

# Kausik Sarkar

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## Education

**Ph.D. (1994)** in Mechanical Engineering, The Johns Hopkins University, Baltimore  
Thesis: “Effective Boundary Conditions for Rough Surfaces and Acoustics of Oceanic Bubbles”

**M.S. (1990)** in Mechanical Engineering, The Johns Hopkins University, Baltimore  
Thesis: “A Numerical Study of the Ginzburg-Landau Equation in Thermo-capillary Flow”

**B.Tech. (1988)** Indian Institute of Technology, Kharagpur, India  
Thesis: “Concepts of Ship-Propeller Design by Lifting Line and Lifting Surface Theory” and “Design of a Container Ship”

## Professional Experience

2013-            Professor of Mechanical and Aerospace Engineering, George Washington University  
2011-2013      Associate Professor of Mechanical and Aerospace Engineering, George Washington University  
2007-2011      Associate Professor of Mechanical Engineering, University of Delaware  
2001-2007      Assistant Professor of Mechanical Engineering, University of Delaware  
1997-2001      Post-doctoral Research Associate, University of Illinois at Urbana Champaign  
1994-1997      Research Scientist, Dynaflo Inc., Maryland  
1988-1994      Research Assistant, Johns Hopkins University

## Awards and Honors

2019            **1<sup>st</sup> prize** in Graduate poster presentation in 2019 GW Research Day to student (Jenna Osborn)  
2018            **1<sup>st</sup> prize** in Graduate poster presentation in 2018 GW Research Day to student (Nima Mobadersany)  
2018            **2<sup>nd</sup> prize** in Graduate poster presentation in 2018 GW Research Day to student (Jenna Osborn)  
2018            **Michael K. Myers Engineering Scholarship** to student (Jenna Osborn)  
2018            **Accelerated GW I-Corp award** in 2018 SEAS R&D Showcase to student (Mitra Aliabouzar)  
2018            **Runner-up prize** in Theoretical poster presentation in 2018 SEAS R&D Showcase to student (Nima Mobadersany)  
2017            **ARCS Fellowship** to student (Jenna Osborn)  
2017            **2017 SEAS Distinguished Researcher Award** of School of Engineering and Applied Science, George Washington University  
2017            **1<sup>st</sup> prize** in Theoretical poster presentation in 2017 SEAS R&D Showcase to student (Nima Mobadersany)  
2017            **Innovation & Entrepreneurship Prize** in 2017 GW Research Day (Jenna Osborn and Mitra Aliabouzar)  
2017            **2<sup>nd</sup> prize** in Graduate poster presentation in 2017 GW Research Day (Jenna Osborn and Mitra Aliabouzar)  
2016            **Fellow of the *American Society of Mechanical Engineers (ASME)***

- Citation:** “Professor Sarkar has made fundamental contributions to flows with bubbles and droplets, over the last twenty years. His creative analysis includes studies of the effects of viscoelasticity, emulsion rheology, normal stress differences, wall-induced migration, and modeling of encapsulated contrast microbubbles for ultrasound imaging. His results have led to fundamental new understanding and help define the current state of the art. Professor Sarkar is an active member of his professional community, and has served ASME in a number of ways, most recently as an associate editor of the Journal of Fluids Engineering.”
- 2016 **1<sup>st</sup> prize in Entrepreneurship Award** for poster presentation in 2016 SEAS R&D Showcase to student (Krishna Kumar and Mitra Aliabouzar)
- 2016 **2<sup>nd</sup> prize** in Graduate poster presentation in 2016 GW Research Day to students (Krishna Kumar and Mitra Aliabouzar)
- 2015 **Fellow of the *American Institute of Medical and Biological Engineers (AIMBE)***  
**Citation:** “For outstanding contributions to the physics of ultrasound contrast agents and dynamics of biological cells”
- 2015 **2<sup>nd</sup> prize** in Graduate poster presentation in 2015 GW Research Day to student (Nima Mobadersany)
- 2015 **3<sup>rd</sup> prize** in Theoretical poster presentation in 2015 SEAS R&D Showcase to student (Nima Mobadersany)
- 2014 **Runner-up prize in Entrepreneurship Award** for poster presentation in 2014 SEAS R&D Showcase students (Nima Mobadersany and Krishna Nandan Kumar)
- 2014 **Fellow of the *American Physical Society (APS)***  
**Citation:** “For fundamental contributions and creative analysis of flows with droplets - effects of viscoelasticity, emulsion rheology, normal stress differences, wall-induced migration, and modeling of encapsulated contrast microbubbles for ultrasound imaging”
- 2013 **Fellow of the *Acoustical Society of America (ASA)***  
**Citation:** “For contributions to modeling of ultrasound microbubbles”
- 2013 **Allan P Colburn award for best dissertation in Engineering and Mathematical Sciences** in University of Delaware to student (Amit Katiyar)
- 2012 Nominated for University of Delaware Excellence in Graduate Mentoring Award
- 2012 University of Delaware Graduate Fellow Award to student (Rajesh Singh)
- 2011 Marquis Who’s Who in Medicine and Healthcare
- 2010 University of Delaware Graduate Fellow Award to student (Amit Katiyar)
- 2009 Elisha Conover endowed fellowship of University of Delaware for a student (Rajesh Singh) studying Fluid Dynamics
- 2009 **Andreas Acrivos Dissertation Award in Fluid Dynamics from American Physical Society** to student (Xiaoyi Li)
- 2007 **Allan P Colburn award for best dissertation in Engineering and Mathematical Sciences** in University of Delaware to student (Xiaoyi Li)
- 2006 University of Delaware Graduate Fellow Award to student (Xiaoyi Li)
- 2007 Nominated for University of Delaware Excellence in Teaching Award
- 2007 Marquis Who’s Who in America
- 2006 Marquis Who’s Who in America

### Editorial Services

- 2018- Editorial Board Pharmaceutical Frontiers  
2015- Associate Editor ASME Journal of Fluids Engineering

### Research Accomplishments

My research, supported primarily by NSF (7 Single PI 3-year awards), NIH (1 R01, 2 R21 and 1 INBRE awards) and DOD [total over 6 million external funding, 3 million as PI] made notable contributions (1 book and 69 journal articles) in three areas:

- 1) **Computational fluid dynamics of multi-phase flows:** We developed new computational techniques for the simulation of emulsions of viscous and viscoelastic drops, capsules and biological cells. We discovered several novel phenomena such as reversal of signs of normal stress differences of emulsions in presence of inertia and effects of shear waves on viscoelastic drop deformation. Most recently, we have elucidated the mechanism of deformation induced lateral migration of drops and blood cells. It provides rational explanations for important blood flow phenomena such as presence of a cell free layer near a blood vessel, Lindquist-Fahraeus effects and margination of leukocytes. Student Xiaoyi Li won **2009 Acrivos award for best dissertation in Fluid Dynamics from American Physical Society**. He also won **2007 Allan P Colburn award for best dissertation in Engineering and Mathematical Sciences** at University of Delaware.
- 2) **Encapsulated bubbles dynamics used for ultrasound imaging and drug delivery:** We are the first to propose an interfacial rheology models for ultrasound contrast agents. It has since been accepted by the contrast agent community as the standard model for contrast agents garnering high citations for our articles. We developed a rigorous acoustical technique for characterization and used it to determine mechanical properties of a number of contrast agents. We have also been developing applications of the acoustic signature of these bubbles for diagnosis of portal hypertension and cancer. Student Amit Katiyar won the **2013 Allan P Colburn award for best dissertation in Engineering and Mathematical Sciences** at University of Delaware.
- 3) **Bioeffects of ultrasound and microbubbles for cancer therapy and tissue engineering:** This is our most recent venture. Initiated at UD, we demonstrated that proliferation of breast cancer cells decreases in presence of ultrasound stimulation. At GW, in collaboration with Grace Zhang, we have shown that ultrasound alone, and even more dramatically when assisted by microbubbles, can significantly enhance differentiation of mesenchymal stem cells into bone (osteogenesis) and cartilage (chondrogenesis) cells in 3D printed scaffolds.

Graduated 10 PhD and 4 MS students and currently supervising 5 PhD students. Students won multiple university and national awards: **2009 Andreas Acrivos dissertation award in Fluid Dynamics by the American Physical Society**, the most distinguished dissertation award in the field of fluid dynamics; **2007 and 2013 Allan P Colburn award for best dissertation in Engineering and Mathematical Sciences** in the University of Delaware. At GWU, in 5 years my students got **12 poster awards (5 awards in SEAS R&D Showcase, 7 awards in GW Research Day)**.

**Publications** (1 book, 75 journal articles, Google Scholar **h index 30** (citation 2613); Web of Science **h index 25** (citation 1695); All articles published since 2004 (from UD and GWU) are with students (undergraduates marked with \*\*)

#### Books

1. Li X, Sarkar K **2008** "Computational Study of Fluid Particles: Dynamics of Drops, Rheology of Emulsions, and Mechanics of Biological Cells," VDM Verlag, ISBN-10: 3639070089.

#### Patents

1. Aliabouzar M, Sarkar K, Zhang LG, **2017** "Enhanced chondrogenesis in the presence of microbubbles Microbubble and ultrasound," US Patent Application 15823064.

#### Peer-reviewed journal articles (undergraduates marked with \*\*)

1. Sarkar K **2019** "Dissolution of an encapsulated gas bubble: effects of encapsulation permeability on unsteady Epstein-Plesset model," in preparation.
2. Katiyar A, DasBanerjee M, Smakotinas M, Sarker KP, Sarkar K **2019** "Inhibition of human breast cancer cell proliferation by low intensity ultrasound stimulation," *Journal of Therapeutic Ultrasound*, in preparation.

3. Mobadersany N, Katiyar A, Sarkar K **2019** “Effects of ambient pressure on the subharmonic response from encapsulated microbubbles,” *Journal of the Acoustical Society of America*, in preparation.
4. Mukherjee S, Sarkar K **2019** “Shear induced migration of a viscous drop in a viscoelastic liquid near a wall at high viscosity ratio: reverse migration,” *Journal of Non-Newtonian Fluid Mechanics*, in preparation.
5. Osborn J, Pullan J, Froberg J, Shreffler J, Gange K, Molden T, Choi Y, Brooks A, Mallik S, Sarkar K **2019** “Echogenic exosomes as ultrasound contrast agents,” *Advanced Biosystems*, submitted.
6. Nowicki M, Zhu W, Sarkar K, Rao R, Zhang LG **2019** “3D printing multiphasic osteochondral tissue scaffolds with nano to micro features via PCL-based bioink,” *Bioprinting Journal*, accepted.
7. Minto J, Zhou X, Osborn J, Zhang LG, Sarkar K, Rao R **2019** “3D Printing: A Catalyst for a Changing Orthopaedic Landscape,” *Journal of Bone & Joint Surgery Review*, accepted.
8. Malipeddy AR, Sarkar K **2019** “Collective diffusivity in a sheared viscous emulsion: effects of viscosity ratio,” *Physical Review Fluids*, 4, 093603.
9. Singha S, Malipeddy AR, Zurita-Gotor M, Sarkar K, Shen K, Loewenberg M, Migler KB, Blawdziewicz J **2019** “Mechanisms of spontaneous chain formation and subsequent microstructural evolution in shear-driven strongly confined drop monolayers,” *Soft Matter*, 15, 4873-4889.
10. Mobadersany N, Sarkar K **2019** “Acoustic microstreaming near a plane wall due to a pulsating free or coated bubble: velocity, vorticity and closed streamlines,” *Journal of Fluid Mechanics*, 875 781-806.
11. Pullan J, Confeld M, Osborn J, Kim J, Sarkar K, Mallik S **2019** “Exosomes as drug carriers for cancer therapy,” *Molecular Pharmaceutics*, 16, 1789-1798.
12. Malipeddy RA, Sarkar K **2019** “Shear-induced collective diffusivity down a concentration gradient in a viscous emulsion,” *Journal of Fluid Mechanics*, 868, 5-25.
13. Aliabouzar M, Kumar KN, Sarkar K **2019** “Effects of size and boiling point of perfluorocarbon droplets on the frequency dependence of vaporization threshold,” *Journal of the Acoustical Society of America*, 145, 1105-1106.
14. Osborn J, Aliabouzar A, Zhou X, Rao R, Zhang LG, Sarkar K **2019** “Ultrasound and microbubbles enhance osteogenic differentiation of human mesenchymal stem cells on 3D printed scaffolds,” *Advanced Biosystems*, 2, 1800257.
15. Karandish F, Haldar MK, Xia L, Gange KN, Feng L, You S, Choi Y, Sarkar K, Mallik S **2018** “Nucleus-targeted, echogenic polymersomes for delivering a cancer stemness inhibitor to pancreatic cancer cells,” *Biomacromolecules*, 19,4122-4132.
16. Aliabouzar M, Zhang LG, Sarkar K **2018** “Acoustic characterization of 3D printed PEGDA scaffolds for tissue engineering applications,” *Biomedical Materials*, 13,055013.
17. Kulkarni P, Haldar MK, Karandish F, Confeld M, Hossain R, Borowicz P, Gange KN, Xia L, Sarkar K, Mallik S **2018** “Tissue-penetrating, hypoxia-responsive echogenic polymersomes for drug delivery to solid tumors,” *Chemistry A European Journal*, 24, 12490-12494.
18. Aliabouzar M, Kumar KN, Sarkar K **2018** “Acoustic vaporization threshold of lipid coated perfluoropentane droplets,” *Journal of the Acoustical Society of America*, 143, 2001-2012.
19. Aliabouzar M, Zhang LG, Sarkar K **2017** “Effects of scaffold microstructure and low intensity pulsed ultrasound on chondrogenic differentiation of human mesenchymal stem cells,” *Biotechnology & Bioengineering*, 115, 495-506.
20. Xia L, Karandish F, Kumar KN, Froberg J, Kulkarni P, Gange KN, Choi Y, Mallik S, Sarkar K **2017** “Acoustic characterization of echogenic polymersomes prepared from amphiphilic block copolymers,” *Ultrasound in Medicine and Biology*, 44, 447-457.

21. Kumar KN, Mallik S, Sarkar K **2017** "Role of freeze-drying in the presence of mannitol on the echogenicity of echogenic liposomes," *Journal of the Acoustical Society of America*, 142, 3670-3676.
22. Miao S, Castro NJ, Nowicki M, Xia L, Cui H, Zhou X, Zhu W, Lee S, Sarkar K, Vozzi G, Tabata Y, Fisher J, Zhang LG **2017** "4D printing of polymeric materials for tissue and organ regeneration," *Materials Today*, 20, 577-591.
23. Aliabouzar M, Zhang LG, Sarkar K **2016** "Lipid-coated microbubbles and low intensity pulsed ultrasound enhance chondrogenesis of human mesenchymal stem cells in 3D printed scaffolds," *Scientific Report*, 6, 37728.
24. Zhou X, Castro NJ, Zhu W, Cui H, Aliabouzar M, Sarkar K, Zhang LG **2016** "Improved bone marrow mesenchymal stem cell osteogenesis in 3D bioprinted tissue scaffolds with low intensity pulsed ultrasound stimulation," *Scientific Report*, 6, 32876.
25. Srivastava P, Malipeddi AR, Sarkar K **2016** "Steady shear rheology of a viscous emulsion in the presence of finite inertia at moderate volume fractions: sign reversal of normal stress differences," *Journal of Fluid Mechanics*, 85, 494-522.
26. Kumar KN, Sarkar K **2016** "Interfacial rheological properties of contrast microbubble Targestar P as a function of ambient pressure," *Ultrasound in Medicine and Biology*, 42, 1010-1017.
27. Singh R, Sarkar K **2015** "Hydrodynamic interactions between pairs of capsules and drops in a simple shear: effects of viscosity ratio and heterogeneous collision," *Physical Review E*, 92, 063029.
28. Lang X, Porter T, Sarkar K **2015** "Interpreting broadband attenuation measured at different excitation amplitudes to estimate strain-dependent interfacial rheological properties of the encapsulation of lipid-coated mono-disperse microbubbles," *Journal of the Acoustical Society of America*, 138, 3994-4003.
29. Kumar KN, Sarkar K **2015** "Effects of ambient hydrostatic pressure on the material properties of the encapsulation of an ultrasound contrast microbubble," *Journal of the Acoustical Society of America*, 138, 624-634.
30. Nahire R, Halder M, Paul S, Margoum A, Ambre AH, Katti KS, Gange KN, Srivastava D K, Sarkar K, Mallik S **2014** "pH-Triggered Echogenicity and Contents Release from Liposomes," *Molecular Pharmaceutics*, 11, 4059-4068.
31. Mukherjee S, Sarkar K **2014** "Lateral migration of a viscoelastic drop in a Newtonian fluid in a shear flow near a wall," *Physics of Fluids*, 26, 103102.
32. Nahire R, Hossain R, Patel R, Paul S, Ambre AH, Meghnani V, Layek B, Katti KS, Gange KN, Leclarc E, Srivastava D K, Sarkar K, Mallik S **2014** "Multifunctional polymersomes for cytosolic delivery of gemcitabine and doxorubicin to cancer cells," *Biomaterials*, 35, 6482-6497.
33. Katiyar A, Duncan R L, Sarkar K **2014** "Ultrasound stimulation increases proliferation of MC3T3-E1 preosteoblast-like cells," *Journal of Therapeutic Ultrasound*, 2, 1, 1-10.
34. Paul S, Nahire R, Mallik S, Sarkar K **2014** "Encapsulated microbubbles and echogenic liposomes for contrast ultrasound imaging and targeted drug delivery," *Computational Mechanics*, 53,413-435.
35. Singh R, Li X, Sarkar K **2014** "Lateral migration of an elastic capsule in a wall-bounded shear," *Journal of Fluid Mechanics*, 739, 421-443.
36. Mukherjee S, Sarkar K **2013** "Effects of matrix viscoelasticity on the lateral migration deformation of a deformable drop in a wall bounded shear," *Journal of Fluid Mechanics*, 727, 318-345.
37. Paul S, Russakow D\*\*, Rodger T, Sarkar K, Cochran M, Wheatley M **2013** "Determination of the interfacial rheological properties of a Poly(DL-Lactic Acid)-encapsulated contrast agent using *in vitro* attenuation and scattering," *Ultrasound in Medicine and Biology*, 39, 1277-1291.

38. Sarkar K, Singh R **2013** "Spatial ordering due to hydrodynamic interactions between a pair of colliding drops in a confined shear," *Physics of Fluids*, 25, 051702.
39. Nahire R, Halder M, Paul S, Margoum A, Ambre AH, Katti KS, Gange KN, Srivastava D K, Sarkar K, Mallik S **2013** "Polymer Coated Echogenic Lipid Nanoparticles with dual release triggers," *Biomacromolecules*, 14, 841-853.
40. Katiyar A, Sarkar K **2012** "Effects of encapsulation damping on excitation threshold for subharmonic generation from contrast microbubbles," *Journal of the Acoustical Society of America*, 132, 3576-3585.
41. Nahire R, Paul S, Scott M, Singh R, Muhonen W, Shabb J, Gange K, Srivastava D K, Sarkar K, Mallik S **2012** "Ultrasound enhanced matrix Metalloproteinase-9 Triggered Release of Contents from Echogenic Liposomes," *Molecular Pharmaceutics*, 9, 2554-2564.
42. Paul S, Russakow D\*\*, Nandy T, Nahire R, Ambre A H, Katti K, Mallik S, Sarkar K **2012** "In vitro attenuation and nonlinear scattering measurement from Echogenic liposomes," *Ultrasonics*, 52, 962-969.
43. Katiyar A, Sarkar K **2011** "Excitation threshold for subharmonic generation from contrast microbubbles," *Journal of the Acoustical Society of America*, 130, 3137-3147.
44. Singh R, Sarkar K **2011** "Inertial effects on the dynamics, streamline topology and inertial stresses due to a drop in shear," *Journal of Fluid Mechanics*, 683, 149-171.
45. Katiyar A, Sarkar K, Forsberg F **2011** "Modeling subharmonic response from contrast microbubbles as a function of ambient static pressure," *Journal of the Acoustical Society of America*, 129, 2325-2335.
46. Mukherjee S, Sarkar K **2011** "Viscoelastic drop falling through a viscous liquid," *Physics of Fluids*, 23, 013101.
47. Paul S, Katiyar A, Sarkar K, Chatterjee D, Shi WT, Forsberg F **2010** "Material Characterization of contrast microbubbles using a nonlinear interfacial elasticity model of the encapsulation," *Journal of the Acoustical Society of America*, 127, 3846-3857.
48. Katiyar A, Sarkar K, **2010** "Stability Analysis of an Encapsulated Microbubble against Gas Diffusion," *Journal of Colloid and Interface Science*, 343, 42-47.
49. Mukherjee S, Sarkar K **2010** "Effects of viscoelasticity on the retraction of a sheared drop," *Journal of Non-Newtonian Fluid Mechanics*, 165, 340-349.
50. Singh R, Sarkar K **2009** "Effects of viscosity ratio and three dimensional positioning on hydrodynamic interactions between two viscous drops in a shear flow at Finite Inertia," *Physics of Fluids*, 21, 103303.
51. Katiyar A, Sarkar K, Jain P, **2009** "Effects of encapsulation elasticity on the stability of an encapsulated microbubble," *Journal of Colloid and Interface Science*, 336, 519-525.
52. Olapade P, Singh R, Sarkar K **2009** "Pair-wise interactions between deformable drops in a shear at finite inertia," *Physics of Fluids*, 21, 063302.
53. Mukherjee S, Sarkar K **2009** "Effects of viscosity ratio on deformation of a viscoelastic drop in a Newtonian matrix under steady shear," *Journal of Non-Newtonian Fluid Mechanics*, 160, 104-112.
54. Sarkar K, Katiyar A, Jain P **2009** "Growth and dissolution of an encapsulated contrast microbubble," *Ultrasound in Medicine and Biology*, 35, 1385-1396.
55. Aggarwal N, Sarkar K **2008** "Effects of matrix viscoelasticity on viscous and viscoelastic drop deformation in a shear flow," *Journal of Fluid Mechanics*, 601, 63-84.

56. Li X, Sarkar K **2008** "Front-tracking simulation of a liquid capsule enclosed by an elastic membrane," *Journal of Computational Physics*, 227, 4998-5018.
57. Aggarwal, N, Sarkar K **2008** "Rheology of an emulsion of viscoelastic drops in steady shear," *Journal of Non-Newtonian Fluid Mechanics*, 150, 19-31.
58. Aggarwal N, Sarkar K **2007** "Deformation and breakup of a viscoelastic drop in a Newtonian matrix under steady shear," *Journal of Fluid Mechanics*, 584, 1-21.
59. Cao Q, Sarkar K, Prasad AK **2006** "Direct numerical simulation of three-layer viscosity-stratified flow," *The Canadian Journal of Chemical Engineering*, 84(5), 548-557.
60. Li X, Sarkar K **2006** "Drop deformation and breakup in a potential vortex," *Journal of Fluid Mechanics*, 564, 1-23.
61. Li X, Sarkar K **2005** "Negative normal stress elasticity of emulsion of viscous drops at finite inertia," *Physical Review Letters*, 95, 256001.
62. Li X, Sarkar K **2005** "Effects of inertia on the rheology of a dilute emulsion of viscous drops in steady shear," *Journal of Rheology*, 49, 1377-1394.
63. Chatterjee D, Sarkar K, Jain P **2005** "Ultrasound mediated destruction of contrast microbubbles used for medical imaging and drug delivery," *Physics of Fluids*, 17, 100603.
64. Sarkar K, Shi WT, Chatterjee D, Forsberg F **2005** "Characterization of ultrasound contrast microbubbles using *in vitro* experiments and viscoelastic models for encapsulation," *Journal of the Acoustical Society of America*, 118, 539-550.
65. Li X, Sarkar K **2005** "Numerical investigation of the rheology of a dilute emulsion of drops in an oscillating extensional flow," *Journal of Non-Newtonian Fluid Mechanics*, 102, 263-280.
66. Chatterjee D, Sarkar K, Jain P, Schreppler N\*\* **2005** "On the suitability of broadband attenuation measurement for characterizing contrast microbubbles," *Ultrasound in Medicine and Biology*, 31, 781-786.
67. Li X, Sarkar K **2005** "Drop dynamics in an oscillating extensional flow at finite Reynolds numbers," *Physics of Fluids*, 17, 027103.
68. Cao Q, Sarkar K, Prasad AK **2004** "Direct numerical simulation of two-layer viscosity-stratified flow," *International Journal of Multiphase Flow*, 30, 1484-1508.
69. Chatterjee D, Sarkar K **2003** "A Newtonian rheological model for the interface of microbubble contrast agents," *Ultrasound in Medicine and Biology*, 29, 1749-1757.
70. Sarkar K, Schowalter WR **2002** "Computation of a viscous jet with embedded drops," *Journal of Non-Newtonian Fluid Mechanics*, 102, 263-280.
71. Sarkar K, Schowalter WR **2001** "Deformation of a two-dimensional drop at non-zero Reynolds number in time-periodic extensional flows: numerical simulation," *Journal of Fluid Mechanics*, 436, 177-206.
72. Sarkar K, Schowalter WR **2001** "Deformation of a two-dimensional drop in time-periodic extensional flows: analytic treatment," *Journal of Fluid Mechanics*, 436, 207-230.
73. Sarkar K, Schowalter WR **2000** "Deformation of a viscoelastic drop in time-periodic extensional flows at non-zero Reynolds number," *Journal of Non-Newtonian Fluid Mechanics*, 95, 315-342.
74. Duraiswami R, Sarkar K, Chahine GL **1998** "Efficient dual reciprocity boundary element techniques for electrical impedance tomography," *Engineering Analysis with Boundary Elements*, 22, 13-31.
75. Duraiswami R, Sarkar K, Chahine GL **1996** "Boundary element techniques for efficient 2D and 3D electrical impedance tomography," *Chemical Engineering Science*, 52, 2185-2196.

76. Sarkar K, Prosperetti A **1996** “Effective boundary conditions for Stokes flow over a rough surface,” *Journal of Fluid Mechanics*, 316, 223-240.
77. Sarkar K, Prosperetti A **1995** “Effective boundary conditions for Laplace Equation with a Rough Boundary,” *Proceedings of the Royal Society of London A*, 451, 425-453.
78. Sarkar K, Prosperetti A **1994** “Coherent and incoherent scattering by oceanic bubbles,” *Journal of the Acoustical Society of America*, 96, 332-341.
79. Sarkar K, Prosperetti A **1993** “Backscattering of underwater noise by bubble clouds,” *Journal of the Acoustical Society of America*, 93, 3128-3138.
80. Sarkar K, Meneveau C **1993** “Gradients of potential fields on rough surface: perturbative calculation of the singularity distribution function  $f(\alpha)$  for small surface,” *Physical Review E*, 47, 957-966.

### Book Review

1. Sarkar K, **2012** “Book Review: Suspension Acoustics: An Introduction to the Physics of Suspensions by Samuel Temkin, Cambridge University Press,” *Journal of the Acoustical Society of America*, 131, 637-637.

### Peer-reviewed conference proceedings

1. Mobadersany N, Sarkar K **2019** “Encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” *Proceedings of 4<sup>th</sup> ASTFE Conference*.
2. Aliabouzar A, Kumar KN, Sarkar K **2018** “Effects of acoustic parameters and bulk fluid properties on acoustic droplet vaporization threshold of perfluoropentane droplets,” *Proceedings of 10<sup>th</sup> International Cavitation Symposium CAV2018*.
3. Osborn J, Aliabouzar A, Zhou X, Rao R, Zhang LG, Sarkar K **2018** “Ultrasound and lipid-coated microbubbles effect on proliferation and osteogenic differentiation of mesenchymal stem cells in 3D printed tissue scaffold,” *Proceedings of 10<sup>th</sup> International Cavitation Symposium CAV2018*.
4. Mobadersany N, Sarkar K **2018** “Circular acoustic microstreaming flows due to pulsating contrast microbubbles near a membrane,” *Proceedings of 10<sup>th</sup> International Cavitation Symposium CAV2018*.
5. Mobadersany N, Sarkar K **2018** “Collapse and jet formation of ultrasound contrast microbubbles for sonoporation,” *Proceedings of 10<sup>th</sup> International Cavitation Symposium CAV2018*.
1. Sarkar K, Paul S, **2013** “Acoustic characterization and modeling of PLA-encapsulated contrast microbubbles,” *Proceedings of the 165<sup>th</sup> meeting of the Acoustical Society of America*.
2. Sarkar K, Katiyar A, **2010** “Effects of ultrasound on osteoblast proliferation and its mechanisms triggered by calcium transport,” *Proceedings of the 160<sup>th</sup> meeting of the Acoustical Society of America*.
3. Sarkar K, Katiyar A, **2010** “Excitation thresholds for subharmonic response of ultrasound contrast microbubbles,” *Proceedings of the 160<sup>th</sup> meeting of the Acoustical Society of America*.
4. Mukherjee S, Sarkar K **2010** “A viscoelastic drop falling in a viscous liquid,” *Proceedings of the 37<sup>th</sup> International and 4<sup>th</sup> National Conference on Fluid Mechanics and Fluid Power, IIT Madras, Chennai, India, FMFP2010-558*.
5. Sarkar K, Jain P, Chatterjee D **2008** “Modeling and characterization of encapsulated contrast microbubbles for ultrasound imaging and drug delivery,” *Proceedings of XV<sup>th</sup> International Congress of Rheology*.



6. Sarkar K, Jain P **2007** "Growth and dissolution of encapsulated microbubbles used for contrast imaging and drug delivery," *Proceedings of 6<sup>th</sup> International Conference on Multiphase Flow*, ICMF 2007, Leipzig, Germany S2\_Tue\_B\_20.
7. Aggarwal N, Sarkar K **2007** "Numerical investigation of effects of viscoelasticity on drop deformation and emulsion rheology," *Proceedings of 6<sup>th</sup> International Conference on Multiphase Flow*, ICMF 2007, Leipzig, Germany S2\_Tue\_D\_29.
8. Li X, Sarkar K **2007** "A 3D computational investigation of deformation-induced lift on the receptor-ligand mediated cell adhesion to substrates," *Proceedings of 6<sup>th</sup> International Conference on Multiphase Flow*, ICMF 2007, Leipzig, Germany S2\_Tue\_B\_18.
9. Aggarwal N, Sarkar K **2007** "Effects of viscoelasticity on drop deformation in shear flows," *Proceedings of 2007 5<sup>th</sup> Joint ASME/JSME Fluids Engineering Conference*, FEDSM2007-37577.
10. Li X, Sarkar K **2007** "Front-tracking simulation of a liquid capsule enclosed by an elastic membrane," *Proceedings of 2007 5<sup>th</sup> Joint ASME/JSME Fluids Engineering Conference*, FEDSM2007-37575.
11. Li X, Sarkar K **2006** "Effects of deformation-induced lift on receptor-ligand mediated cell adhesion to a substrate explored by a 3D computational fluid dynamics approach," *Proceedings of 2006 ASME Joint U.S.-European Fluids Engineering Summer Conference*, FEDSM2006-98549.
12. Jain P, Sarkar K **2006** "Growth and dissolution of encapsulated microbubbles used in ultrasound contrast imaging," *Proceedings of 2006 ASME Joint U.S.-European Fluids Engineering Summer Conference*, FEDSM2006-98550.
13. Sarkar K, Jain P, Chatterjee, D **2005** "Characterization and ultrasound-pulse mediated destruction of ultrasound contrast microbubbles," *Innovations in Nonlinear Acoustics, 17<sup>th</sup> International Symposium on Nonlinear Acoustics (Ed. Atchley et al)*, 271-274.
14. Sarkar K, Jain P, Chatterjee D **2004** "Modeling thin-walled microbubbles for medical ultrasound," *Proceedings of ASME-International Mechanical Engineering Congress and R&D Expo IMECE2004-61645*.
15. Sarkar K, Jain P, Chatterjee D **2004** "Destruction of Definity® microbubbles used for ultrasound contrast imaging," *Proceedings of ASME-International Mechanical Engineering Congress and R&D Expo*, IMECE2004-61646.
16. Sarkar K, Li X **2004** "Oscillating extensional rheology of emulsion of drops at finite Reynolds number," *Proceedings of 2004 ASME Heat Transfer-Fluids Engineering Summer Conference*, HT-FED04-56648.
17. Sarkar K, Duraiswami R, Chahine GL **1996** "Numerical Simulation of Separated Cavitation Behind a Sphere," *ASME Cavitation Multiphase Flow Forum*, FED-236, 479-484.
18. Sarkar K, Duraiswami R, Chahine GL **1995** "Three-dimensional numerical simulation of bubble-vortical flow interaction," *ASME Cavitation Multiphase Flow Forum*, FED-210, 135-143.
19. Ohearn TJO, Torczynski J, Ceccio SL, Tassin AL, Chahine GL, Duraiswami R, Sarkar K **1995** "Development of an Electrical Impedance Tomography, System for an Air-Water Vertical Bubble Column," *Proceedings of the Forum on Measurement Techniques in Multiphase Flows the Winter Annual Meeting of the ASME*.

#### Conference presentations (speaker in bold)

1. N Mobadersany, **Sarkar K 2019** "Acoustic microstreaming due to an oscillating contrast microbubbles near a substrate: velocity, vorticity and closed streamlines," *177<sup>th</sup> meeting of the Acoustical Society of America*, Louisville, Kentucky, May 13-17, 2019.

2. **Osborn J**, Pullan J, Mallik S, Sarkar K **2019** “Development and characterization of acoustically responsive exosomes for simultaneous imaging and drug delivery applications,” *177<sup>th</sup> meeting of the Acoustical Society of America*, Louisville, Kentucky, May 13-17, 2019.
3. Aliabouzar M, Kumar KN, **Sarkar K 2019** “Effects of size and boiling point of perfluorocarbon droplets on the frequency dependence of vaporization threshold,” *177<sup>th</sup> meeting of the Acoustical Society of America*, Louisville, Kentucky, May 13-17, 2019.
4. **Sarkar K**, Mobadersany N **2019** “Encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” *4<sup>th</sup> Thermal and Fluids Engineering Conference, American Society of Thermal and Fluids Engineers*, Las Vegas, Nevada April 14-17, 2019.
5. **Sarkar K**, Mobadersany N **2018** “Acoustic microstreaming due to a pulsating contrast microbubble near a wall,” *71<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Atlanta, Georgia, November 18-20, 2018.
6. Kumar KN, Aliabouzar A, **Sarkar K 2018** “Nucleation of bubbles in perfluoropentane droplets under ultrasonic excitation,” *10<sup>th</sup> International Cavitation Symposium CAV2018*, Baltimore, Maryland, May 14-17, 2018.
7. **Aliabouzar A**, Kumar KN, Sarkar K **2018** “Effects of acoustic parameters and bulk fluid properties on acoustic droplet vaporization threshold of perfluoropentane droplets,” *10<sup>th</sup> International Cavitation Symposium CAV2018*, Baltimore, Maryland, May 14-17, 2018.
8. **Osborn J**, Aliabouzar A, Zhou X, Rao R, Zhang LG, Sarkar K **2018** “Ultrasound and lipid-coated microbubbles effect on proliferation and osteogenic differentiation of mesenchymal stem cells in 3D printed tissue scaffold,” *10<sup>th</sup> International Cavitation Symposium CAV2018*, Baltimore, Maryland, May 14-17, 2018.
9. **Mobadersany N**, Sarkar K **2018** “Circular acoustic microstreaming flows due to pulsating contrast microbubbles near a membrane,” *10<sup>th</sup> International Cavitation Symposium CAV2018*, Baltimore, Maryland, May 14-17, 2018.
10. Mobadersany N, **Sarkar K 2018** “Collapse and jet formation of ultrasound contrast microbubbles for sonoporation,” *10<sup>th</sup> International Cavitation Symposium CAV2018*, Baltimore, Maryland, May 14-17, 2018.
11. **Malipeddy AR**, Sarkar K **2018** “Shear-induced gradient diffusivity of emulsions at finite inertia,” *March Meeting of the American Physical Society*, Los Angeles, California, March 5-9, 2018.
12. **Sarkar K**, Srivastava P, Malipeddy AR **2018** “Effects of micro-inertia on average normal stress differences of a concentrated emulsion,” *March Meeting of the American Physical Society*, Los Angeles, California, March 5-9, 2018.
13. Kumar KN, Mallik S, **Sarkar K 2017** “Mechanism of echogenicity of echogenic liposomes,” *174<sup>th</sup> meeting of the Acoustical Society of America*, New Orleans, Louisiana, December 4-8, 2017.
14. **Osborne J**, Aliabouzar M, Zhou X, Rao R, Zhang LG, Sarkar K **2017** “Ultrasound and lipid-coated microbubbles for osteogenic differentiation of mesenchymal stem cells in 3D printed tissue scaffolds,” *174<sup>th</sup> meeting of the Acoustical Society of America*, New Orleans, Louisiana, December 4-8, 2017.
15. **Aliabouzar M**, Zhang LG, Sarkar K **2017** “Acoustic characterization of 3D printed micro-structured scaffolds for tissue engineering,” *174<sup>th</sup> meeting of the Acoustical Society of America*, New Orleans, Louisiana, December 4-8, 2017.
16. **Sarkar K**, Mobadersany N **2017** “Jetting of a ultrasound contrast microbubble near a rigid wall,” *70<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Denver, Colorado, November 19-21, 2017.

17. **Mobadersany N**, Sarkar K **2017** "Acoustic microstreaming due to an ultrasound contrast microbubble near a wall," 70<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Denver, Colorado, November 19-21, 2017.
18. **Malipeddy AR**, Sarkar K **2017** "Shear-induced gradient diffusivity in emulsions," 70<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Denver, Colorado, November 19-21, 2017.
19. **Aliabouzar M**, Kumar KN, Sarkar K **2017** "Acoustic vaporization threshold of lipid coated perfluoropentane droplets," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
20. **Kumar KN**, Mallik S, Sarkar K **2017** "Role of mannitol on the echogenicity of echogenic liposomes (ELIPs)," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
21. **Kumar KN**, Aliabouzar M, , Sarkar K **2017** "Study of acoustic droplet vaporization using classical nucleation theory," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
22. **Mobadersany N**, Sarkar K **2017** "The dynamic of contrast agent near a wall under the excitation of ultrasound wave," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
23. **Xia L**, Kumar KN, Fataneh K, Mallik S, Sarkar K **2017** "In vitro acoustic characterization of echogenic polymersomes with PLA-PEG and PLLA-PEG shells," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
24. **Xia L**, Sarkar K **2017** "A new expression for the second-order acoustical nonlinearity parameter B/A for a suspension of free or encapsulated bubbles," 3<sup>rd</sup> *Joint meeting of the Acoustical Society of America and the European Acoustics Association*, Boston, Massachusetts, June 25-29, 2017.
25. Aliabouzar M, Zhang LG, **Sarkar K 2016** " Low intensity pulsed ultrasound and lipid-coated microbubbles enhance chondrogenesis of human mesenchymal stem cells in 3D bioprinted scaffolds," presented at the 5<sup>th</sup> *joint meeting of the Acoustical Society of America and Acoustical Society of Japan*, Honolulu, Hawaii, Nov 28-Dec 2, 2016.
26. **Sarkar K 2016** "Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming," 69<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Portland, Oregon, November 20-22, 2016 (**Invited talk** in *Mini-Symposium on "Multiphase flows in Biomedicine"*).
27. **Aliabouzar M**, Zhang LG, Sarkar K **2016** " Effects of ultrasound in presence of microbubbles on cartilage tissue regeneration in three-dimensional printed scaffolds," presented at the 171<sup>st</sup> *meeting of the Acoustical Society of America*, Salt Lake, Utah, May 23-27, 2016.
28. **Kumar KN**, Aliabouzar M, Sarkar K **2016** "Effects of acoustic parameters on nanodroplet vaporization," presented at the 171<sup>st</sup> *meeting of the Acoustical Society of America*, Salt Lake, Utah, May 23-27, 2016.
29. **Mobadersany N**, Sarkar K **2016** "Jet formation of contrast microbubbles in the vicinity of a vessel wall," presented at the 171<sup>st</sup> *meeting of the Acoustical Society of America*, Salt Lake, Utah, May 23-27, 2016.
30. **Sarkar K**, Xia L, Porter TM **2015** "Estimating strain-dependent interfacial rheological properties of the encapsulation of lipid-coated mono-disperse microbubbles using broadband attenuation at different pressure amplitudes," 87<sup>th</sup> *Annual Meeting of the Society of Rheology*, Baltimore, Maryland, October 11-15, 2015.
31. **Malipeddy AR**, Sarkar K **2015** "Deformation of a viscoelastic drop in periodic planar extensional flows," 87<sup>th</sup> *Annual Meeting of the Society of Rheology*, Baltimore, Maryland, October 11-15, 2015.

32. **Sarkar K 2014** “Lateral migration and diffusion of a mechanical engineer through emulsion of drops induced by Andy’s influence,” *67<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Francisco, California, November 23-25, 2014.
33. **O’Brien C**, Alibouzar M, Sarkar K, Zhang LZ **2014** “Tunable low intensity pulsed ultrasound for improving stem-cell functions in 3D printed scaffold,” *2014 Annual Meeting of Biomedical Engineering Society*, San Antonio, Texas, October 22-25, 2014 (poster).
34. **Sarkar K**, Mukherjee S, Singh R **2014** “Wall induced migration of drops and capsules: Effects of inclination and viscoelasticity,” *DynaCaps2014: Dynamics of Capsules, Vesicles and Cells in Flow*, Universite de Technologie, Compiègne, France, July 15-18, 2014 (**Invited Talk**).
35. **Sarkar K**, Paul S, Katiyar A **2014** “Modeling encapsulated microbubbles: From echocardiography to noninvasive blood pressure monitoring to drug delivery,” *DynaCaps2014: Dynamics of Capsules, Vesicles and Cells in Flow*, Universite de Technologie, Compiègne, France, July 15-18, 2014 (**Invited Talk**).
36. **Sarkar K 2014** “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery,” *2<sup>nd</sup> Northeast Complex Fluids and Soft Matter Workshop (NCS2)*, 06/06/14, City University of New York, New York, New York, June 6, 2014 (**Invited Talk**).
37. **Kumar KN**, Paul S, Sarkar K **2014** "Ambient pressure estimation using subharmonic emissions from contrast microbubbles," presented at the *167<sup>th</sup> meeting of the Acoustical Society of America*, Providence, Rhode Island, May 5-9, 2014.
38. **Mobadersany N**, Katiyar A, Sarkar K **2014** "Effects of ambient pressure variation on the subharmonic response from contrast microbubbles," presented at the *167<sup>th</sup> meeting of the Acoustical Society of America*, Providence, Rhode Island, May 5-9, 2014.
39. **Xia L**, Paul S, Chitnis P, Ketterling J, Sheeran P, Dayton P, Sarkar K **2014** "Acoustic characterization of polymer-encapsulated microbubbles with different shell-thickness-to-radius ratios using in vitro attenuation and scattering: comparison between different rheological models," presented at the *167<sup>th</sup> meeting of the Acoustical Society of America*, Providence, Rhode Island, May 5-9, 2014.
40. **O’Brien C**, Alibouzar M, Zhu W, Sarkar K, Zhang LZ **2013** “The untapped effects of tunable low intensity ultrasound on human bone marrow mesenchymal stem cell functions,” *2013 Annual Meeting of Biomedical Engineering Society*, Seattle, Washington, September 25-28, 2014 (poster).
41. **Sarkar K**, Mobadersany N, Katiyar A **2013** “Effects of ambient pressure variation on the subharmonic response from contrast microbubbles,” presented at the *166<sup>th</sup> meeting of the Acoustical Society of America*, San Francisco, California, December 2-6, 2013.
42. Paul S, **Sarkar K**, Nahire R, Mallik S **2013** “In vitro acoustic characterization of echogenic liposomes with a polymerized bilayer (Pol-ELIP),” presented at the *166<sup>th</sup> meeting of the Acoustical Society of America*, San Francisco, California, December 2-6, 2013.
43. **Sarkar K**, Paul S **2013** “Acoustic characterization and modeling of PLA-encapsulated contrast microbubbles,” presented at the *21<sup>st</sup> International Congress of Acoustics & 165<sup>th</sup> meeting of the Acoustical Society of America*, Montreal, Quebec, Canada, June 2-7, 2013.
44. **Sarkar K 2013** “Effects of viscoelasticity on drop dynamics and emulsion rheology,” *10<sup>th</sup> Frontiers in Applied and Computational Mathematics (FCAM)*, 05/31/13, Newark, New Jersey (**Invited Talk**).
45. **Sarkar K 2013** “Encapsulated microbubbles for contrast ultrasound imaging and targeted drug delivery: Interfacial rheology of the encapsulation,” *245<sup>th</sup> American Chemical Society National Meeting*, April 7-11, New Orleans, Louisiana (**Invited Talk**).
46. **Sarkar K 2013** “Effective steady shear rheology of a viscous emulsion at finite inertia: Reversal of normal stress differences,” *245<sup>th</sup> American Chemical Society National Meeting*, April 7-11, New Orleans, Louisiana.

47. **Sarkar K 2013** “Mechanics of soft particles: Vesicles and encapsulated microbubbles for drug delivery and ultrasound imaging,” *Advances in Computational Mechanics (ACM 2013)--A Conference Celebrating the 70th Birthday of Thomas J. R. Hughes*, February 24-27, San Diego, California (**Invited Talk**).
48. **Sarkar K 2013** “Modeling contrast microbubbles: From echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” *18th European Symposium on Ultrasound Contrast Imaging*, January 16-18, Rotterdam, The Netherlands. (**Invited Talk**).
49. **Sarkar K 2012** “A theory of wall-induced lateral migration of a drop in shear: effects of drop inclination and viscoelasticity,” *65th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, November 18-20, 2012.
50. **Sarkar K, Mukherjee S 2012** “Effects of viscoelasticity on the migration of a viscous drop in a shear flow near a wall,” *65th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, November 18-20, 2012.
51. **Paul S, Sarkar K, Wheatley M 2012** “Nonlinear dynamics of PLA (poly-lactic acid) encapsulated ultrasound contrast microbubbles,” *65th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, November 18-20, 2012.
52. **Singh R, Sarkar K 2012** “Pair-collision between heterogeneous capsules in simple shear: Effect of membrane stiffness,” presented at the *65th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, November 18-20, 2012.
53. **Srivastava Paul, Sarkar K 2012** “Effects of inertia on the steady shear rheology of concentrated emulsions: sign reversal of normal stress differences,” *65th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, November 18-20, 2012.
54. **Katiyar A, Sarkar K 2012** “Effects of Damping on Frequency Dependent Subharmonic Threshold for Contrast Microbubbles,” presented at the *164th meeting of the Acoustical Society of America*, Kansas City, Missouri, October 22-26, 2012.
55. **Paul S, Sarkar K, Nandy T, Mallik S 2012** “Echogenicity and release characteristics of Folate-conjugated ELIPS for cytosolic delivery of cancer drugs,” presented at the *164th meeting of the Acoustical Society of America*, Kansas City, Missouri, October 22-26, 2012.
56. **Sarkar K, Katiyar K, Paul S, Chitnis PV, Ketterling JA 2012** “Modeling Subharmonic response from contrast microbubbles for imaging and noninvasive pressure estimation,” presented at the *163rd meeting of the Acoustical Society of America*, Hong Kong, May 13-18, 2012 (**Invited Talk**).
57. **Katiyar A, Sarkar K 2011** “Frequency dependent subharmonic threshold,” presented at the *64th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Baltimore, Maryland, November 20-22, 2011.
58. **Mukherjee S, Sarkar K 2011** “Effects of viscoelasticity on the migration of a viscous drop in a shear flow near a wall,” presented at the *64th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Baltimore, Maryland, November 20-22, 2011.
59. **Paul S, Sarkar K, Wheatley M 2011** “Material characterization of poly-lactic acid shelled ultrasound contrast agent and their dynamics,” presented at the *64th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Baltimore, Maryland, November 20-22, 2011.
60. **Singh R, Sarkar K 2011** “Confined shear induces spatial ordering in an interacting pair of drops,” presented at the *64th Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Baltimore, Maryland, November 20-22, 2011.

61. Katiyar A, **Sarkar K 2011** “Role of effective surface tension on the frequency dependent subharmonic threshold,” presented at the 162<sup>nd</sup> *meeting of the Acoustical Society of America*, San Diego, California, October 31-November 4, 2011.
62. Katiyar A, **Sarkar K 2011** “Inhibition of breast cancer cell proliferation by low-intensity pulsed ultrasound (LIPUS),” presented at the 162<sup>nd</sup> *meeting of the Acoustical Society of America*, San Diego, California, October 31-November 4, 2011.
63. **Paul S**, Sarkar K, Nandy T, Mallik S **2011** “Experimental characterization of dye-loaded echogenic liposomes,” presented at the 162<sup>nd</sup> *meeting of the Acoustical Society of America*, San Diego, California, October 31-November 4, 2011.
64. **Paul S**, Russakow D, Rodgers T, Wheatley M, Sarkar K **2011** “Novel Poly-lactic acid polymer shelled contrast agents,” presented at the 162<sup>nd</sup> *meeting of the Acoustical Society of America*, San Diego, California, October 31-November 4, 2011.
65. **Sarkar K**, Katiyar A, F. Forsberg **2011** “Dynamics of contrast microbubbles and their subharmonic response for noninvasive blood pressure estimation,” presented at the 36<sup>th</sup> *International Symposium on Ultrasonic Imaging and Tissue Characterization*, Arlington, Virginia, June 13-15, 2011 (**Invited Talk**).
66. **Katiyar A**, Sarkar K, F. Forsberg **2011** “Subharmonic response from ultrasound contrast microbubbles for noninvasive blood pressure estimation,” presented at the 161<sup>th</sup> *meeting of the Acoustical Society of America*, Seattle, Washington, May 23-27, 2011.
67. **Sarkar K**, Paul S, Nandy T, Mallik S **2011** “Scattering and attenuation from an emulsion of echogenic liposomes,” presented at the 161<sup>th</sup> *meeting of the Acoustical Society of America*, Seattle, Washington, May 23-27, 2011.
68. **Katiyar A**, Sarkar K, F. Forsberg **2010** “Subharmonic response from ultrasound contrast microbubbles for noninvasive blood pressure estimation,” presented at the 63<sup>rd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Long Beach, California, November 21-23, 2010.
69. **Singh R**, Sarkar K, **2010** “Inertial effects on the dynamics of a drop in a shear flow and the dispersed stresses,” presented at the 63<sup>rd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Long Beach, California, November 21-23, 2010.
70. **Mukherjee S**, Sarkar K, **2010** “A viscoelastic drop falling through a viscous fluid,” presented at the 63<sup>rd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Long Beach, California, November 21-23, 2010.
71. **Paul S**, Sarkar K, F. Forsberg **2010** “Strain-softening elasticity model of the encapsulation of an ultrasound contrast microbubble,” presented at the 63<sup>rd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Long Beach, California, November 21-23, 2010.
72. **Sarkar K**, Katiyar A, **2010** “Effects of ultrasound on osteoblast proliferation and its mechanisms triggered by calcium transport,” presented at the 2<sup>nd</sup> *Pan-American/Iberian meeting on Acoustics and 160<sup>th</sup> meeting of the Acoustical Society of America*, Cancun, Mexico, November 15-19, 2010.
73. **Sarkar K**, Katiyar A, **2010** “Excitation thresholds for subharmonic response of ultrasound contrast microbubbles,” presented at the 2<sup>nd</sup> *Pan-American/Iberian meeting on Acoustics and 160<sup>th</sup> meeting of the Acoustical Society of America*, Cancun, Mexico, November 15-19, 2010.
74. **Katiyar A**, Sarkar K, **2009** “Effects of encapsulation elasticity on the stability of an encapsulated contrast microbubble for medical imaging and drug delivery,” presented at the 62<sup>nd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Minnesota, Minneapolis, November 22-24, 2009.
75. **Singh R**, Sarkar K, **2009** “Trajectories of a pair of drops in steady shear at finite inertia: effects of viscosity ratio and positioning,” presented at the 62<sup>nd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Minnesota, Minneapolis, November 22-24, 2009.

76. **Mukherjee S, Sarkar K, 2009** “Effects of viscoelasticity on retraction of a sheared drop,” presented at the 62<sup>nd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Minnesota, Minneapolis, November 22-24, 2009.
77. **Sarkar K, Chatterjee D, Jain P, Katiyar A 2008** “Modeling encapsulated contrast microbubbles for ultrasound imaging and drug delivery,” *XV<sup>th</sup> Internal Congress of Rheology*, Monterey, California, August 3-8 2008 (**Invited Talk**).
78. **Sarkar K, Jain P 2007** “Growth and dissolution of a contrast microbubble: Effects of encapsulation,” *154<sup>th</sup> Meeting of the Acoustical Society of America*, New Orleans, Louisiana, November 27-December 1, 2007.
79. **Sarkar K, Aggarwal N 2007** “Effects of matrix viscoelasticity on drop deformation in steady shear,” presented at the 60<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Salt Lake City, Utah, November 18-20, 2007.
80. **Aggarwal N, Sarkar K 2006**, “Dynamics of a viscoelastic drop in a Newtonian matrix in steady shear” presented at the 59<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Tampa Bay, Florida, November 19-21, 2006.
81. **Li X, Sarkar K 2006** “Deformation-induced Lift on Receptor-Ligand Mediated Cell Adhesion to Substrates Explored by a 3-D Computational Fluid Dynamics approach,” presented at the 59<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Tampa Bay, Florida, November 19-21, 2006.
82. **Sarkar K, Jain P 2006** “Growth and dissolution of encapsulated microbubbles used in ultrasound contrast imaging,” *2006 ASME Joint U.S.-European Fluids Engineering Summer Meeting*, Miami, Florida, July 17-20, 2006.
83. **Sarkar K, Li X 2006** “Effects of deformation-induced lift on receptor-ligand mediated cell adhesion to a substrate explored by a 3D computational fluid dynamics approach,” *2006 ASME Joint U.S.-European Fluids Engineering Summer Meeting*, Miami, Florida, July 17-20, 2006
84. **Jain P, Sarkar K 2006** “Performance based applications of ultrasound contrast agents in the biomedical field,” presented at the *American Physical Society March Meeting*, Baltimore, Maryland, March 13-17 2006.
85. **Aggarwal N, Sarkar K 2006** “Effects of viscoelasticity on drop deformation,” presented at the *American Physical Society March Meeting*, Baltimore, Maryland, March 13-17 2006.
86. **Sarkar K, Li X 2005** “Computational modeling of leucocyte adhesion cascade (LAC),” presented at the 58<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Chicago, Illinois, November 20-22 2005.
87. **Li X, Sarkar K 2005** “Effects of inertia on the rheology of a dilute emulsion of drops in steady shear,” presented at the 58<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Chicago, Illinois, November 20-22 2005.
88. **Sarkar K, Jain P, Chatterjee, D 2005** “Destruction of contrast microbubbles used for ultrasound imaging and drug delivery,” presented at the *150<sup>th</sup> Annual Meeting of the Acoustical Society of America*, Minneapolis, Minnesota, October 17-21 2005.
89. **Sarkar K, Jain P, Chatterjee, D 2005** “Characterization and ultrasound mediated destruction of ultrasound contrast microbubbles,” presented at the *17<sup>th</sup> International Symposium on Nonlinear Acoustics*, State College, Pennsylvania, July 18-22 2005.
90. **Sarkar K, Li X 2005** “Rheology of emulsion of viscous drops at finite inertia,” presented at the *2005 Eastern Sectional Meeting of American Mathematical Society*, Newark, Delaware April 2-3 2005 (**Invited Talk**).

91. **Prasad A**, Cao Q, Sarkar K **2004** “Direct numerical simulation of three-layer viscosity-stratified flow,” presented at the 57<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Seattle, Washington, November 23-25 2004.
92. **Li X**, Sarkar K **2004** “Oscillating extensional rheology of emulsion of drops at finite Reynolds number : Negative elasticity,” presented at the 57<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Seattle, Washington, November 23-25 2004.
93. **Sarkar K**, Jain P, Chatterjee D **2004** “Characterization and destruction of Definity® microbubbles used for ultrasound imaging and drug delivery,” presented at the 57<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Seattle, Washington, November 23-25 2004.
94. **Sarkar K**, Jain P, Chatterjee D **2004** “Modeling thin-walled microbubbles for medical ultrasound,” presented at the *2004 ASME International Mechanical Engineering Congress and R&D Expo*, Anaheim, California, November 13-19 2004.
95. **Sarkar K**, Chatterjee D, Jain P **2004** “Destruction of Definity® microbubbles used for ultrasound contrast imaging,” presented at the *2004 ASME International Mechanical Engineering Congress and R&D Expo*, Anaheim, California, November 13-19 2004.
96. **Sarkar K**, Li X **2004** “Finite Reynolds number two-phase flow with drops,” presented in *IUTAM Symposium on “Computational Approaches to Disperse Multi-phase Flow”*, Argonne, IL, October 4-7, 2004.
97. **Sarkar K**, Li X **2004** “Oscillating extensional rheology of emulsion of drops at finite Reynolds number,” presented at the *Annual Summer Meeting of ASME Heat Transfer-Fluids Engineering*, Charlotte, North Carolina, July 11-15 2004.
98. **Sarkar K**, Chatterjee D **2003** “An interfacial rheological model of encapsulated microbubble contrast agents for medical ultrasound,” presented at the 56<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, New Jersey, November 23-25 2003.
99. **Sarkar K**, Li X **2003** “Hydrodynamic interaction between two drops in an oscillatory shear flow: do they attract or repel?”, presented at the 56<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, New Jersey, November 23-25 2003.
100. **Li X**, Sarkar K **2003** “Inertial dynamics in time-periodic straining flows: resonance and nonlinearity,” presented at the 56<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, New Jersey, November 23-25 2003.
101. **Sarkar K**, Chatterjee D **2003** “Characterization of ultrasound contrast agent Definity® through experiments and modeling,” presented at the 56<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, New Jersey, November 23-25 2003.
102. **Sarkar K**, Chatterjee D, Shi WT, Forsberg F **2003** “An interfacial rheological model of ultrasound contrast agents: theory & experiments,” presented at the 146<sup>th</sup> *Annual Meeting of the Acoustical Society of America*, Austin, Texas, November 10-14.
103. **Sarkar K** **2002** “Effect of shear waves on viscoelastic drop deformation,” presented at the 74<sup>th</sup> *Annual Meeting of the Society of Rheology*, Minneapolis, Minnesota, October 13-17.
104. **Sarkar K** **2001** “Expansion of a drop-laden jet,” presented at the 54<sup>th</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, Albuquerque, 21-23 November 2001.
105. **Sarkar K**, Schowalter WR **2001** “Computation of a free jet with embedded drops,” presented at the *Acrivos Symposim*, Greece, 2001.
106. **Sarkar K**, Schowalter WR **2000** “Viscous/viscoelastic drop deformation in time-dependent straining flow: numerical and analytical analysis,” presented at the 53<sup>rd</sup> *Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, San Diego, California, Albuquerque, 21-23 November 2001.



107. **Sarkar K**, Schowalter WR **1999** "Viscous drop deformation in a time-dependent straining flow: numerical and theoretical Analysis," presented at the *Annual Meeting of the American Institute of Chemical Engineers*, Dallas, Texas, October 31-November 5, 1999.
108. **Sarkar K**, Schowalter WR **1999** "Further studies on the deformation of a viscoelastic drop in a potential vortex," presented at the *71<sup>st</sup> Annual Meeting of the Society of Rheology*, Madison, Wisconsin, October 17-21, 1999.
109. **Sarkar K**, Schowalter WR **1998** "Deformation of a viscoelastic drop in the flow induced by a potential vortex," presented at the *70<sup>th</sup> Annual Meeting of the Society of Rheology*, Monterey, California, October 4-8, 1998.
110. **Schowalter WR**, Sarkar K **1998** "Recent advances in the modeling of suspensions," presented at the *2<sup>nd</sup> Meeting of the Hellenic Society of Rheology and International Symposium*, Crete, Greece, August 31-September 2, 1998.
111. **Sarkar K**, Chahine GL, Duraiswami R **1996** "Numerical simulation of separated cavitation behind a sphere," presented at *Cavitation Multiphase Flow Forum, Summer Meeting, American Society of Mechanical Engineers*, San Diego, California, 7-11 July 1996.
112. **Duraiswami R**, Sarkar K., Chahine GL **1996** "2D and 3D electrical impedance tomography using dual reciprocity BEM," presented in *Symposium on Industrial Applications and Recent Developments in BEM, ASME Applied Mechanics & Materials Meeting*, JHU, Baltimore, Maryland, June 12-14, 1996.
113. **Sarkar K**, Duraiswami R, Chahine GL **1996** "Coupling of vortex element and boundary element methods for simulating vortical flows with free surfaces," presented in *Symposium on Industrial Applications and Recent Developments in BEM, ASME Applied Mechanics & Materials Meeting*, JHU, Baltimore, MD., June 12-14, 1996.
114. **Sarkar K**, Duraiswami R, Chahine GL **1995** "Three dimensional numerical simulation of bubble-vortical flow interaction," presented at *Cavitation Multiphase Flow Forum, Summer Meeting, American Society of Mechanical Engineers*, Hilton Head, South Carolina, 13-18 August 1995.
115. **Sarkar K**, Prosperetti A **1993** "Smoothed boundary conditions for Stokes flow over a rough surface," presented at the *46<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society*, Albuquerque, New Mexico, 21-23 November 1993.
116. **Sarkar K**, Prosperetti A **1993**, "Coherent and incoherent scattering from oceanic bubbles," presented at the *125<sup>th</sup> Meeting of the Acoustical Society of America*, Ottawa, Canada, 17 May - 21 May 1993.
117. **Sarkar K**, Prosperetti A **1993** "A unified approach for scattering from bubbles in the ocean," presented at the *1<sup>st</sup> Graduate Meeting of the American Society of Mechanical Engineers*, Ithaca, New York, 19 March - 20 March 1993.
118. **Prosperetti A**, Sarkar K **1992** "Enhanced backscattering from bubble cloud distributions on the ocean surface," presented at the *122<sup>nd</sup> Meeting of the Acoustical Society of America*, Salt Lake City, Utah, 11 May - 15 May 1992.

### Technical reports

1. Duraiswami R, Sarkar K, Chahine GL **1995** "2DynaEIT: A Boundary Element Code for Efficient Electrical Impedance Tomography--- Theory and Test Cases," Dynaflow, Inc. Tech Rep. 95012-1.
2. Duraiswami R, Sarkar K., Prabhukumar S, Chahine GL **1995** "BEM Methods for Efficient 2D and 3D Electrical Impedance Tomography," Dynaflow, Inc. Tech Rep. 95006-1NSF.
3. Chahine GL, Sarkar K, Duraiswami R **1994** "Letter Report -- Estimation of Bubble Dynamics Forces," Dynaflow, Inc. Tech. Rep. 94010-1.

4. Sarkar K, Smith MK 1990 “Spontaneous Violation of Reflection Symmetry in Complex Ginzburg-Landau equation,” Johns Hopkins University Technical Report.
5. Sarkar K 1988 “Concepts of Ship-Propeller Design by Lifting-Line and Lifting-Surface Theory,” B.Tech Project report, IIT, Kharagpur, India.

## Invited Talks (16 keynote/invited talks in conferences and 42 invited talks in academia and industries)

### Keynote/invited presentations in conferences

1. 2019 “Dynamics of colloidal suspension: effective viscosity and Brownian diffusion in the footsteps of Einstein,” **Lectures in 2019 Summer School: Topics in Multiphase Flow and Thermal Transport**, University of Maryland at College Park, Maryland, June 3-7, 2019.
2. 2019 “Bubbles & sound for diagnostic imaging, therapeutics and tissue engineering: pressure dependent subharmonic to collapsing jet and acoustic streaming,” **PLENARY TALK 2019 CEAFM-Burgers-GWU Fluid Mechanics Research Symposium** Johns Hopkins University, Baltimore, Maryland, May 30, 2019.
3. 2016 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” **APS DFD 2016 Mini-symposium on Multiphase Flows in Biomedicine**, 69th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Portland, Oregon, November 19-22, 2016.
4. 2014 “Wall induced migration of drops and capsules: Effects of inclination and viscoelasticity,” **DynaCaps2014: Dynamics of Capsules, Vesicles and Cells in Flow**, 07/15/14, Universite de Technologie, Compiègne, France.
5. 2014 “Modeling encapsulated microbubbles: From echocardiography to noninvasive blood pressure monitoring to drug delivery,” **DynaCaps2014: Dynamics of Capsules, Vesicles and Cells in Flow**, 07/17/14, Universite de Technologie, Compiègne, France.
6. 2014 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery,” **2nd Northeast Complex Fluids and Soft Matter Workshop (NCS2)**, 06/06/14, City University of New York, New York, New York.
7. 2013 “Effects of viscoelasticity on drop dynamics and emulsion rheology,” **10th Frontiers in Applied and Computational Mathematics (FCAM)**, 05/31/13, Newark, New Jersey.
8. 2013 “Encapsulated microbubbles for contrast ultrasound imaging and targeted drug delivery: Interfacial rheology of the encapsulation,” **245th American Chemical Society National Meeting**, 04/07/13, New Orleans, Louisiana.
9. 2013 “Mechanics of soft particles: Vesicles and encapsulated microbubbles for drug delivery and ultrasound imaging,” **Advances in Computational Mechanics (ACM 2013)—A Conference Celebrating the 70th Birthday of Thomas J. R. Hughes**, 02/25/13, San Diego, California.
10. 2013 “Modeling contrast microbubbles: From echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” **18th European Symposium on Ultrasound Contrast Imaging**, 01/17/13, Rotterdam, The Netherlands.
11. 2012 “Modeling Subharmonic response from contrast microbubbles for imaging and noninvasive pressure estimation,” **163rd meeting of the Acoustical Society of America and 2012 Hong Kong Acoustics**, 05/15/12, Hong Kong, China.
12. 2012 “Subharmonic signals from ultrasound contrast agents,” **2012 Leading Edge in Diagnostic Ultrasound Annual Conference**, 05/08/12, Bogata Hotel Casino & Spa, Atlantic City, New Jersey.

13. 2011 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” *5<sup>th</sup> Annual Symposium of Integrating Nanotechnology with Cell Biology and Neuroscience (INCBN)*, University New Mexico, Albuquerque, New Mexico, 08/18/11.
14. 2011 “Dynamics of contrast microbubbles and their subharmonic response for noninvasive blood pressure estimation,” at the *36<sup>th</sup> International Symposium on Ultrasonic Imaging and Tissue Characterization*, Arlington, Virginia, 06/14/11.
15. 2008 “Modeling encapsulated contrast microbubbles for ultrasound imaging and drug delivery,” at the *XV<sup>th</sup> Internal Congress of Rheology*, Monterey, California, 08/04/08.
16. 2007 “Ultrasound contrast agents: A problem in fluid mechanics,” at *2007 Leading Edge in Diagnostic Ultrasound Annual Conference*, 05/02/07, Bogata Hotel Casino & Spa, Atlantic City, New Jersey.
17. 2005 “Rheology of emulsion of viscous drops at finite inertia,” Direct numerical simulation of three-layer viscosity-stratified flow,” at the *2005 Eastern Sectional Meeting of American Mathematical Society*, Newark, Delaware 04/02/05.

### Invited talks in academia and industries

18. 2019 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” at *Biomedical Engineering, George Washington University*, 10/30/19.
19. 2019 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” at *Mechanical Engineering, University of Colorado at Colorado Spring*, 09/26/19.
20. 2019 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” at *Mechanical Engineering, University of Colorado at Boulder*, 09/25/19.
21. 2019 “Dynamics of encapsulated microbubbles for contrast ultrasound imaging and drug delivery: from pressure dependent subharmonic to collapsing jet and acoustic streaming,” at *Power Engineering, Jadavpur University, India*, 08/02/19.
22. 2015 “Encapsulated Microbubbles—for echocardiography and noninvasive blood pressure monitoring—and wall induced migration of drops/capsules in shear,” at *Mechanical Engineering, University of Maryland College Park*, 09/02/15.
23. 2014 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Biomedical Engineering and Mechanics, Virginia Tech*, 09/10/14.
24. 2013 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Chemical Engineering, IIT, Bombay*, 07/18/13.
25. 2012 “Encapsulated Microbubbles and liposomes: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Mechanical and Aerospace Engineering, Boston University*, 11/09/12.
26. 2012 “Encapsulated Microbubbles and liposomes: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Chemical and Biological Engineering, Drexel University*, 10/05/12.

27. 2011 “Ultrasound contrast agents and ultrasound induced fracture and cancer therapy,” *Lizzi Center for Biomedical Engineering, Riverside Research*, New York, New York, 8/9/11.
28. 2011 “Ultrasound contrast agents and ultrasound induced fracture and cancer therapy,” *Center for Outcomes Research, Christiana Care and Health System*, Newark, Delaware, 7/22/11.
29. 2011 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Mechanical and Aerospace Engineering, George Washington University*, 04/04/11.
30. 2011 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Mechanical Engineering, University of Washington at Seattle*, 03/28/11.
31. 2011 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Mechanical Engineering, University of Delaware*, 03/25/11.
32. 2011 “Contrast microbubbles for noninvasive blood pressure estimation,” at *BIOMS (Biomedical Movement Science program) Seminar, University of Delaware*, 03/21/11.
33. 2010 “Encapsulated Microbubbles: from echocardiography to noninvasive blood pressure monitoring and targeted drug delivery,” at *Mechanical Engineering, University of Colorado at Boulder*, 08/26/10.
34. 2010 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Mechanical Engineering, Jadavpur University, India*, 03/16/10.
35. 2010 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Engineering Mechanics, Jawaharlal Nehru Center for Advanced Scientific Research, India*, 03/10/10.
36. 2010 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Mechanical Engineering, Indian Institute of Science, India*, 03/08/10.
37. 2010 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Power Engineering, Jadavpur University, India*, 03/02/10.
38. 2010 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Mechanical Engineering, Indian Institute of Technology, Kharagpur, India*, 02/24/10.
39. 2009 “Encapsulated microbubbles for ultrasound imaging/drug delivery and cell adhesion to biologically activated substrates,” at *Mechanical Engineering, Iowa State University*, 02/18/09.
40. 2008 “Encapsulated microbubbles for contrast ultrasound/drug delivery and cell adhesion to biologically activated substrates,” at *BIOMS (Biomedical Movement Science program) Seminar, University of Delaware*, 10/17/08.
41. 2008 “Computational study of emulsions: viscous/viscoelastic drops and biological cells,” at *Computational Science Group Meeting, University of Delaware*, 10/08/08.
42. 2008 “Ultrasound contrast imaging and drug delivery with microbubbles,” at *Department of Mechanical Engineering, University of Maryland at Baltimore County*, 04/04/08.
43. 2008 “What to expect when you shear a viscoelastic drop?” at *Center for Advanced Modeling and Simulation, Idaho national Laboratory*, 03/21/08.
44. 2007 “Microbubbles for contrast ultrasound and cell adhesion,” at *Department of Biomedical Engineering, Washington University at St. Louis*, 10/16/07.

45. 2007 “Ultrasound contrast agents and cell adhesion,” at *Division of Applied Mathematical Sciences Brown University*, 03/19/07.
46. 2007 “Modeling contrast microbubbles: Acoustic response, growth and dissolution,” at *Fluid Dynamics Seminar Series, Department of Mathematical Sciences, New Jersey Institute of Technology*, 01/22/07.
47. 2006 “Modeling and characterization of ultrasound contrast agents,” at *Bioacoustics Research Laboratory, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign*, 04/06/06.
48. 2005 “Encapsulated Microbubbles for ultrasound imaging and drug delivery,” at *Department of Aerospace Engineering and Mechanics, University of Minnesota*, 09/20/05.
49. 2005 “Dynamics of encapsulated microbubbles for ultrasound imaging and drug delivery,” at *Polymer Division, NIST*, 08/15/05.
50. 2005 “Modeling contrast microbubbles for ultrasound imaging and drug delivery,” at *Department of Mechanical and Industrial Engineering, University of Illinois at Urbana-Champaign*, 06/30/05.
51. 2005 “Modeling contrast microbubbles for ultrasound imaging and drug delivery,” at *Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania*, 04/21/05.
52. 2005 “Encapsulated Microbubbles for ultrasound imaging and drug delivery,” at *Department of Mathematics, University of Delaware*, 04/05/05.
53. 2004 “Microbubble contrast agents for ultrasound imaging and drug delivery,” at *Department of Mechanical Engineering, Boston University*, 12/10/04.
54. 2004 “Microbubble based Ultrasound Contrast Agents,” at *Department of Mechanical Engineering, New Jersey Institute of Technology*, 09/08/04.
55. 2004 “Ultrasound Contrast Agents: Modeling and characterization of its interfacial rheology,” at *Department of Mechanical Engineering, National University of Singapore*, 01/28/04.
56. 2003 “Ultrasound Contrast Agents: A fresh look at its interfacial rheology,” at *DuPont Experimental Station*, 05/12/03.
57. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *Department of Mechanical and Aerospace Engineering, University of Missouri-Columbia*, 04/11/01.
58. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *Department of Mechanical Engineering, Southern Methodist University*, 03/27/01.
59. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *Department of Mechanical Engineering, University of Delaware*, 03/20/01.
60. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *Department of Mechanical and Nuclear Engineering, Kansas State University*, 03/15/01.
61. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *School of Mechanical and Materials Engineering, Washington State University*, 03/09/01.
62. 2001 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *School of Mechanical Engineering, Purdue University*, 02/23/01.
63. 2000 “Viscous/Viscoelastic Drop Deformation: Numerical & Theoretical Analysis,” at *Center for Simulation of Advanced Rockets, University of Illinois at Urbana-Champaign*, 09/6/00.

**Coverage in National & International Media**

1. <http://www.cnn.com/2017/10/13/politics/cuba-us-diplomats-acoustic-weapons/index.html>
2. <https://www.nbcnews.com/politics/white-house/dangerous-sound-what-americans-heard-cuba-attacks-n810306>
3. <https://www.nytimes.com/aponline/2017/10/12/us/politics/ap-us-cuba-attacks-the-sound.html>
4. <https://www.youtube.com/watch?v=rgbnZG85IRo>
5. <http://www.france24.com/en/20171028-bizarre-attacks-drama-rolls-between-us-cuba>

**Research Grants/Contracts (Total over \$6 million, over \$3 million as PI, currently 2 NSF and 1 NIH R01 grants)**

1. “Rheology, diffusion and microstructural evolution of emulsions of complex fluids” *XSEDE (NSF)* Resource Allocation, 1,100,000 SUs (Comet) (estimated value of \$16,682) 10/19-09/20.
2. “Rheology, diffusion and microstructural evolution of emulsions” *XSEDE (NSF)* Resource Allocation, 1,093,778 SUs (Comet) (estimated value of \$16,588) 10/18-09/19.
3. “Low intensity pulsed ultrasound (LIPUS) and microbubbles for osteochondral regeneration in 3D printed nanostructured scaffolds” *Cross-Disciplinary Research Fund*, PI (co-PI: Lijie Grace Zhang, Raj Rao), \$42,500 07/17-06/18.
4. “Nonlinear response of encapsulated contrast microbubbles for noninvasive blood pressure measurement” *National Science Foundation*, PI, \$199,994, 08/16-07/19.
5. “Collaborative Research: Acoustic microstreaming in the aqueous core of bubble containing liposomes for controlled release via shear induced bilayer reorganization” *National Science Foundation*, PI, (collaborative-PI Steven Wrenn, Drexel University \$224,274) \$227,742, 07/16-06/19.
6. “Low intensity pulsed ultrasound (LIPUS) and microbubbles for cartilage regeneration in 3D printed nanostructured scaffolds” *Cross-Disciplinary Research Fund*, PI (co-PI: Lijie Grace Zhang, Raj Rao), \$45,000 07/16-06/17.
7. “R01: Echogenic polymersomes for triggered contents release” *National Institute of Health*, PI (M-PI: Sanku Mallik and Bin Guo, North Dakota State University), \$1,200,000 09/15-08/19.
8. “Controlling Cancer Cell Proliferation Using Low-Intensity Pulsed Ultrasound” *George Washington University Facilitating Fund*, PI, \$20,000 05/13-04/14.
9. “Contrast Ultrasonography for Thyroid Cancer Diagnosis” *Katzen Cancer Research Center*, PI, (co-PI M. Reza Taheri, George Washington University Medical faculty Associates) \$80,000 07/13-06/14.
10. “Collaborative Research: Engineering monodisperse lipid-coated microbubbles with distinct scattering spectra for ultrasound molecular imaging applications” *National Science Foundation*, PI, (collaborative-PI Tyrone Porter, Boston University \$225,000) \$225,000, 9/11-12/16.
11. “Collaborative Research: Echogenic lipid nanoparticles for concurrent ultrasound imaging and drug delivery” *National Science Foundation*, PI, \$294,029 (collaborative –PI: Sanku Mallik, North Dakota State University \$292,686) 9/10-12/15.
12. “Noninvasive Ultrasonic Pressure Estimation using subharmonic response of Contrast Microbubbles” *National Science Foundation*, PI, \$302,889, 9/10-8/13.
13. “CRI- System Acquisition for the development of scalable parallel algorithms for scientific computing” *National Science Foundation*, Co-Investigator, (PI-Stephen Siegel, University of Delaware Computer Science) \$749,769, 05/10-04/13.
14. “PT/PHD PREDOCTORAL TRAINING PROGRAM” *National Institute of Health*, Co-Investigator, (PI Stuart Binder-Macleod) \$676,630, 05/10-04/15.
15. “Targeted Microbubbles for Contrast Enhanced Vascular Ultrasound Imaging” *National Institute of Health* IDeA Network of Biomedical Research Excellence, INBRE, PI, (IDeA PI: Karl Steiner), \$182,557, 9/09-9/11.
16. “Noninvasive Subharmonic Pressure Estimation for Monitoring Breast Cancer Response to Neoadjuvant Therapy” *Department of Defense*, co-PI (PI Flemming Forsberg, Thomas Jefferson), \$476,192, 04/08-3/11.

17. "Modeling and Characterization of Microbubble Contrast Agents for Medical Imaging and Drug Delivery" **National Science Foundation**, PI, \$240,000, 01/07-12/12.
18. "Subharmonic Microbubble Signals for Pressure Estimation" **National Institute of Health**, co-PI (PI Flemming Forsberg, Thomas Jefferson), \$476,192 (\$67,000 for KS), 01/07-12/09.
19. "Simulation of Leukocyte Adhesion Cascade: Effects of Cell Deformation and Hydrodynamic Interactions between Cells" **National Science Foundation**, PI, \$275,000, 09/06-08/10.
20. "Dynamics of Encapsulated Microbubbles for Medical Ultrasound" **National Science Foundation**, CTS-0352829, PI, \$40,000, 3/04-2/05.
21. "Summer Undergraduate Research program" **University of Delaware Research Foundation** (UDRF), PI, \$3,500, 6/04-8/04.
22. "Modeling and Characterization of Microbubble Contrast Agent for Medical Ultrasound" **University of Delaware Research Foundation** (UDRF), PI, \$30,000, 6/03-5/04.
23. "Modeling and Characterization of Definity by measuring in vitro attenuation" **Bristol-Myers Squibb Imaging**, PI, (50 vials of Definity®), 3/03-9/03.
24. "Ultrasound Activated Contrast Imaging of Prostate Cancer Detection" **Department of Defense** DAMD17-03-1-0119, co-PI (PI: Flemming Forsberg, Thomas Jefferson), \$541,180 (\$130,000 for KS), 3/03-3/06.



## Research Supervision

### PhD:

#### At University of Delaware

1. Qing Cao, awarded PhD 2004 “Experimental and numerical investigation of viscosity stratified two- and three- layer flow,” Co-advised with Ajay Prasad, (*Currently Senior Principal Scientist at IGINYA, Inc.*).
2. Xiaoyi Li, awarded PhD 2007 “Computational emulsion rheology and modeling mechanics of biological cells,” (*Currently Senior Scientist at United Technology Research Center*).
3. Amit Katiyar, awarded PhD 2012 “Dynamics of ultrasound contrast microbubbles and therapeutic effects of low intensity ultrasound,” (*Currently Senior R&D Engineer, at Dow Chemical Company*).
4. Swarnajay Mukherjee, PhD awarded 2013 “Computational study of multiphase viscoelastic flows,” (*Currently Mechanical Engineer at Schlumberger*).
5. Rajesh Singh, PhD awarded 2013 “Computational studies of the mechanics of capsules and biological cells in a shear flow,” (*Currently Postdoctoral Researcher at National Energy Technology Laboratory (NETL)*).
6. Shirshendu Paul, PhD awarded 2013 “Acoustic characterization of ultrasound contrast microbubbles and echogenic liposomes: Applications to imaging and drug-delivery,” (*Currently Thin Films Metrology TD Engineer at Intel*).

#### At George Washington University

7. Krishna Nandan Kumar PhD awarded 2017 “Acoustic studies on nanodroplets, microbubbles and liposomes,” (*Currently Senior R&D Engineer, FloDesign Sonics*).
8. Lang Xia, PhD awarded 2018 “Dynamics of ultrasound contrast agents and nonlinear acoustic waves: experiments, modeling, and theories” (*Currently Research Engineer, X-wave Innovations, Inc.*).
9. Nima Mobadersany PhD awarded in 2018 “Dynamics of contrast microbubbles and the surrounding fluid in the presence of ultrasound” (*Currently Development Engineer, HVAC Manufacturing Inc.*).
10. Mitra Aliabouzar PhD awarded in 2018 “Engineering microbubbles, phase shift droplets and 3D printed scaffolds for biomedical acoustic applications” (*Currently Postdoctoral Researcher in University of Michigan*).
11. Abhlah Reddy Malipeddi 2013-date “Computational multiphase flows”
12. Jenna Osborne, 2016-date “Bio-effects of Ultrasound on therapy and tissue engineering”
13. Roozbeh Hassanzadeh Azami, 2018-date “Microbubbles for biomedical acoustics”
14. Anik Tarafdar 2018-date “Computational multiphase flows”
15. Megan Anderson 2019-date “Bio-effects of Ultrasound on therapy and tissue engineering”

**MS:****At University of Delaware**

1. Pankaj Jain awarded MS 2006 “Acoustical investigation of ultrasound contrast agents: theory and experiments,” (*Currently Analyst at PayPal*).
2. Peter Olapade awarded MS 2007 “Computational studies of pair-wise interactions and drop dynamics in concentrated emulsion at finite inertia,” (*Currently Software Engineer at Schlumberger Information Solutions*).
3. Nishith Aggrawal awarded MS 2007 “Computational viscoelastic drop deformation and rheology,” (*Currently Algorithmic Trader at Jump Trading, LLC*).
4. Priyesh Srivastava, MS awarded 2013 “Shear rheology of concentrated emulsion at finite inertia: a numerical study,” (*Currently Research Engineer at Convergent Science, Inc*).

**Post-Doctoral:****At University of Delaware**

1. Dhiman Chatterjee 2002-2004 “Experiments and modeling of ultrasound contrast agents” (*Currently, Associate Professor of Mechanical Engineering in IIT Madras, India*).

**Post-MS Research Associate:****At George Washington University**

1. Priyesh Srivastava 2013 “Parallelized computer simulation of emulsions,” (*Currently Research Engineer at Convergent Science, Inc*).

**Undergraduate:****At University of Delaware**

1. Nathan Schreppler 2003-2004
2. Brian Tuchband 2003-2004
3. Stephanie Frangiakis 2003
4. Julia Li 2005
5. Aaron Winn 2005-2006
6. Dale Heintzelman 2006
7. Daniel Gempesaw 2007
8. Amelia House 2007
9. Benjamin Keller 2008

10. Daniel Russakow 2008-2011
11. John Delucca 2010-2011
12. David Ly 2010-2011
13. Mark Orteiz 2010-2011
14. Tyler Rodger 2011-2012

**At George Washington University**

15. Seyeon Jeong 2012-2013
16. Daniel De Oliveira Da Silva 2013
17. Tezita Watts 2013-2014
18. Ben Herman 2016-2017
19. Emma Gleysteen 2017-2018
20. Anya Qureshi 2018-2019

**High School Intern:****At George Washington University**

1. Anvitha Chimata (Thomas Jefferson High School for Science and Technology) 2018
2. Ilona Deckelman (Holton-Arms School) 2018
3. Morgan Beddingfield (Holton-Arms School) 2019

**Teaching****At University of Delaware**

1. MEEG640 Intermediate Heat Transfer: Spring 2002, Spring 2003, Spring 2004, Spring 2005, Spring 2006, Spring 2007, Spring 2008, Spring 2011
2. MEEG630 Intermediate Fluid Mechanics: Fall 2002
3. MEEG331 Fluid Mechanics I: Fall 2003, Fall 2004, Fall 2005, Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010
4. MEEG331 Fluid Mechanics I Lab: Fall 2005, Fall 2006, Fall 2007
5. MEEG667 Microscale Flows: Spring 2004
6. MEEG667 Microscale Flows with Biological Applications: Spring 2005
7. MEEG342 Heat Transfer: Spring 2009
8. MEEG467/667 Computational Multiphase Flow: Spring 2011

**At George Washington University**

9. MAE3187 Heat Transfer: Spring 2012, Spring 2013, Spring 2014, Spring 2015, Spring 2016, Spring 2017, Spring 2018
10. MAE6221 Fluid Mechanics: Fall 2012, Fall 2013
11. APSC6213 Analytical Methods in Engineering III: Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018, Fall 2019.
12. MAE6291 Complex Fluids: Spring 2019

## University Service

### Departmental Committees:

#### At University of Delaware

1. 2002-2004 Computer Committee
2. 2002-2003 Departmental Webmaster
  
3. 2003-2004 Faculty Search Committee
4. 2004-2005 Graduate Committee
5. 2006-2009 Safety Committee
  
6. 2007-2011 Undergraduate Committee
7. 2007-2010 Advisor to Undergraduate Honors Students

#### At George Washington University

8. 2011-2012 Mechanical and Aerospace Engineering Faculty Secretary
9. 2012-2013 Mechanical and Aerospace Engineering ABET Committee
10. 2012- Mechanical and Aerospace Engineering Academic Standards Committee
11. 2012-2013 Mechanical and Aerospace Engineering Faculty Search Committee
12. 2018- Mechanical and Aerospace Engineering Laboratory Committee
13. 2018- Mechanical and Aerospace Engineering Faculty Secretary

### College Committees

#### At University of Delaware

14. 2003-2004 e-CALC-II Committee
15. 2008 Mechanical Engineering Chair Search Committee
16. 2010 Mechanical Engineering Adjunct Faculty Search Committee

#### At George Washington University

17. 2013-2014 SEAS Personnel (promotion and tenure) Subcommittee
18. 2016- SEAS R&D Showcase Lead Judge
19. 2016 SEAS Teaching Award Selection Committee
20. 2016 SEAS Conflict of Interest Committee
21. 2018-2019 SEAS Research Award Selection Committee
22. 2018-2020 SEAS Personnel (promotion and tenure) Subcommittee

### University Committees

#### At University of Delaware

23. 2009-2011 Faculty Senate

#### At George Washington University

24. 2014- Faculty Senate
25. 2014- Senate Research Committee (Chair 2015-2016, 2017-2019)
26. 2014- Academic Research Council

### Professional Society Committees

- 2004- ASME Fluids Engineering Multiphase Flow Technical Committee
- 2004- ASME Micro- and Nano-Fluid Dynamics Technical Committee
- 2006 July 17-20 Co-organizer of ASME Forum on Multiphase Flow of Biological Interest  
(2006 ASME Joint U.S.-European Fluids Engineering Summer Conference, Miami, FL)
- 2007 July 30-August 2 Coordinator of ASME Forum on Biological Flows  
(2007 Joint ASME/JSME Fluids Engineering Conference, San Diego, CA)

- 2008 August 3-8 Co-organizer minisymposium on Interfacial Rheology  
(XVth *International Congress of Rheology ICR2008*, Monterey, CA)
- 2008 August 10-14 Co-organizer of ASME Forum on Biological Flows  
(2008 *ASME Fluids Engineering Summer Conference*, Jacksonville, FL)
- 2011 November 20-22 Organizer (UD) of American Physical Society—64th Annual meeting of  
Division of Fluid Dynamics, Baltimore, MD
- 2012 July 8-12 Organizer of ASME Forum on Biological Flows  
(2012 *ASME Fluids Engineering Summer Meeting*, Puerto Rico)
- 2013-2014 Andreas Acrivos Award Committee of Division of Fluid Dynamics (Chair in 2014)
- 2016-2019 APS DFD External Affairs Committee
- 2018 March 5-9 Co-organizer of APS Focus Session on Microinertia Effects on Particulate Flows  
(GSOFT, GSNP)(*APS March Meeting, Los Angeles, CA*)
- 2019-2020 Stanley Corrsin Award Committee of Division of Fluid Dynamics
- 2019 AIMBE (American Institute of Medical and Biological Engineers) Review  
committee for 2020 Class of College of Fellows

## Professional Activity

### Membership in professional organizations

- *American Society of Mechanical Engineers*
- *Acoustical Society of America*
- *American Physical Society-Division of Fluid Dynamics*
- *Society of Rheology*
- *American Institute of Medical and Biological Engineers*

### Reviewer for the following journals

- *Proceedings of the Royal Society*
- *Proceedings of the National Academy of Science*
- *Nature Nanotechnology*
- *Ultrasound in Medicine and Biology*
- *Journal of the Acoustical Society of America*
- *Journal of Fluid Mechanics*
- *Physics of Fluids*
- *Acoustics Research Online*
- *Journal of Ultrasound in Medicine*
- *Journal of Computational Physics*
- *Langmuir*
- *Journal of Non-Newtonian Fluid Mechanics*
- *Journal of Rheology*
- *International Journal of Multiphase flow*
- *International Journal of Heat and Mass Transfer*
- *Fluid Dynamics Research*
- *Bubble Science Engineering and Technology*
- *ASME Journal of Fluids Engineering*

- *Journal of Colloid and Interface Sciences*
- *Chemical Engineering Science*
- *Journal of Engineering Mathematics*
- *European Journal of Physics B*
- *International Journal for Numerical Methods in Engineering*
- *Microfluidics and Nanofluidics*
- *Computers and Fluids*
- *Acta Biomaterialia*
- *IEEE Transaction of Ultrasonics and Ferroelectrics and Frequency Control Society*
- *Theranostics*
- *Soft Matter*
- *Current Molecular Medicine*
- *Biomedicine & Pharmacotherapy*

**Reviewer for the following funding agencies**

- *NSF Advanced Materials and Manufacturing System Panel*
- *NSF Chemical and Transport Division*
- *US Civilian Research & Development Foundation (CRDF)*
- *ACS Petroleum Research Fund*
- *NASA Fluid Physics Division*
- *DOE Advanced Fuel Cycle*
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**External Promotion and Tenure**

- *University of Hawaii*
- *Washington State University*
- *University of Colorado at Boulder*