International Journal of Multiphase Flow*, **103**, pp 16-29

18.   M. Mehrabadi, J. A. K. Horwitz, **S. Subramaniam**, and A. Mani, "A direct comparison of particle-resolved and point-particle methods in decaying turbulence," (2018) *Journal of Fluid Mechanics*, **850**, pp 336-369

19.   E. Murphy, S. Sundararajan, and **S. Subramaniam**, "Rheological transition in simple shear of moderately dense assemblies of dry cohesive granules," (2018) *Physical Review E*, **97**, 062902

20.   M. Mehrabadi and **S. Subramaniam**, "Mechanism of kinetic energy transfer in homogeneous bidisperse gas-solid flow and its implications for segregation," *Physics of Fluids* (2017), **29**, 020714

21.   Eric Murphy and Shankar **Subramaniam**, "Binary collision outcomes for inelastic soft-sphere models with cohesion," *Powder Technology* (2017), v. **305**, pp. 462-476

22.   M. Mehrabadi, S. Tenneti, and **S. Subramaniam**, "Importance of the fluid-particle drag model in predicting segregation in bidisperse gas-solid flow," *International Journal of Multiphase Flow* (2016), v. **86**, pp. 99–114

23.   V. Vidyapati and **S. Subramaniam**, "A Constitutive Model for Dense Granular Flows Based on Microstructural Descriptors," *Industrial and Engineering Chemistry Research* (2016), v. **55**, pp. 10178-10190

24.   S. Tenneti, M. Mehrabadi, and **S. Subramaniam**, "Stochastic Lagrangian model for hydrodynamic acceleration of inertial particles in gas-solid suspensions," *Journal of Fluid Mechanics* (2016), v*ol.* **788**, *pp.* 695–729

25.   B. Sun, S. Tenneti, **S. Subramaniam** and D. L. Koch, "Pseudo-turbulent heat flux and average gas–phase conduction in gas–solid heat transfer: flow past random fixed particle assemblies," *Journal of Fluid Mechanics* (2016), v*ol.* **798**, *pp.* 299–349

26.   M. Mehrabadi, E. J. Murphy, and **S. Subramaniam**, "Development of a gas–solid drag law for clustered particles using particle-resolved direct numerical simulation," *Chemical Engineering Science* (2016), v. **152**, pp. 199–212

27.   R. Kolakaluri, E. Murphy, **S. Subramaniam**, R. C. Brown and R. O. Fox, "Filtration Model for Polydisperse Aerosols in Gas-Solid Flow Using Granule-Resolved Direct Numerical Simulation," *AIChE Journal,* **61**(11), 3594-3606, (2015)

28.   B. Sun, S. Tenneti and **S. Subramaniam**, "Modeling average gas–solid heat transfer using particle-resolved direct numerical simulation," *International Journal of Heat and Mass Transfer,* **86**, 898–913 (2015)

29.   E. Murphy and **S. Subramaniam**, "Freely cooling granular gases with short-ranged attractive potentials," *Physics of Fluids,* **27**, 043301, (2015)

30.   M. Mehrabadi, S. Tenneti, R. Garg and **S. Subramaniam**, "Pseudo-turbulent gas-phase velocity fluctuations in homogeneous gas–solid flow: fixed particle assemblies and freely evolving suspensions," *Journal of Fluid Mechanics,* **770**, 210-246 (2015)

31.   R. Kolakaluri, **S. Subramaniam** and M. V. Panchagnula, "Trends in multiphase modeling and simulation of sprays," *International Journal of Spray and Combustion Dynamics*, **6** (4), 317-356 (2014)

32.   S. Markutsya, R. O. Fox and **S. Subramaniam**, "Characterization of sheared colloidal aggregation using Langevin dynamics simulation," *Physical Review E,* **89**, 062312 (2014)

33.   S. Tenneti and **S. Subramaniam**, "Particle-resolved direct numerical simulation for gas-solid flow model development," *Annual Review of Fluid Mechanics,* **46**, 199-230 (2014)

34.   Vidyapati and **S. Subramaniam**, "Granular flow in silo discharge: Discrete Element Method Simulations and Model Assessment," *Industrial Engineering and Chemistry Research,* **52**(36), 13171-13182 (2013)

35.   S. Tenneti, B. Sun, R. Garg, and **S. Subramaniam**, "Role of fluid heating in dense gas–solid flow as revealed by particle-resolved direct numerical simulation," *International Journal of Heat and Mass Transfer,* **58**, 471–479 (2013)

36.   **S. Subramaniam**, "Lagrangian-Eulerian methods for multiphase flows," *Progress in Energy and Combustion Science,* **39**, 215-245 (2013)

37.   S. Markutsya, R. O. Fox, and **S. Subramaniam**, "Coarse-graining approach to infer mesoscale interaction potentials from atomistic interactions for aggregating systems," *Industrial and Engineering Chemistry Research,* **51**(49), 16116-16134 (2012)

38.   V. Garzo, S. Tenneti, **S. Subramaniam**, and C. M. Hrenya, "Enskog kinetic theory for monodisperse gas-solid flows," *Journal of Fluid Mechanics,* **712**, 129-168 (2012)

39.   M. G. Pai, and **S. Subramaniam**, "Two-way coupled stochastic model for dispersion of inertial particles in turbulence," *Journal of Fluid Mechanics,* **700**, 29-62 (2012)

40.   Vidyapati, and **S. Subramaniam**, "Granular rheology and phase transition: DEM simulations and order-parameter based constitutive model," *Chemical Engineering Science,* **72**, 20-34 (2012)

41.   Vidyapati, M. Kheiripour Langroudi, J. Sun, S. Sundaresan, G.I. Tardos, and **S. Subramaniam**, "Experimental and computational studies of dense granular flow: Transition from quasi-static to intermediate regime in a Couette shear device," *Powder Technology,* **220**, 7-14 (2012)

42. G. Lomboy, S. Sundararajan, K. Wang, and **S. Subramaniam**, "A test method for determining adhesion forces and Hamaker constants of cementitious materials using atomic force microscopy," *Cement And Concrete Research*, **41**(11), 1157-1166 (2011)

43. S. Tenneti, R. Garg, and **S. Subramaniam**, "Drag law for monodisperse gas-solid systems using particle-resolved direct numerical simulation of flow past fixed assemblies of spheres," *International Journal of Multiphase Flow*, **37**(9), 1072-1093 (2011)

44. Z. Qin, R. O. Fox, **S. Subramaniam**, R. H. Pletcher, and Zhang L., "On the apparent particle dispersion in granular media," *Advanced Powder Technology*, **22**(6), (2011)

45. Y. Xu, and **S. Subramaniam**, "Effect of particle clusters on carrier flow turbulence: a direct numerical simulation study," *Flow Turbulence and Combustion* **85**:735–761 DOI 10.1007/s10494-010-9298-8 (2010)

46. S. Tenneti, R. Garg, C. M. Hrenya, R. O. Fox, and **S. Subramaniam**, "Direct numerical simulation of gas-solid suspensions at moderate Reynolds number: quantifying the coupling between hydrodynamic forces and particle velocity fluctuations," *Powder Technology,* **203***,* 57-69 (2010)

47. A. Passalacqua, R. O. Fox, R. Garg, and **S. Subramaniam**, "A fully coupled quadrature-based moment method for dilute to moderately dilute fluid–particle flows," *Chemical Engineering Science*, **65**(7) Special Issue: Sp. Iss. SI, 2267-2283 (2010)

48. M. G. Pai, and **S. Subramaniam**, "A comprehensive probability density function formalism for multiphase flows," *Journal of Fluid Mechanics*, **628**, 181-228 (2009)

49. R. Garg, C. Narayanan, and **S. Subramaniam**, "A numerically convergent Lagrangian–Eulerian simulation method for dispersed two-phase flows," *International Journal of Multiphase Flow*, **35**(4), 376-388 (2009)

50. S. Markutsya, **S. Subramaniam,** R. D. Vigil, and R. O. Fox, "On Brownian dynamics simulation of nanoparticle aggregation," *Industrial and Engineering Chemistry Research*, **47**, 3338-3345 (2008)

51. R. Garg, C. Narayanan, D. Lakehal, and **S. Subramaniam**, "Accurate numerical estimation of interphase momentum transfer in Lagrangian-Eulerian simulations of dispersed two-phase flows," *International Journal of Multiphase Flow*, **33**(12), 1337-1364 (2007)

52. J. Sun, F. Battaglia, and **S. Subramaniam,** "Hybrid two-fluid DEM simulation of gas-solid fluidized beds," *ASME Journal of Fluids Engineering*, **129** (11), 1394-1403 (2007)

53. Y. Xu and **S. Subramaniam**, "Consistent modeling of interphase turbulent kinetic energy transfer in particle-laden turbulent flows," *Physics of Fluids*, **19**(8), 085101, (2007)

54. G. M. Pai and **S. Subramaniam**, "Modeling droplet dispersion and interphase turbulent kinetic energy transfer using a new dual-timescale Langevin model," *International Journal of Multiphase Flow*, **33**(3): 252-281 (2007)

55. J. Sun, F. Battaglia, and **S. Subramaniam,** "Dynamics and structures of segregation in a dense, vibrating granular bed," *Physical Review E*, **74**(6):061307–13, (2006)

56. G. M. Pai and **S. Subramaniam**, "Modeling interphase turbulent kinetic energy transfer in Lagrangian-Eulerian spray computations," *Atomization and Sprays*, **16**(7): 807-826 (2006)

57. Y. Xu and **S. Subramaniam**, *"*A multiscale model for dilute turbulent gas–particle flows based on the equilibration of energy concept," *Physics of Fluids*, **18**(3), 033301, (2006)

58. D. Gao, **S. Subramaniam**, R. O. Fox, G. S. Grest, and D. K. Hoffman, "Momentum transfer between polydisperse particles in granular flow," *ASME Journal of Fluids Engineering*, **128**(1), 62-68 (2006)

59. G. M. Pai and **S. Subramaniam**, "Accurate numerical solution of the spray equation using particle methods," *Atomization and Sprays* **16**(2): 159-194 (2006)

60. D. Gao, **S. Subramaniam**, R. O. Fox, and D. K. Hoffman, "Objective decomposition of the stress tensor in granular flows," *Physical Review E*, **71**, 021302, (2005)

61. **S. Subramaniam**, "Statistical modeling of sprays using the droplet distribution function approach," *Physics of Fluids*, vol. **13**(3), 624-642 (2001)

62. **S. Subramaniam**, "Statistical representation of a spray as a point process," *Physics of Fluids*, vol. **12**(10), 2413-2431 (2000)

63. **S. Subramaniam** and D. C. Haworth, "A probability density function method for turbulent mixing and combustion on three-dimensional unstructured deforming meshes," *International Journal of Engine Research*, v. **1**(2), 171-190 (2000)

64. **S. Subramaniam**, "Minimum error Fickian diffusion coefficients for mass diffusion in multicomponent gas mixtures," *Journal of Non-equilibrium Thermodynamics*, v. **24**(1), 1-39 (1999)

65. **S. Subramaniam** and S. B. Pope, "Comparison of mixing model performance for nonpremixed turbulent reactive flow," *Combustion & Flame*, v. **117**(4), 732-754 (1999)

66. **S. Subramaniam** and S. B. Pope, "A mixing model for turbulent reactive flows based on Euclidean minimum spanning trees," *Combustion and Flame*, v. **115**(4), 487-514 (1998)

67. A. R. Masri, **S. Subramaniam** and S. B. Pope, "A mixing model to improve the PDF simulation of turbulent piloted flames," *Twenty-sixth Symposium (International) on Combustion*, v. **1**, 49-57 (1996)

V. INVITED SEMINARS AND PRESENTATIONS

Invited Workshop and Conference Presentations

1. Invited Presentation in a Special Session in Honor of Christine Hrenya at the 2020 AIChE Annual Meeting: "An index to characterize particle mixing at different scales," 2020 AIChE (Virtual) Annual Meeting (*Special Session in Honor of Christine Hrenya IV*), Nov 2020 (Invited by Professor Jennifer Curtis)

2. Invited Keynote Lecture: "Multiphase Flows: Rich Physics, Challenging Theory, and Big Simulations," *72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Seattle, WA, Nov 2019

3. Invited Keynote Lecture: "Discovering the Fascinating World of Particle Technology," at the *8ᵗʰ World Congress on Particle Technology*, Orlando, FL, April 2018

4. Invited Presentation at the *AIChE 2014 Annual Meeting* in a *Festschrift for Professor Dimitri Gidaspow's 80ᵗʰ Birthday and Career Long Accomplishments* on 'Heat Transfer in Gas-Solid Flow: Model Development Using Particle-Resolved Direct Numerical Simulation', Nov 2014

5. Invited Keynote Lecture: 'Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development' at *Chemeca 2014,* the annual conference for the Australian and New Zealand community of chemical and process engineers and industrial chemists organized by the *Institution of Chemical Engineers (IChemE)* in Perth, Australia, September 2014 (Host: Professor Vishnu Pareek, Curtin University, Australia)

6. Invited Presentation: "Kinetic Theory of Gas-Solid Flow Based on Microscale Simulation: A Route Towards Describing Multiscale Phenomena" in a *Special Session on 'Kinetic and hydrodynamic PDE-based descriptions of multiscale phenomena'* at the 2013 Spring Central Sectional Meeting of the *American Mathematical Society* in Ames, IA, April 2013 (Invited by Professor Eitan Tadmor)

7. Invited Presentation: "Closure Models for Turbulent Particle-Laden Flows from Particle-Resolved Direct Numerical Simulation" in the *Minisymposium on High-Speed, High-Energy, Multi-Material Flows* at the *American Physical Society's Division of Fluid Dynamics (APS-DFD)* Annual Meeting in San Diego, CA, Nov 2012 (Invited by Professor H. S. Udaykumar)

8. Invited Presentation in a Symposium to honor Dr. Thomas O'Brien's Career-long Accomplishments at the 2012 AIChE Annual Meeting: "A Constitutive Model for Intermediate, Quasi-Static and Inertial Regimes of Dense Granular Flows," *2012 AIChE Annual Meeting* (October/November 2012), Pittsburgh, PA (Invited by Dr. Sofiane Benyahia)

9. Invited Keynote Lecture: "Lagrangian-Eulerian Methods for Sprays and Dispersed Multiphase Flows" at the *Institute for Liquid Atomization and Spray Systems (ILASS)* Annual Meeting, San Antonio, TX, May 2012 (Invited by Professor Mario Trujillo)

10. Invited Presentation: "Modeling and Simulation of Multiphase Flow," Indo-US Science and Technology Forum's *Frontiers of Liquid Atomization* Workshop at IIT Madras, Chennai, India, Dec 19-20, 2011 (Invited by Professor Paul Sojka)

11. Invited Presentation: "Particle-Resolved Simulation of Turbulence Modification by Particle Clusters," 2010 ASME Fluids Engineering Division Summer Meeting, Montreal, Canada, November 2010 (Invited by Professor Lance Collins)

12. S. Subramaniam, "Progress and Challenges in Spray Combustion", ASME International Mechanical Engineering Congress and Exposition, Seattle, WA, November 2007 (Invited by Professor Mahesh Panchagnula)

13. S. Subramaniam, "Modeling Droplet Heat and Mass Transfer in Sprays: Progress and Challenges", Spray '05 International Conference on Heat and Mass Transfer, Antalya, Turkey, June 2005 (Invited by Professor Norman Chigier)

14. Invited Presentation: "The Role of Volume and Surface Measure in Statistical Models of Multiphase Flow", Special Session on Modeling and Simulation of Complex Fluid Systems, American Mathematical Society, Sectional Meeting, Tallahassee, FL, March 2004 (Invited by Professor Xiaoming Wang)

15. Invited Presentation: "Consistent Modeling of Multiphase Flows", Sondersforschungsbereich-412: Workshop on Modeling, Simulation and Design in Process Engineering, University of Stuttgart, Germany, March 2003 (Invited by Professor Ulrich Maas)

Invited Seminars at Universities

16. "Understanding Multiphase Flows for Predictive Modeling and Control" University of British Columbia, Department of Mechanical Engineering, Vancouver, BC, Canada, March 2018 (Host: Professor Ian Frigaard)

17. "Understanding Multiphase Flows for Predictive Modeling and Control" University of Minnesota, Department of Aerospace Engineering & Mechanics, Minneapolis, MN, April 2017 (Host: Professor Mahesh Krishnan)

18. "Understanding Multiphase Flows for Predictive Modeling and Control" University of Michigan, Department of Aerospace Engineering, Ann Arbor, MI, April 2017 (Host: Professor Venkat Raman)

19. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", at the Institut Mecanique des Fluides, Toulouse, France, May 2016 (Host: Professor Eric Climent)

20. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", *s* at ETH Zurich, Switzerland, May 2016 (Host: Professor Patrick Jenny)

21. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", at the University of Alberta, Canada, April 2016 (Host: Assistant Professor Aloke Kumar)

22. "Particle–Resolved Direct Numerical Simulation of Gas–Solid Flow for Model Development", *2015 Summer School and International Symposium on Environmental Multiphase Flow* at Wuhan, China, May 2015 (remote presentation by videoconference)

23. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", *Lindbergh Lecture Series* at the University of Wisconsin, Madison, November 2014 (Host: Professor Mario Trujillo)

24. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", Louisiana State University's *Enabling Process Innovation through Computation (EPIC) Seminar Series*, April 2014 (Host: Professor Krishnaswamy Nandakumar, Chemical Engineering, LSU)

25. "Progress and Challenges in Modeling and Simulation of Gas–Solid Flows", *Computational and Applied Mathematics Seminar,* Mathematics Department, Iowa State University, December 2014 (Host: Professor Jue Yan)

26. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development", Stanford University's Mechanical Engineering Department Seminar, Stanford University, Stanford, CA, November 2013 (Host: Professor Mathias Ihme)

27. "Particle–Resolved Direct Numerical Simulation for Gas–Solid Flow Model Development" at the *Laboratoire EM2C* in Ecole Centrale Paris, France, April 8, 2013 (Host: Professor Marc Massot)

28. "Gas-solid Flows and Particle Clustering" at the University of Florida, Gainesville, Department of Mechanical Engineering in Professor Balachandar's group, Feb 2010 (Host: Professor Balachandar)

29. "Gas-Solid Flows: Progress and Challenges in Theory, Modeling and Simulation," University of Minnesota's Mechanical Engineering Department Seminar, University of Minnesota, Minneapolis, MN, September 2009 (Host: Professor Sean Garrick)

30. "Modeling and Simulation of Nanoparticle Aggregation in Liquid Suspensions," University of Iowa's Mechanical Engineering Department Seminar, University of Iowa, Iowa City, IA, September 2008 (Host: Professor H. S. Udaykumar)

31. S. Subramaniam, "Modeling Growth and Structure of Nanoparticles Aggregating in Liquid Suspension", Condensed Matter Seminar, Physics Department, Kansas State University, Manhattan, KS, May 2007 (Host: Professor Chris Sorensen)

32. S. Subramaniam, "Modeling Effects of Clustering in Multiphase Flow through a Transport Theory of Fluctuations", Fall 2007 Fluid Mechanics Seminar, Stanford University, Stanford, CA, November 2007 (Host: Professor Heinz Pitsch)

33. S. Subramaniam, "Modeling and Simulation of Turbulent Reactive Flows", Mechanical Engineering Department, The Ohio State University, Columbus, OH, July 2002 (Host: Professor Vishwanath Subramaniam)

Invited Presentations to Industry

34. "Understanding Granular and Gas-Solid Flows for Predictive Modeling and Control," ANSYS Fluent Inc., June 2018 (remote presentation by videoconference)

35. "Consortium for Multiphase Research and Education (CoMFRE)," John Deere Visit, Iowa State University, Nov 2017

36. "Consortium for Multiphase Research and Education (CoMFRE)," Phillips66 Visit, Iowa State University, Nov 2017

37. "Modeling and simulation of particle deposition with application to the impact of sand on turbine blades," Pratt & Whitney, Aug 2014

38. "Computational Fluid Dynamics for Understanding Transport in Thermochemical Processes," Conoco-Phillips Meeting, Iowa State University, May 2008

Invited Seminars at National Laboratories

39. "Direct Numerical Simulation of Heat and Mass Transfer in Gas-Solid Flow: Effect of Particle Clustering" at the National Energy Technology Laboratory, Morgantown, WV, Apr 2010

VI. OTHER PRESENTATIONS

1. **S. Subramaniam**, "Single-point closures for turbulent multiphase flow that incorporate two-point statistics through filtered fields," 74th Annual Meeting of the APS Division of Fluid Dynamics, Phoenix, AZ, Nov 2021

2. V. V. Belekar, N. K. Nere, K. Sinha, T. J. Heindel, and **S. Subramaniam**, "Continuum Simulations of Multiphase Heat and Mass Transfer in Wet Granular Mixtures modeled as Separated-Phase," AIChE (Virtual) Annual Meeting (Pharmaceutical Discovery, Development and Manufacturing Forum), Nov 2021

3. V. V. Belekar, A. Passalacqua, T. J. Heindel, K. Sinha, and **S. Subramaniam**, "Continuum Simulations of Granular Flow near the Maximum Packing Limit using a Novel Solution Approach to address Realizability," AIChE (Virtual) Annual Meeting (Particle Technology Forum), Nov 2021

4. A. M. Lattanzi, V. Tavanashad, **S. Subramaniam**, and J. Capecelatro, "Fluid-mediated sources of granular temperature at finite Reynolds numbers," AIChE Annual Meeting (Fluidization Fundamentals), Boston, MA, Nov 2021

5. O. Olafasakin, Y. Chang, A. Passalacqua, **S. Subramaniam**, R. C. Brown, and M. M. Wright, "Machine Learning Reduced Order Model for Cost and Emission Assessment of a Pyrolysis System," AIChE Annual Meeting (Biofuels Production: Design, Simulation and Economic Analysis), Boston, MA, Nov 2021

6. B. R. Nagawkar, **S. Subramaniam**, and A. Passalacqua, "A Comprehensive Model for the CFD Simulation of Autothermal Fast Pyrolysis of Biomass," AIChE (Virtual) Annual Meeting (Particulate Systems: Solids and Processing), Nov 2021

7. B. R. Nagawkar , A. Passalacqua, and **S. Subramaniam**, "An Index to Characterize Mixing from Average Volume Fraction Fields in Gas-Solid Flows," AIChE (Virtual) Annual Meeting (Particulate Systems: Solids and Processing), Nov 2021

8. H. Nadeem, P. Jamdagni, **S. Subramaniam**, K. Sinha, and T. J. Heindel, "Mixture Homogeneity Measurements in a Vertical Bladed Mixer Using Tracer Particles," AIChE (Virtual) Annual Meeting (Particulate Systems: Solids and Processing), Nov 2021

9. V. V. Belekar, A. Passalacqua, T. J. Heindel, K. Sinha, and **S. Subramaniam**, "Continuum Simulations of Dense Granular Flow near the Maximum Packing Limit," AIChE (Virtual) Annual Meeting (Particle Technology Forum), Nov 2020

10. V. V. Belekar, N. K. Nere, T. J. Heindel, K. Sinha, and **S. Subramaniam**, "Continuum Simulations of Heat and Mass transfer in Wet Granular Mixtures," AIChE (Virtual) Annual Meeting (Pharmaceutical Discovery, Development and Manufacturing Forum), Nov 2020

11. E. J. Murphy , K. Sinha, M. Mummudi, R. Bharadwaj, V. V. Belekar, S. Subramaniam and N. K. Nere, "Computational Approaches to Scale-up and Tech-Transfer in Agitated Filter Bed Drying," AIChE (Virtual) Annual Meeting (Pharmaceutical Discovery, Development and Manufacturing Forum), Nov 2020

12. J. Lynch, E. Miklaszewski, J. Dilger, W. Crespo, J. Michael, S. Subramaniam, "Numerical investigation of alkali emission enhancement in pyrotechnic plumes exposed to microwaves," SERDP & ESTCP Symposium, Dec 2020

13. H. Nadeem , S. Subramaniam, K. Sinha, T.J. Heindel, "Particle mixing measures in a vertical bladed mixer using X-ray computed tomography (CT)" AIChE (Virtual) Annual Meeting, November 15-20, Nov 2020

14. M. Ni, M. Mehrabadi, J. Capecelatro and S. Subramaniam, "Residual Terms in the Spatially Filtered Fluid Momentum Equation for a Particle laden Suspension" ,73rd Annual Meeting of the APS Division of Fluid Dynamics (Virtual), Nov 2020

15. S. Subramaniam, "Representing Number Fluctuations in Disperse Multiphase Flow using the Filtered Klimontovich Density," 73rd Annual Meeting of the APS Division of Fluid Dynamics (Virtual), Nov 2020

16. V. Tavanashad and S. Subramaniam, "Physical origins of the dependence of drag force on density ratio through fully-resolved direct numerical simulation of particle-laden to bubbly flow," *72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Seattle, WA (2019)

17. H. Nadeem , S. Subramaniam, K. Sinha and T. J. Heindel, "Particle Motion in a Vertical Bladed Mixer Using X-Ray Particle Tracking Velocimetry (XPTV)," 2019 AIChE Annual Meeting (Particle Technology Forum), Orlando, FL (2019)

18. V. V. Belekar, A. Passalacqua, T. J. Heindel, K, Sinha and S. Subramaniam, "Continuum Simulations of Dense Granular Flow and Model Assessment," 2019 AIChE Annual Meeting (Particle Technology Forum), Orlando, FL (2019)

19. J. Lynch, T. Sippel and S. Subramaniam, "Limitations of approximate Boltzmann solutions for atmospheric combustion with high-frequency electric fields," 61st Annual Meeting of the APS Division of Plasma Physics, Fort Lauderdale, FL (2019)

20. S. Subramaniam , "Discovering the Fascinating World of Particle Technology," Abstract for Invited Keynote Lecture at the *Eighth World Congress on Particle Technology*, Orlando, FL (2018)

21. V. Tavanashad, A. Passalacqua, R. O. Fox, and S. Subramaniam, "Effect of density ratio on velocity fluctuations in dispersed multiphase flow from simulations of finite-size particles," *71st Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Atlanta, GA (2018)

22. M. Esmaily , J. A. K. Horwitz, S. Subramaniam, M. Mehrabadi, "A new correction scheme for two-way coupled point-particle methods for anisotropic grids," *71st Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Atlanta, GA (2018)

23. S. Subramaniam, and S. Balachandar, "Extending current mathematical formulations of multiphase flow to regions of strong inhomogeneity," *71st Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Atlanta, GA (2018)

24. J. Horwitz , M. Mehrabadi, S. Subramaniam, A. Mani, "A direct comparison of fully resolved and point-particle models in particle-laden turbulent flow," *69th Annual Meeting of the American Physical Society (Division of Fluid Dynamics) Meeting*, Portland, OR, (2016)

25. M. Mehrabadi, and S. Subramaniam, "Dynamics of kinetic energy transfer in homogeneous bidisperse gas-solid flow using particle-resolved direct numerical simulation," *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Boston, MA (2015)

26. S. Subramaniam and B. Sun, "Transport of temperature-velocity covariance in gas-solid flow and its relation to the axial dispersion coefficient," *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Boston, MA (2015)

27. E. Murphy, M. Mehrabadi and S. Subramaniam, "Modeling Two-point Particle Dynamics of Homogeneous Gas-Solid Flows to describe Clustering and Stability, " *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Boston, MA (2015)

28. B. Sun, S. Tenneti and S. Subramaniam, "Mass transfer in a flow past a non-porous catalyst sphere," *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Boston, MA (2015)

29. E. Murphy, S. Subramaniam, "A Kinetic Theory Based Solid-Solid Drag Model, " *67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, San Francisco, CA (2014)

30. E. Murphy, G. Lomboy, K. Wang, S. Sundararajan, S. Subramaniam, "Homogeneous Shear Simulations of Liquid-Solid Suspensions of Microparticles," *2014 AIChE Annual Meeting,* Atlanta, GA (2014)

31. B. Sun, S. Tenneti, R. O. Fox and S. Subramaniam , "Probability Density Function Model of Scalar Transport and Mixing in Gas-solid Flow," *ASME 2014 Fluids Engineering Summer Meeting*, Chicago, IL, (2014)

32. M. Mehrabadi, S. Tenneti and S. Subramaniam, "Developing Improved Lagrangian Point Particle Models of Gas-Solid Flow from Particle-Resolved Direct Numerical Simulation," *ASME 2014 Fluids Engineering Summer Meeting*, Chicago, IL, (2014)

33. S. Subramaniam , M. Mehrabadi, R. Kolakaluri and S. Tenneti, "Role of fluctuations in instability generation in gas-solid suspensions," *66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Pittsburgh, PA (2013)

34. M. Mehrabadi, S. Tenneti, S. Subramaniam, "Particle-Resolved Direct Numerical Simulation of a Particle-Laden Mixing Layer," *66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Pittsburgh, PA (2013)

35. E. Murphy, S. Sundararajan, S. Subramaniam, "Shear-rate Dependent Regime Transition in Homogeneously Sheared Systems of Frictionless Cohesive Granules," *66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, Pittsburgh, PA (2013)

36. M. Mehrabadi, E. Murphy and S. Subramaniam , "Development of a Two-Fluid Drag Law for Clustered Particles using Direct Numerical Simulation," *2013 AIChE Annual Meeting,* San Francisco, CA (2013)

37. B. Sun, S. Tenneti and S. Subramaniam, "Modeling Gas-Solid Heat Transfer Using Particle-Resolved Direct Numerical Simulation," *2013 AIChE Annual Meeting,* San Francisco, CA (2013)

38. Mehrabadi, S. Tenneti, E. Murphy and S. Subramaniam, "Dynamics of a homogeneous bidisperse gas-solid flow using particle-resolved direct numerical simulation," *2013 AIChE Annual Meeting,* San Francisco, CA (2013)

39. Mehrabadi, E. Murphy and S. Subramaniam , "Development of a Two-Fluid Drag Law for Clustered Particles using Direct Numerical Simulation," *2013 Workshop on Multiphase Flow,* National Energy Technology Laboratory, Morgantown, WV (2013)

40. S. Subramaniam and V. Vidyapati, "A constitutive model for intermediate, quasi-static and inertial regimes of dense granular flows," at the *2012 AIChE Annual Meeting*, Pittsburgh, PA (2012)

41. S. Subramaniam , "Closure models for turbulent particle-laden flows from particle-resolved direct numerical simulation," at the *65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, San Diego, CA (2012)

42. E. Murphy and S. Subramaniam, "Homogeneous cooling granular gases of cohesive particles," at the *65th Annual Meeting of the American Physical Society Division of Fluid Mechanics*, San Diego, CA (2012)

43. S. Subramaniam, "Lagrangian-Eulerian methods for sprays and dispersed multiphase flows," Keynote Lecture at *the 24th Annual Meeting of ILASS*, San Antonio, TX (2012)

44. B. Sun, S. Tenneti, and S. Subramaniam, "Study of heat transfer in gas-solid flow using Particle-Resolved Uncontaminated-Fluid Reconcilable Immersed Boundary Method (PUReIBM)," Plenary Talk at the *International Conference on Numerical Methods in Multiphase Flows*, University Park, PA (2012)

45. R. Kolakaluri, E. Murphy, and S. Subramaniam, "A model for filtration of polydisperse particulates in gas-solid flow using particle-resolved direct numerical simulation," at the *48th Annual Technical Conference of Society of Engineering Sciences*, Evanston, IL (2011)

46. B. Sun, S. Tenneti, and S. Subramaniam, "Heat transfer in gas-solid flow using particle-resolved DNS of steady flow past fixed particle assemblies," at the *48th Annual Technical Conference of Society of Engineering Sciences*, Evanston, IL (2011)

47. S. Tenneti, R. Garg, and S. Subramaniam, "Quantification of gas-phase velocity fluctuations in statistically homogeneous gas-solid flow using particle-resolved direct numerical simulation," at the *48th Annual Technical Conference of Society of Engineering Sciences*, Evanston, IL (2011)

48. B. Sun, S. Tenneti, and S. Subramaniam, "The study of heat transfer in gas-solid flow using particle-resolved DNS of steady flow past fixed particle assemblies," at the *AICHE Annual Meeting*, Minneapolis, MN (2011)

49. S. Tenneti, R. Garg, and S. Subramaniam, "Quantification of gas-phase velocity fluctuations in statistically homogeneous gas-solid flow using particle-resolved direct numerical simulation," at the AIChE *2011 Annual Meeting*, Minneapolis, MN (2011)

50. S. Subramaniam, "Multiphase flow physics from direct simulation for model development," *2011 Workshop on Multiphase Flow,* National Energy Technology Laboratory, Pittsburgh, PA (2011)

51. R. Kolakaluri, R. O. Fox, and S. Subramaniam, "A model for efficiency of granular filtration based on granule-resolved direct numerical simulation of particle trapping," Multiphase Flow Science Workshop, Pittsburgh, PA (2010)

52. R. Garg, B. Sun, S. Tenneti, and S. Subramaniam, "Improved correlations for gas-solid heat transfer using particle-resolved direct numerical simulation," Multiphase Flow Science Workshop, Pittsburgh, PA (2010)

53. E. Murphy, R. Kolakaluri, and S. Subramaniam, "A model of the granular filtration of polydisperse particles," 47th Annual Technical Meeting, Society of Engineering Science, Ames, IA (2010)

54. V. Vidyapati and S. Subramaniam, "Refined order parameter model and its performance in homogenous shear flows," 47th Annual Technical Meeting, Society of Engineering Science, Ames, IA (2010)

55. S. Subramaniam, "Fluctuations in number and volume fraction in granular and multiphase flows: implications for theory and modeling," International Conference on Multiphase Flow, Tampa, FL (2010)

56. S. Tenneti, R. O. Fox, and S. Subramaniam, "Instantaneous particle acceleration model for gas-solid systems at moderate Reynolds numbers," International Conference on Multiphase Flow, Tampa, FL (2010)

57. S. Subramaniam, "Particle-Resolved Simulation of Turbulence Modification by Particle Clusters" at the ASME-Fluids Engineering Division Summer Meeting, Montreal, Canada (2010)

58. Z. Qin, R. H. Pletcher, R. O. Fox, and S. Subramaniam, "A flow intensification model for granular filter applications," 62nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Minneapolis, MN (2009)

59. S. Tenneti, R. Garg, C. M. Hrenya, R. O. Fox, and S. Subramaniam, "Particle acceleration model for gas--solid suspensions at moderate Reynolds numbers," 62nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Minneapolis, MN (2009)

60. S. Markutsya, R. O. Fox, R. D. Vigil, and S. Subramaniam, "Understanding the structural properties of clusters in sheared aggregating systems using Brownian dynamics simulation," 62nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Minneapolis, MN (2009)

61. V. Vidyapati, M. K. Langrudi, G. Tardos, J. Sun, S. Sundaresan, and S. Subramaniam, "DEM simulation of granular flow in a Couette device," 62nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Minneapolis, MN (2009)

62. S. Subramaniam, , "Fluctuations in number and volume fraction in granular and multiphase flows: implications for theory and modeling," 62nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Minneapolis, MN (2009)

63. S. Tenneti, R. Garg, R. O. Fox and S. Subramaniam, "Effect of hydrodynamic forces on particle velocity fluctuations in suspensions at moderate Reynolds number," 61st

Annual Meeting, Division of Fluid Dynamics, American Physical Society, San Antonio, TX (2008)

64. R. Garg, S. Tenneti, M. G. Pai and S. Subramaniam, "Heat transfer in ordered and random arrays of spheres at low Reynolds number," 61st Annual Meeting, Division of Fluid Dynamics, American Physical Society, San Antonio, TX (2008)

65. S. Markutsya, S. Subramaniam, and R. O. Fox, "Improved potential of mean force for Brownian dynamics simulation of nanoparticle aggregation," 61st Annual Meeting, Division of Fluid Dynamics, American Physical Society, San Antonio, TX (2008)

66. R. Garg, A. Passalacqua, S. Subramaniam, and R. O. Fox, "Comparison of Euler-Euler and Euler-Lagrange simulations of finite-Stokes-numbers gas-particle flows in a lid-driven cavity", AIChE Annual Meeting, November 16th – 21st, Philadelphia, PA, 2008

67. W. Wang, S. Subramaniam, R. H. Pletcher, Y. Xu, R. Garg and M. G. Pai, "A priori test of particle clustering effect on subgrid modeling", *60th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Salt Lake City, UT (2007)

68. M. G. Pai and S. Subramaniam, "Second-order transport due to fluctuations in clustering particle systems", *60th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Salt Lake City, UT (2007)

69. R. Garg and S. Subramaniam, "Accurate Spray Simulations using the Lagrangian-Eulerian Method", *ILASS Americas 20th Annual Conference on Liquid Atomization and Spray Systems*, Chicago, IL (2007)

70. M. G. Pai, R. Garg and S. Subramaniam, "Relative Acceleration of Particle Pairs in Flows past Random Arrays of Spheres", *59th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Tampa, FL (2006)

71. Y. Xu, M. G. Pai, and S. Subramaniam, "The Effects of Upstream Turbulence on Flow through Random Arrangements of Spheres", *59th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Tampa, FL (2006)

72. J. Sun, F. Battaglia and S. Subramaniam, "Minimum Spanning Tree Analysis of Force Networks in Granular Media", *59th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Tampa, FL (2006)

73. J. Sun, F. Battaglia, S. Subramaniam, "Hybrid Two-Fluid DEM Simulation of Gas-Solid Fluidized Beds", *2006 ASME International Mechanical Engineering Congress and Exposition, IMECE2006 - Fluids Engineering Division,* Chicago, IL (2006)

74. S. Markutsya, S. Subramaniam, R. O. Fox and R. D. Vigil, "Using Brownian Dynamics to Model Nanoparticle Aggregation under Shear", *AICHE 2006 Annual Meeting*, San Francisco, CA (2006)

75. J. B. Lechman, G. S. Grest, G. M. Pai and S. Subramaniam, "Feasibility of a Coupled Discrete-Time Immersed Boundary-Discrete Element Method for Numerical Simulation of Granular Multiphase Flow", *AICHE 2006 Annual Meeting*, San Francisco, CA (2006)

76. R. Garg, C. Narayanan, D. Lakehal and S. Subramaniam, "Development of a Consistent Lagrangian-Eulerian Approach for Particle-Laden Flows", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

77. Y. Xu and S. Subramaniam, "Consistent Modeling of Interphase Turbulent Kinetic Energy Transfer in Particle-Laden Flows", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

78. G. M. Pai and S. Subramaniam, "A New Dual-Timescale Langevin Model for Particle-Laden Turbulent Flows", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

79. S. Markutsya, S. Subramaniam, M. H. Lamm, D. Vigil, and R. O. Fox, "Assessing the Applicability of Brownian Dynamics to Simulation of Nanoparticle Clustering in Liquid Suspensions", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

80. S. Subramaniam, "The Role of Particle-Fluid Velocity Correlation in Single-Point Statistical Closures of Dispersed Turbulent Two-Phase Flows", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

81. J. Sun, F. Battaglia and S. Subramaniam, "Analysis of Microstructures in a Brazil Nut Problem", *58th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Chicago, IL (2005)

82. G. M. Pai and S. Subramaniam, "A New Coupled Langevin Model for Dilute Droplet-Laden Turbulent Flows", *ILASS Americas 18th Annual Conference on Liquid Atomization and Spray Systems*, Irvine, CA (2005)

83. Y. Xu and S. Subramaniam, "An Improved Multiscale Model for Dilute Turbulent Gas-Particle Flows based on the Equilibration of Energy Concept", *ASME Fluids Engineering Division Summer Conference 2005,* Houston, TX (2005)

84. D. Gao, R. Fan, S. Subramaniam, R. O. Fox, D. K. Hoffman, "Momentum Transfer between Polydisperse Particles in Granular Flow", *ASME International Mechanical Engineering Congress & Exposition IMECE 2004,* Anaheim, CA (2004)

85. G. M. Pai and S. Subramaniam, "Analysis of Turbulence Models in Lagrangian-Eulerian Spray Computations", *ILASS Americas 17th Annual Conference on Liquid Atomization and Spray Systems*, Washington, DC (2004)

86. S. Subramaniam and D. Gao, "Objective Decomposition of the Stress Tensor in Granular Flows", *57th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Seattle, WA (2004)

87. G. M. Pai and S. Subramaniam, "Analysis of turbulence models in Lagrangian-Eulerian spray computations", *ILASS Americas 17ᵗʰ Annual Conference on Liquid Atomization and Spray Systems*, Washington, DC (2004)

88. S. Subramaniam, "Annual Progress Report on Granular Flow and Kinetics Project", *DOE Center for Synthesis and Processing Annual Review Meeting*, Germantown, MD (2003)

89. S. Subramaniam, "Mathematical Models of Turbulent Multiphase Flow", *Mathematics Department Seminar*, Iowa State University, Ames, IA (2003)

90. S. Subramaniam, "Modeling Turbulent Two-Phase Flows", *16ᵗʰ Annual Conference on Liquid Atomization and Spray Systems*, Monterey, CA (2003)

91. G. M. Pai and S. Subramaniam, "Accurate Numerical Solution of Spray Vaporization Models using Particle Methods", *ILASS Americas 16th Annual Conference on Liquid Atomization and Spray Systems*, Monterey, CA (2003)

92. S. Subramaniam, "Developing Consistent Models for Two-Phase Flows", *Multiphase Fluid Dynamics Research Consortium (MFDRC) Meeting*, Baltimore, MD (2002)

93. S. Subramaniam, "Properly Constrained Interphase Momentum Transfer Models for Constant-Density Two-Phase Flow: Resolution of the Ill-posedness issue in Canonical Problems", *15th Annual Conference on Liquid Atomization and Spray Systems*, Madison, WI (2002)

94. S. Subramaniam, "Properly Constrained Interphase Momentum Transfer Models for Constant-Density Two-Phase Flow: Resolution of the Ill-posedness issue in Canonical Problems", *ILASS Americas 15th Annual Conference on Liquid Atomization and Spray Systems*, Madison, WI (2002)

95. S. Subramaniam, "Relationship between Lagrangian Statistical Spray Models and Eulerian Statistical Models of Two-phase Flow", *14th Annual Conference on Liquid Atomization and Spray Systems*, Dearborn, MI (2001)

96. S. Subramaniam, "Relationship between Lagrangian Statistical Spray Models and Eulerian Statistical Models of Two-phase Flow", *ILASS Americas 14th Annual Conference on Liquid Atomization and Spray Systems*, Dearborn, MI (2001)

97. S. Subramaniam, "Eulerian and Lagrangian Statistical Representations of Multiphase Flow", *Fourth International Conference on Multiphase Flow*, New Orleans, LA (2001)

98. S. Subramaniam, "A Test Problem to Validate Statistical Models of Vaporizing Sprays", *SIAM Eighth International Conference on Numerical Combustion*, Amelia Island, FL (2000)

99. S. Subramaniam, "Statistical Representations of Multiphase Flow", *53rd Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Washington, DC (2000)

100. S. Subramaniam, "A Vaporization Model Problem to Validate Statistical Models of Sprays", *Eighth International Conference on Liquid Atomization and Sprays*, Pasadena, CA (2000)

101. S. Subramaniam, "A Test Problem to Validate Statistical Models of Vaporizing Sprays", *SIAM Eighth International Conference on Numerical Combustion*, Amelia Island, FL (2000)

102. S. Subramaniam, "Statistical Representation and Modeling of Multiphase Flows", *Fluids Seminar*, Mechanical and Aerospace Engineering Department, Rutgers University, Piscataway, NJ (2000)

103. S. Subramaniam, "The Validity of Multiphase DNS Initialized on the Basis of Single-Point Statistics", *52nd Annual Meeting, Division of Fluid Dynamics, American Physical Society*, New Orleans, LA (1999)

104. S. Subramaniam, "A Spectral Model for Primary Breakup of Round Turbulent Jets", *ILASS Americas 12th Annual Conference on Liquid Atomization and Spray Systems*, Indianapolis, IN, (1999)

105. S. Subramaniam and P. J. O'Rourke, "The KIVA Stochastic Spray Model: Convergence Issues and Implications for Modeling", *International Multidimensional Engine Modeling User's Group Meeting*, Detroit, MI (1999)

106. S. Subramaniam, "A Spectral Model for Primary Breakup of Round Turbulent Jets", *ILASS Americas 12th Annual Conference on Liquid Atomization and Spray Systems*, Indianapolis, IN, (1999)

107. S. Subramaniam, "Progress on a Spectral Model for Primary Breakup of Round Turbulent Jets", *51st Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Philadelphia, PA (1998)

108. S. Subramaniam, "Preliminary Computations of Diesel Sprays: Convergence Issues and Implications for Modeling", *Diesel CRADA Review Meeting*, Livermore, CA (1998)

109. S. Subramaniam, "Minimum Error Diagonal Approximation to Mass Diffusion Equations in Multicomponent Gas Mixtures", *50th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, San Francisco, CA (1997)

110. S. Subramaniam and D. C. Haworth, "Estimation of Mean Fields in Hybrid Particle/Finite Volume Methods on Unstructured Three–Dimensional Deforming Meshes", *49th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Syracuse, NY (1996)

111. S. Subramaniam and S. B. Pope, "The Euclidean Minimum Spanning Tree (EMST) Model for Scalar Mixing in the PDF Approach to Turbulent Combustion", *SIAM Sixth International Conference on Numerical Combustion*, New Orleans, LA (1996)

112. S. Subramaniam and S. B. Pope, "Limitations of the Amplitude Mapping Closure", *45th Annual Meeting, Division of Fluid Dynamics, American Physical Society*, Tallahassee, FL (1992)

113. M. Mehrabadi and S. Subramaniam, "On the segregation of particle size classes in bidisperse gas-solid flow: dependence on gas-solid drag and influence on interphase energy transfer dynamics," *Poster at International Conference on Multiphase Flow,* Florence, Italy, 2016

114. E. Murphy, G. Lomboy, S. Sundararajan, K. Wang, S. Subramaniam, "Exploring the rheological behaviour of athermal suspensions of attractive microparticles," *International Conference on Multiphase Flow,* Florence, Italy, 2016

115. S. Subramaniam, M. Mehrabadi, J. Horwitz, A. Mani, "Developing improved Lagrangian point particle models of gas-solid flow from particle-resolved direct numerical simulation", *Proceedings of the Center for Turbulence Research 2014 Summer Program*, Stanford, CA (2014).

116. M. Ramezani, S. Subramaniam, and M. G. Olsen. "Investigation of Pseudo Turbulent Scalar Transport in Two Phase Fluid Flow and Passive Scalar Mixing Using Simultaneous SPIV/PLIF." In *ASME 2014 4th Joint US-European Fluids Engineering Division Summer Meeting collocated with the ASME 2014 12th International Conference on Nanochannels, Microchannels, and Minichannels*, pp. V01BT22A008-V01BT22A008. American Society of Mechanical Engineers, 2014.

117. S. Sundararajan, T. J. Heindel, B. Ganapathysubramanian, and S. Subramaniam, "Women in Mechanical Engineering: A departmental effort to improve recruitment, retention, and engagement of women students," ASEE Annual Conference and Exposition, San Antonio TX, June 10-13 (2012)

118. S. Subramaniam and M. G. Pai, "Transport due to fluctuations in granular systems and its implication for continuum modeling," 17th International Conference on the Discrete Simulation of Fluid Dynamics, Florianópolis, Brazil, August, 4-8 (2008)

119. S. Subramaniam, and S. Markutsya, "Modeling and simulation of nanoparticle aggregation in liquid suspensions," 17th International Conference on the Discrete Simulation of Fluid Dynamics, Florianópolis, Brazil, August, 4-8 (2008)

VII. FUNDING HISTORY

Agency	Amount	Title; Dates
NSF	$678,526	Collaborative Research: CDS&E: Advances in closure modeling for turbulent flows with finite-sized particles informed by massive simulations on heterogeneous architectures; 2020-2023
AbbVie Inc.	$200,000	CoMFRE Membership Fee, 2018-2022
NSF	$581,689	Collaborative Research: Bridging the gap between particle-scale thermal transport and device-scale predictions, 2019-2022
NSWC	$150,000	On-command Pyrotechnic Light Emission through Controlled Electromagnetic Irradiation; 2019-2020
DOE	$1,070,054	An open-source framework for the computational analysis and design of autothermal chemical processes; 2018-2021
AFRL	$52,619	Compressible multiphase flow model development; 2017-2018
NSF	$678,214	MRI Acquisition: Computing for Sustainability; 2017-2019
CoE	$150,000	A strategic research thrust in *Multiphase Flow Research* enabled by a Center for Multiphase Flow Research (CoMFRe); 2015-2017
NSF	$338,465	Investigation of the lift and virtual mass force in gas-liquid flows with particle-resolved direct numerical simulation; 2014-2017
NSF	$260,000	Predictive Computational Tools for Biomass Fast Pyrolysis in Fluidized Bed Reactors using Particle-Resolved Direct Numerical Simulation of Reacting Gas-Solid Flow; 2013-2016
NSF	$250,499	Stability Limits for Gas-Solid Suspensions with Finite Fluid Inertia using Particle-Resolved Direct Numerical Simulations; 2011-2014
DOE	$200,000	Development of a Two-fluid Drag Law for Clustered Particles Using Direct Numerical Simulation and Validation through Experiments; 2011-2014
NSF	$349,999	Multiphase Models for CO_2 Cleanup: Heat and Mass Transfer in Fluid-Particle Suspensions through Direct Numerical Simulation and Laser-Based Measurements; 2010-2013
NSF	$300,000	Understanding Rheology Of Cement-Based Materials Through Intergrated Experiments And Computations At Multiple Scales; 2009-2012
DOE	$2,100,000	A Systems Approach to Bio-Oil Stabilization; 2008-2010
DOE	$470,000	Kinetic Theory of Multiphase Flow; 2007-2011
AFOSR	$7,500,000	MURI: Rotorcraft Brownout: Advanced Understanding; 2008-2013 (withdrew in 2009)
DOE	$1,594,175	Development, Verification and Validation of Multiphase Models for Polydisperse Flows; 2007-2010
DOE	$600,000	Rheological Behavior of Dense Assemblies of Granular Materials; 2007-2010
DOE	$395,000	Granular Flow and Kinetics; 2002-2007
DOE	$541,800	Kinetic Theory of Multiphase Flow; 2002-2007
NSF	$1,004,984	NIRT: Multi-Scale Simulation of Nanoparticle Aggregation for Scale Up of High-Rate Synthesis Methods; 2004-2007

Agency	Amount	Title; Dates
ISU-SPRIG	$16,000	Modeling Processes in Nanoscale Manufacturing: A Combined Numerical and Experimental Study of Nanoparticle Dispersion in Complex Flows; Jan-Dec 2003
DOE	$277,998	*Early Career Principal Investigatory Program*: Developing New Mathematical Models for Multiphase Flows based on a Fundamental Probability Density Function Approach; 2003-2006
NASA	$30,000	Analytical/Numerical Modeling of Fluid Phenomena created by High Intensity Sound; July-Dec 2003

VIII. GRADUATE STUDENT & POSTDOCTORAL SCHOLAR SUPERVISION

Ph.D. Students

Name	Date	Thesis Title
Vahid Tavanashad	2020	Analysis of dispersed multiphase flow using fully-resolved direct numerical simulation: flow physics and modeling
Eric Murphy	2017	Analysis and Modeling of Structure Formation in Granular and Fluid-Solid Flows
Bo Sun	2016	Modeling heat and mass transfer in reacting gas–solid flow using particle-resolved direct numerical simulation
Mohammad Mehrabadi	2016	Analysis of Gas-Solid Flow Using Particle-Resolved Direct Numerical Simulation: Flow Physics and Modeling
Ravi Kolakaluri	2013	Direct Numerical Simulations and Analytical Modeling of Granular Filtration
Sudheer Tenneti	2012	Momentum, energy and scalar transport in polydisperse gas–solid flows using particle–resolved direct numerical simulations
Vidyapati	2012	Constitutive modeling of dense granular flow based on discrete element method simulations
Sergiy Markutsya	2010	Modeling and simulation of nanoparticle aggregation in colloidal systems
Rahul Garg	2009	Modeling and Simulation of Two-Phase Flows
Ying Xu	2008	Modeling and Direct Numerical Simulation of Particle-laden Turbulent Flows
Gurpura Madhusudan Pai	2007	Probability density function formalism for multiphase flows
Jin Sun	2007	Multiscale modeling of segregation in granular flows

MS Students

Name	Date	Thesis Title
Mohammad Mehrabadi	2012	Fluid-phase velocity fluctuations in gas-solid flow
Christopher Schmitz	2011	A turbulence-based model for the primary breakup of pressure atomized liquid jets
Vidyapati	2010	Discrete element simulations and constitutive modeling of dense granular flows
Sergiy Markutsya	2006	Implementation of Brownian dynamics for modeling aggregation in colloidal systems
Ying Xu	2008	An Improved Multiscale Model for Dilute Turbulent Gas-Particle Flows based on the Equilibration of Energy Concept

Post-doctoral Scholars:

1. Dr. George Qin, 2008-2010.
2. Dr. Donghong Gao, July 2003-July 2004.

IX. UNDERGRADUATE RESEARCH SUPERVISION

Name	Dates
Jakob Courbat	2020, 2021
Sam Laneman	2020
Kyle Trom	2019
Fei-Shyuan Lim	2018
Ryan Byrnes	2017
Danny Lee	2017
Evan Foley	2015
Jeremiah Curley	2014
Jianqiu Huang	2014
Andres Paredes Morejon	2013
Gary Hedgcoxe	2012
Nasif Kayanja	2012
Eric Murphy	2008, 2009
Dustin Bremner	2008
Jeff Boger	2008
Brian Langstraat (Science Undergraduate Laboratory Intern through Ames Lab)	2006
Sam Stineman	2004
Kenny Kopecky	2004
Nathan Delzell	2003
Carol Aplin	2003, 2004
Cassandra Jo Reichter	2002

X. COURSE TEACHING

Rutgers

Undergraduate:
        Thermodynamics
        Heat Transfer
Graduate:
        Conduction Heat Transfer
        Multiphase Flow

Iowa State

Term	Course number	Course Title	Credits	Lab
Fall 2021	ME 335	Fluid Flow	4	Yes
Spring 2021	ME 335	Fluid Flow	4	Yes
Fall 2020	ME 335	Fluid Flow	4	Yes
Spring 2020	ME 436	Heat Transfer	4	Yes
Spring 2020	ME 632	Multiphase Flow	3	No
Fall 2019	ME 335	Fluid Flow	4	Yes
Spring 2019	ME 335	Fluid Flow	4	Yes
Fall 2018	ME 436	Heat Transfer	4	Yes
Spring 2018	ME 436	Heat Transfer	4	Yes
Spring 2017	ME 632	Multiphase Flow	3	No
Fall 2016	ME 335	Fluid Flow	4	Yes
Spring 2015	ME 436	Heat Transfer	4	Yes
Spring 2015	ME 632	Multiphase Flow	3	No
Fall 2013	ME 335	Fluid Flow	4	Yes
Spring 2013	ME 632	Multiphase Flow	3	No
Fall 2012	ME 436	Heat Transfer	4	Yes
Fall 2011	ME 335	Fluid Flow	4	Yes
Spring 2011	ME 632	Multiphase Flow	3	No
Fall 2010	ME 436	Heat Transfer	4	Yes
Spring 2009	ME 632	Multiphase Flow	3	No
Spring 2008	ME 335	Fluid Flow	4	Yes
Spring 2008	ME 690O	Multiscale Simulation of Complex Flow	3	No
Spring 2007	ME 632	Multiphase Flow	3	No
Spring 2007	ME 436	Heat Transfer	4	Yes
Fall 2005	ME 270	Introduction to Mechanical Engineering Design	3	Yes
Fall 2005	ME 335	Fluid Flow	4	Yes

Spring 2005	ME 335	Fluid Flow	4	Yes
Spring 2005	ME 335	Fluid Flow	4	Yes
Fall 2004	ME 538	Advanced Fluid Flow	3	Yes
Fall 2003	ME 335	Fluid Flow	4	Yes
Fall 2003	ME 335	Fluid Flow	4	Yes
Fall 2002	ME 335	Fluid Flow	4	Yes
Fall 2002	ME 335	Fluid Flow	4	Yes

XI. PROFESSIONAL SERVICE

    a.   Editorial and Review Service for Manuscripts

- Editorial Advisory Board Member: *International Journal of Multiphase* Flow, 2017-present

- Editorial Board Member: *International Journal of Spray and Combustion Dynamics*: 2008-2016

- Editorial Board Member: *Atomization and Sprays,* April 2004-2008

Reviewing Activities:

Journals

- Acta Mechanica
- Aerosol Science and Technology
- AIAA Journal
- AICHE Journal
- ASME Journal of Fluids Engineering
- ASME VVUQ
- Atomization and Sprays
- Chemical Engineering Journal
- Chemical Engineering Science
- Combustion and Flame
- Combustion Science and Technology
- Communications in Computational Physics
- Computers and Chemical Engineering
- Current Opinion in Chemical Engineering
- Energy and Fuels
- Enhanced Heat Transfer
- International Combustion Symposium
- International Journal of Multiphase Flow
- International Conference on Multiphase Flow
- Journal of Computational Physics
- Journal of Fluid Mechanics
- Langmuir

- o Particuology
- o Physics of Fluids
- o Physical Review Fluids
- o Powder Technology
- o Theoretical and Computational Fluid Dynamics

b. Service to Professional Societies

- Symposium Organizer, *Society for Engineering Science*, Annual Meetings 2010 and 2011

- Technical Program Chair, Institute for Liquid Atomization and Spray Systems (ILASS Americas), 2005-present

- Co-Chair, Technical Committee on Computational Modeling, Institute for Liquid Atomization and Spray Systems (ILASS Americas), 2002-2005

- Chair, Honors and Awards Committee, Institute for Liquid Atomization and Spray Systems (ILASS Americas), 2002-2005

- Organizer, Second Workshop on Granular Flow and Kinetics, Argonne National Laboratory, 2004

- Session Chair, American Physical Society-Division of Fluid Dynamics (1997, 2013, 2018)

- Session Chair for Institute of Liquid Atomization and Spray Systems (ILASS Americas) (8 times)

c. Government, Educational, or Corporate Advisory Committees

1. Member, Technical Advisory Board of the *Modeling & Simulation* Subcommittee of the RAPID (Rapid Advancement in Process Intensification Deployment) Institute, the 10th Department of Energy Manufacturing USA Institute, 2017-2019

2. Participant and Report Contributor, US Department of Energy, Office of Fossil Energy, National Energy Technology Laboratory's Workshop on Multiphase Flow, 2006

XII. ACADEMIC COMMITTEES

A. University-Level Service

1. Preparing Future Faculty Mentor for Joseph D. Miller (2010), Varun Vikas (2011-2012)
2. Organized *Workshop on Complex Fluid Systems*, Oct 2009

3. Organizer, *Impact Academy 2007*, Summer 2007
4. Panelist for *Preparing Future Faculty* Program, February 2004, October 2006
5. Faculty Mentor for *Engineering Leadership Program*, 2006

B. College-Level Service

1. College Honors and Awards Committee (2005-2006)

C. Department-Level Service

1. Developed the *Faculty Forum:* a mentoring activity for tenure-track faculty (2014)
2. Senior Leadership Committee (2014)
3. Departmental Chair Evaluation Committee (2014)
4. Program Director for Complex Fluid Systems Research Program (2014)
5. Faculty Search Committee (Chair), (2011-2012)
6. Song Zhang 3rd Year Reappointment Review Committee (Chair), (2010)
7. Faculty Search Committee (Chair), (2008-2009)
8. Faculty Coordinator, Women in Mechanical Engineering Program, (2008- April 2009)
9. Member P&T Committee for Eliot Winer, (2009)
10. Program Director for Complex Fluid Systems Research Program: Organized Workshop in Oct 2009
11. Chair's Faculty Roundtable Participant, (2008-2009)
12. Reorganized ME computational group efforts under the new *Center for Computational Thermo-Fluids Research,* (2008-2009)
13. Course Development Committees for ME 436 (Heat Transfer), (2007-2014)
14. Course Development Committee for ME 335 (Fluid Mechanics) (2003-2013)
15. Course Development Committee for ME 270 (Introduction to Mechanical Design) (2005-2006)
16. ME Computing Committee (2006-2007)
17. Organized ME Departmental Seminar (2004-2005)
18. ME Graduate Program Committee (2003-2005)
19. ME Governance Document Committee (2003-2005)

XIII. PROFESSIONAL SOCIETIES

American Physical Society – Division of Fluid Dynamics (APS-DFD)
American Society of Mechanical Engineers (ASME)
American Institute of Chemical Engineers (AIChE)
Institute for Liquid Atomization and Spray Systems (ILASS)