Curriculum Vitae

Boyce E. Griffith
Associate Professor of Mathematics
Adjunct Associate Professor of Applied Physical Sciences
Adjunct Associate Professor of Biomedical Engineering
Carolina Center for Interdisciplinary Applied Mathematics
McAllister Heart Institute
The University of North Carolina at Chapel Hill
October 8, 2018

Contact Information

Department of Mathematics
Phillips Hall, Campus Box 3250
University of North Carolina
Chapel Hill, NC 27599-3250
email: `boyceg@unc.edu`
web: `https://griffith.web.unc.edu`
phone: 919-962-7110
fax: 919-962-2568

Research Interests

Mathematical modeling and computer simulation in medicine and biology; multiscale physiological modeling, especially cardiovascular fluid dynamics, mechanics, and fluid-structure interaction, cardiac electrophysiology, and cardiac electro-mechanical coupling; medical devices; numerical analysis; and scientific computing

Education

Courant Institute of Mathematical Sciences, New York University, New York, New York
PhD in Mathematics, September 2005

Rice University, Houston, Texas
BA in Computational and Applied Mathematics and in Mathematics, May 2000
BS in Computer Science, May 2000

Professional Experience

Employment

2017–present	Adjunct Associate Professor of Applied Physical Sciences, University of North Carolina at Chapel Hill
2015–present	Adjunct Assistant (2015–2017) and Adjunct Associate (2017–present) Professor of Biomedical Engineering, University of North Carolina at Chapel Hill
2014–present	Assistant (2014–2017) and Associate (2017–present) Professor of Mathematics, University of North Carolina at Chapel Hill
2012–2014	Assistant Professor of Medicine and Mathematics, New York University
2008–2012	Assistant Professor of Medicine, New York University
2006–2008	American Heart Association Postdoctoral Research Fellow, Courant Institute of Mathematical Sciences, New York University
2005–2006	Courant Instructor, Department of Mathematics, Courant Institute of Mathematical Sciences, New York University

Faculty appointments

2018–present	Faculty, Program in Computational Medicine, University of North Carolina School of Medicine
2017–present	Adjunct Faculty, Department of Applied Physical Sciences, University of North Carolina at Chapel Hill

2015–present	Faculty, Clinician-Scientist Training Program in Cardiovascular Medicine, University of North Carolina School of Medicine
2015–present	Faculty, Integrative Vascular Biology Training Program, University of North Carolina School of Medicine
2015–present	Faculty, Big Data to Knowledge (BD2K) Training Program, University of North Carolina at Chapel Hill
2015–present	Adjunct Faculty, Joint Department of Biomedical Engineering, University of North Carolina at Chapel Hill and North Carolina State University
2015–present	Faculty, Curriculum in Bioinformatics and Computational Biology, University of North Carolina at Chapel Hill
2014–present	Member, McAllister Heart Institute, University of North Carolina School of Medicine
2014–present	Member, Carolina Center for Interdisciplinary Applied Mathematics, University of North Carolina at Chapel Hill
2014–present	Faculty, Department of Mathematics, University of North Carolina at Chapel Hill
2013–2014	Adjunct Faculty, Department of Mathematics, University of North Carolina at Chapel Hill
2012–2014	Associated Faculty, Department of Mathematics, Courant Institute of Mathematical Sciences, New York University
2011–2014	Affiliated Faculty, Center for Health Informatics and Bioinformatics, New York University School of Medicine
2010–2014	Affiliated Faculty, Sackler Institute of Graduate Biomedical Sciences, New York University School of Medicine
2008–2014	Faculty, Leon H. Charney Division of Cardiology, Department of Medicine, New York University School of Medicine

Honors and Recognition

2019	Plenary Speaker, SIAM Conference on Computational Science and Engineering
2018	Scientific Teaching Fellow, Yale/HHMI/Helmsley Summer Institute on Scientific Teaching
2018	Semi-plenary Speaker, Fluids Section, 18th U.S. National Congress for Theoretical and Applied Mechanics
2017	Finalist, Burroughs Wellcome Fund Innovation in Regulatory Science Award
2017	National Science Foundation CAREER Award
2016	Semifinalist, Howard Hughes Medical Institute/Gates Foundation/Simons Foundation Faculty Scholars Program
2015	University of North Carolina at Chapel Hill Junior Faculty Development Award
2015	Finalist, Burroughs Wellcome Fund Innovation in Regulatory Science Award
2009–2010	Whitehead Fellowship for Junior Faculty in Biomedical and Biological Sciences, New York University School of Medicine
2006–2008	Medtronic/American Heart Association Postdoctoral Research Fellowship
2006	Kurt O. Friedrichs Prize for an Outstanding Dissertation in Mathematics, Department of Mathematics, Courant Institute of Mathematical Sciences, New York University
2004–2005	New York University Graduate School of Arts and Science Dean's Dissertation Fellowship
2000–2004	Department of Energy Computational Science Graduate Fellowship
2000	*Cum Laude*, Rice University
1999	Tau Beta Pi National Engineering Honor Society

Publications

Complete listing of published work and preprints:
`https://scholar.google.com/citations?user=TGZ5TDcAAAAJ`

Refereed journal articles

1. S. Rossi, S. Gaeta, B. E. Griffith, and C. Henriquez. Muscle thickness and curvature influence atrial conduction velocities. *Front Physiol*. Accepted for publication

2. L. Y. Feng, N. Qi, H. Gao, W. Sun, M. Vazquez, B. E. Griffith, and X. Y. Luo. On the chordae structure and dynamic behaviour of the mitral valve. *IMA J Appl Math*, 2018. Epub ahead of print
3. S. G. Smith, B. E. Griffith, and D. A. Zaharoff. Analyzing the effects of instillation volume on intravesical delivery using biphasic solute transport in a deformable geometry. *Math Med Biol*, 2018. Epub ahead of print
4. B. E. Griffith and X. Y. Luo. Hybrid finite difference/finite element version of the immersed boundary method. *Int J Numer Meth Biomed Eng*, 33(11):e2888 (31 pages), 2017
5. W. Kou, B. E. Griffith, J. E. Pandolfino, P. J. Kahrilas, and N. A. Patankar. A continuum mechanics-based musculo-mechanical model for esophageal transport. *J Comput Phys*, 348:433–459, 2017
6. Y. Bao, A. Donev, B. E. Griffith, D. M. McQueen, and C. S. Peskin. An immersed boundary method with divergence-free velocity interpolation. *J Comput Phys*, 347:183–206, 2017
7. H. Gao, L. Feng, N. Qi, C. Berry, B. E. Griffith, and X. Y. Luo. A coupled mitral valve-left ventricle model with fluid-structure interaction. *Med Eng Phys*, 47:128–136, 2017
8. A. Hasan, E. M. Kolahdouz, A. Enquobahrie, T. G. Caranasos, J. P. Vavalle, and B. E. Griffith. Image-based immersed boundary model of the aortic root. *Med Eng Phys*, 47:72–84, 2017
9. S. Rossi and B. E. Griffith. Incorporating inductances in tissue-scale models of cardiac electrophysiology. *Chaos*, 27:093926 (18 pages), 2017
10. A. P. Hoover, B. E. Griffith, and L. A. Miller. Quantifying performance in the medusan mechanospace with an actively swimming three-dimensional jellyfish model. *J Fluid Mech*, 813:1112–1155, 2017
11. F. Balboa Usabiaga, B. Kallemov, B. Delmotte, A. P. S. Bhalla, B. E. Griffith, and A. Donev. Hydrodynamics of suspensions of passive and active rigid particles: A rigid multiblob approach. *Comm Appl Math Comput Sci*, 11(2):217–296, 2016
12. S. K. Jones, Y. J. Yun, T. L. Hedrick, B. E. Griffith, and L. A. Miller. Bristles reduce the force required to 'fling' wings apart in the smallest insects. *J Exp Biol*, 219:3759–3772, 2016
13. E. D. Tytell, M. C. Leftwich, C.-Y. Hsu, B. E. Griffith, A. H. Cohen, A. J. Smits, C. Hamlet, and L. J. Fauci. The role of body stiffness in undulatory swimming: Insights from robotic and computational models. *Phys Rev Fluids*, 1:073202 (17 pages), 2016
14. G. Sommer, S. Sherifova, P. J. Oberwalder, O. E. Dapunt, P. A. Ursomanno, A. DeAnda, B. E. Griffith, and G. A. Holzapfel. Mechanical strength of aneurysmatic and dissected human thoracic aortas at different shear loading modes. *J Biomech*, 49(12):2374–2382, 2016
15. V. Flamini, A. DeAnda, and B. E. Griffith. Immersed boundary-finite element model of fluid-structure interaction in the aortic root. *Theor Comput Fluid Dynam*, 30(1):139–164, 2016
16. B. Kallemov, A. P. S. Bhalla, B. E. Griffith, and A. Donev. An immersed boundary method for rigid bodies. *Comm Appl Math Comput Sci*, 11(1):79–141, 2016
17. S. Land, V. Gurev, S. Arens, C. M. Augustin, L. Baron, R. Blake, C. Bradley, S. Castro, A. Crozier, M. Favino, T. E. Fastl, T. Fritz, H. Gao, A. Gizzi, B. E. Griffith, D. E. Hurtado, R. Krause, X. Y. Luo, M. P. Nash, S. Pezzuto, G. Plank, S. Rossi, D. Ruprecht, G. Seemann, N. P. Smith, J. Sundnes, J. J. Rice, N. Trayanova, D. Wang, Z. J. Wang, and S. A. Niederer. Verification of cardiac mechanics software: Benchmark problems and solutions for testing active and passive material behaviour. *Proc R Soc A*, 471(2184):20150641 (20 pages), 2015
18. S. K. Jones, R. Laurenza, T. L. Hedrick, B. E. Griffith, and L. A. Miller. Lift vs. drag based mechanisms for vertical force production in the smallest flying insects. *J Theor Biol*, 384:105–120, 2015
19. A. Kheradvar, E. M. Groves, A. Falahatpisheh, M. R. K. Mofrad, S. H. Alavi, R. Tranquillo, L. P. Dasi, C. A. Simmons, K. J. Grande-Allen, C. J. Goergen, F. Baaijens, S. H. Little, S. Canic, and B. Griffith. Emerging trends in heart valve engineering: Part IV. Computational modeling and experimental studies. *Ann Biomed Eng*, 43(10):2314–2333, 2015
20. W. Kou, A. P. S. Bhalla, B. E. Griffith, J. E. Pandolfino, P. J. Kahrilas, and N. A. Patankar. A fully resolved active musculo-mechanical model for esophageal transport. *J Comput Phys*, 298:446–465, 2015
21. R. D. Guy, B. Phillip, and B. E. Griffith. Geometric multigrid for an implicit-time immersed boundary method. *Adv Comput Math*, 41(3):635–662, 2015
22. A. Kheradvar, E. M. Groves, C. A. Simmons, B. Griffith, S. H. Alavi, R. Tranquillo, L. P. Dasi, A. Falahatpisheh, K. J. Grande-Allen, C. J. Goergen, M. R. K. Mofrad, F. Baaijens, S. Canic, and S. H. Little.

Emerging trends in heart valve engineering: Part III. Novel technologies for mitral valve repair and replacement. *Ann Biomed Eng*, 43(4):858–870, 2015

23. A. Kheradvar, E. M. Groves, C. J. Goergen, S. H. Alavi, R. Tranquillo, C. A. Simmons, L. P. Dasi, K. J. Grande-Allen, M. R. K. Mofrad, A. Falahatpisheh, B. Griffith, F. Baaijens, S. H. Little, and S. Canic. Emerging trends in heart valve engineering: Part II. Novel and standard technologies for aortic valve replacement. *Ann Biomed Eng*, 43(4):844–857, 2015
24. A. Kheradvar, E. M. Groves, L. P. Dasi, S. H. Alavi, R. Tranquillo, K. J. Grande-Allen, C. A. Simmons, B. Griffith, A. Falahatpisheh, C. J. Goergen, M. R. K. Mofrad, F. Baaijens, S. H. Little, and S. Canic. Emerging trends in heart valve engineering: Part I. Solutions for future. *Ann Biomed Eng*, 43(4):833–843, 2015
25. S. Delong, Y. Sun, B. E. Griffith, E. Vanden-Eijnden, and A. Donev. Multiscale temporal integrators for fluctuating hydrodynamics. *Phys Rev E*, 90(6):063312 (23 pages), 2014
26. H. Gao, X. S. Ma, N. Qi, C. Berry, B. E. Griffith, and X. Y. Luo. A finite strain model of the human mitral valve with fluid-structure interaction. *Int J Numer Meth Biomed Eng*, 30(12):1597–1613, 2014
27. H. Gao, H. M. Wang, C. Berry, X. Y. Luo, and B. E. Griffith. Quasi-static image-based immersed boundary-finite element model of left ventricle under diastolic loading. *Int J Numer Meth Biomed Eng*, 30(11):1199–1222, 2014
28. M. Cai, A. Nonaka, J. B. Bell, B. E. Griffith, and A. Donev. Efficient variable-coefficient finite-volume Stokes solvers. *Comm Comput Phys*, 16(5):1263–1297, 2014
29. H. Gao, D. Carrick, C. Berry, B. E. Griffith, and X. Y. Luo. Dynamic finite-strain modelling of the human left ventricle in health and disease using an immersed boundary-finite element method. *IMA J Appl Math*, 79(5):978–1010, 2014
30. T. G. Fai, B. E. Griffith, Y. Mori, and C. S. Peskin. Immersed boundary method for variable viscosity and variable density problems using fast constant-coefficient linear solvers II: Theory. *SIAM J Sci Comput*, 36(3):B589–B621, 2014
31. S. Delong, F. Balboa Usabiaga, R. Delgado-Buscalioni, B. E. Griffith, and A. Donev. Brownian dynamics without Green's functions. *J Chem Phys*, 140(13):134110 (23 pages), 2014
32. F. Balboa Usabiaga, R. Delgado-Buscalioni, B. E. Griffith, and A. Donev. Inertial Coupling Method for particles in an incompressible fluctuating fluid. *Comput Meth Appl Mech Eng*, 269:139–172, 2014
33. H. M. Wang, X. Y. Luo, H. Gao, R. W. Ogden, B. E. Griffith, and C. Berry. A modified Holzapfel-Ogden law for a residually stressed finite strain model of the human left ventricle in diastole. *Biomechan Model Mechanobiol*, 13(1):99–113, 2014
34. A. P. S. Bhalla, R. Bale, B. E. Griffith, and N. A. Patankar. Fully resolved immersed electrohydrodynamics for particle motion, electrolocation, and self-propulsion. *J Comput Phys*, 256:88–108, 2014
35. A. P. S. Bhalla, B. E. Griffith, N. A. Patankar, and A. Donev. A minimally-resolved immersed boundary model for reaction-diffusion problems. *J Chem Phys*, 139(21):214112 (15 pages), 2013
36. B. E. Griffith and C. S. Peskin. Electrophysiology. *Comm Pure Appl Math*, 66(12):1837–1913, 2013
37. T. G. Fai, B. E. Griffith, Y. Mori, and C. S. Peskin. Immersed boundary method for variable viscosity and variable density problems using fast constant-coefficient linear solvers I: Numerical method and results. *SIAM J Sci Comput*, 35(5):B1132–B1161, 2013
38. A. P. S. Bhalla, R. Bale, B. E. Griffith, and N. A. Patankar. A unified mathematical framework and an adaptive numerical method for fluid-structure interaction with rigid, deforming, and elastic bodies. *J Comput Phys*, 250:446–476, 2013
39. A. P. S. Bhalla, B. E. Griffith, and N. A. Patankar. A forced damped oscillation framework for undulatory swimming provides new insights into how propulsion arises in active and passive swimming. *PLOS Comput Biol*, 9(6):e100309 (16 pages), 2013
40. S. Delong, B. E. Griffith, E. Vanden-Eijnden, and A. Donev. Temporal integrators for fluctuating hydrodynamics. *Phys Rev E*, 87(3):033302 (22 pages), 2013
41. X. S. Ma, H. Gao, B. E. Griffith, C. Berry, and X. Y. Luo. Image-based fluid-structure interaction model of the human mitral valve. *Comput Fluid*, 71:417–425, 2013

42. H. M. Wang, H. Gao, X. Y. Luo, C. Berry, B. E. Griffith, R. W. Ogden, and T. J. Wang. Structure-based finite strain modelling of the human left ventricle in diastole. *Int J Numer Meth Biomed Eng*, 29(1):83–103, 2013
43. F. Balboa Usabiaga, J. B. Bell, R. Delgado-Buscalioni, A. Donev, T. Fai, B. E. Griffith, and C. S. Peskin. Staggered schemes for fluctuating hydrodynamics. *Multiscale Model Simul*, 10(4):1369–1408, 2012
44. B. E. Griffith and S. Lim. Simulating an elastic ring with bend and twist by an adaptive generalized immersed boundary method. *Comm Comput Phys*, 12(2):433–461, 2012
45. B. E. Griffith. On the volume conservation of the immersed boundary method. *Comm Comput Phys*, 12(2):401–432, 2012
46. X. Y. Luo, B. E. Griffith, X. S. Ma, M. Yin, T. J. Wang, C. L. Liang, P. N. Watton, and G. M. Bernacca. Effect of bending rigidity in a dynamic model of a polyurethane prosthetic mitral valve. *Biomech Model Mechanobiol*, 11(6):815–827, 2012
47. B. E. Griffith. Immersed boundary model of aortic heart valve dynamics with physiological driving and loading conditions. *Int J Numer Meth Biomed Eng*, 28(3):317–345, 2012[*]
48. P. E. Hand and B. E. Griffith. Empirical study of an adaptive multiscale model for simulating cardiac conduction. *Bull Math Biol*, 73(12):3071–3089, 2011
49. P. E. Hand and B. E. Griffith. Adaptive multiscale model for simulating cardiac conduction. *Proc Natl Acad Sci U S A*, 107(33):14603–14608, 2010
50. P. Lee, B. E. Griffith, and C. S. Peskin. The immersed boundary method for advection-electrodiffusion with implicit timestepping and local mesh refinement. *J Comput Phys*, 229(13):5208–5227, 2010
51. B. E. Griffith. An accurate and efficient method for the incompressible Navier-Stokes equations using the projection method as a preconditioner. *J Comput Phys*, 228(20):7565–7595, 2009
52. P. E. Hand, B. E. Griffith, and C. S. Peskin. Deriving macroscopic myocardial conductivities by homogenization of microscopic models. *Bull Math Biol*, 71(7):1707–1726, 2009
53. B. E. Griffith, X. Y. Luo, D. M. McQueen, and C. S. Peskin. Simulating the fluid dynamics of natural and prosthetic heart valves using the immersed boundary method. *Int J Appl Mech*, 1(1):137–177, 2009
54. B. E. Griffith, R. D. Hornung, D. M. McQueen, and C. S. Peskin. An adaptive, formally second order accurate version of the immersed boundary method. *J Comput Phys*, 223(1):10–49, 2007
55. B. E. Griffith and C. S. Peskin. On the order of accuracy of the immersed boundary method: Higher order convergence rates for sufficiently smooth problems. *J Comput Phys*, 208(1):75–105, 2005
56. S. J. Cox and B. E. Griffith. Recovering quasi-active properties of dendritic neurons from dual potential recordings. *J Comput Neurosci*, 11(2):95–110, 2001
57. L. J. Gray and B. E. Griffith. A faster Galerkin boundary integral algorithm. *Comm Numer Meth Eng*, 14(12):1109–1117, 1998

Refereed book chapters

1. D. M. McQueen, T. O'Donnell, B. E. Griffith, and C. S. Peskin. Constructing a Patient-Specific Model Heart from CT Data. In N. Paragios, N. Ayache, and J. Duncan, editors, *Handbook of Biomedical Imaging*, pages 183–197. Springer-Verlag, New York, NY, USA, 2015
2. T. Skorczewski, B. E. Griffith, and A. L. Fogelson. Multi-bond models for platelet adhesion and cohesion. In S. D. Olson and A. T. Layton, editors, *Biological Fluid Dynamics: Modeling, Computation, and Applications*, Contemporary Mathematics, pages 149–172. American Mathematical Society, Providence, RI, USA, 2014
3. B. E. Griffith, R. D. Hornung, D. M. McQueen, and C. S. Peskin. Parallel and adaptive simulation of cardiac fluid dynamics. In M. Parashar and X. Li, editors, *Advanced Computational Infrastructures for Parallel and Distributed Adaptive Applications*, pages 105–130. John Wiley and Sons, Hoboken, NJ, USA, 2009

Refereed conference proceedings and abstracts

1. H. Gao, N. Qi, X. S. Ma, B. E. Griffith, C. Berry, and X. Y. Luo. Fluid-structure interaction model of human mitral valve within left ventricle. In H. van Assen, P. Bovendeerd, and T. Delhaas, editors, *Functional Imaging*

[*]The published version of this paper includes substantial typographical errors that were introduced by the publisher following the proofing process. *Erratum:* B. E. Griffith. Immersed boundary model of aortic heart valve dynamics with physiological driving and loading conditions. *Int J Numer Meth Biomed Eng*, 29(5):698–700, 2013

and Modeling of the Heart: 8th International Conference, FIMH 2015, Maastricht, The Netherlands, June 25–27, 2015, volume 9126 of *Lecture Notes in Computer Science*, pages 330–337, 2015
2. A. Ward, S. Maddalo, S. Lavallee, V. Flamini, A. DeAnda, and B. Griffith. Influence of anti-hypertensive medications on aortic peak stress. *Circulation*, 130:A17405, 2014
3. B. E. Griffith, V. Flamini, A. DeAnda, and L. Scotten. Simulating the dynamics of an aortic valve prosthesis in a pulse duplicator: Numerical methods and initial experience. *J Med Dev*, 7(4):040912 (2 pages), 2013
4. S. L. Maddalo, A. Ward, V. Flamini, B. Griffith, P. Ursomanno, and A. DeAnda. Antihypertensive strategies in the management of aortic disease. *J Am Coll Surg*, 217(3):S39, 2013
5. H. Gao, B. E. Griffith, D. Carrick, C. McComb, C. Berry, and X. Y. Luo. Initial experience with a dynamic imaging-derived immersed boundary model of human left ventricle. In S. Ourselin, D. Rueckert, and N. Smith, editors, *Functional Imaging and Modeling of the Heart: 7th International Conference, FIMH 2013, London, UK, June 20–22, 2013*, volume 7945 of *Lecture Notes in Computer Science*, pages 11–18, 2013

Other conference publications

1. V. Flamini, A. DeAnda, and B. E. Griffith. Simulating the effects of intersubject variability in aortic root compliance by the immersed boundary method. In P. Nithiarasu, R. Löhner, and K. M. Liew, editors, *Proceedings of the Third International Conference on Computational & Mathematical Biomedical Engineering*, 2013
2. X. S. Ma, H. Gao, N. Qi, C. Berry, B. E. Griffith, and X. Y. Luo. Image-based immersed boundary/finite element model of the human mitral valve. In P. Nithiarasu, R. Löhner, and K. M. Liew, editors, *Proceedings of the Third International Conference on Computational & Mathematical Biomedical Engineering*, 2013

Other non-refereed works

1. S. J. Cox and B. E. Griffith. A fast, fully implicit backward Euler solver for dendritic neurons. Technical report, Department of Computational and Applied Mathematics, Rice University, 2000. Technical Report TR00-32

PhD thesis

1. B. E. Griffith. *Simulating the blood-muscle-valve mechanics of the heart by an adaptive and parallel version of the immersed boundary method.* PhD thesis, Courant Institute of Mathematical Sciences, New York University, 2005

Submitted for publication (in alphabetical order by author)

1. A. P. S. Bhalla, M. G. Knepley, M. F. Adams, R. D. Guy, and B. E. Griffith. Scalable smoothing strategies for a geometric multigrid method for the immersed boundary equations. Submitted, arXiv preprint arXiv:1612.02208
2. S. Gaeta, S. Rossi, B. E. Griffith, C. Henriquez, and T. Bahnson. Multiscale conduction velocity mapping using multipolar electrode catheters. Submitted
3. S. K. Jones, A. P. S. Bhalla, G. Katsikis, B. E. Griffith, and D. Klotsa. Transition in motility mechanism due to inertia in a model two-sphere swimmer. Submitted, arXiv preprint arXiv:1801.03974
4. W. Lee, Y. Kim, B. E. Griffith, and S. Lim. Bacterial flagellar bundling and unbundling via polymorphic transformations. Submitted
5. N. Nangia, B. E. Griffith, N. A. Patankar, and A. P. S. Bhalla. A robust incompressible Navier-Stokes solver for high density ratio multiphase flows. Submitted
6. W. Sun, W. Mao, and B. E. Griffith. Computer modeling and simulation of heart valve function and intervention. Submitted

Conference and Workshop Talks

1. Cardiac fluid-structure interaction by a hypereleastic immersed boundary-finite element method. 13^{th} World Congress on Computational Mechanics, New York, New York, 2018
2. Cardiac fluid-structure interaction by a hypereleastic immersed boundary-finite element method. SIAM Annual Meeting, Portland, Oregon, 2018
3. Fluid-Structure Interaction: Methods, Models, and Applications in Biology and Medicine (Fluids Sectional Semi-plenary Lecture). 18^{th} U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, 2018

4. Towards experimentally validated immersed boundary models of fluid-structure interaction in bioprosthetic heart valves. 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, 2018
5. Sharp interface immersed boundary methods for heart valve fluid-structure interaction. SIAM Conference on Computational Science & Engineering, Atlanta, Georgia, 2017
6. Immersed boundary models of cardiac fluid dynamics in vitro and in vivo. Society of Engineering Science 53rd Annual Technical Meeting, College Park, Maryland, 2016
7. Simulating heart valve dynamics in a computational pulse duplicator. ESB-ITA Thematic Symposium on Frontier Biomechanical Challenges in Cardiovascular Physiopathology, Palermo, Italy, 2016
8. Towards validated immersed boundary models of in vitro cardiac fluid dynamics. 12th World Congress on Computational Mechanics, Seoul, South Korea, 2016
9. Towards validated immersed boundary models of in vitro cardiac fluid dynamics. Second International Symposium on Computing in Cardiology, Northwestern Polytechnical University, Xi'an, Shaanxi, China, 2016
10. Towards validated immersed boundary models of in vitro cardiac fluid dynamics. SIAM Conference on the Life Sciences, Boston, Massachusetts, 2016
11. Towards validated immersed boundary models of in vitro cardiac fluid dynamics. 10th International Conference on Scientific Computing and Applications, Fields Institute, Toronto, Canada, 2016
12. Towards validated immersed boundary models of in vitro cardiac fluid dynamics. Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, New Jersey, 2016
13. Toward validated immersed boundary models of cardiovascular dynamics using in vitro experiments. Computational Fluid Dynamics in Medicine and Biology II, Albufeira, Portugal, 2015
14. Fluid-structure interaction models of natural and prosthetic heart valves. 13th US National Congress on Computational Mechanics, San Diego, California, 2015
15. Extensions of the immersed boundary method for modeling cardiovascular dynamics. Computational Biofluids in Physiology in Celebration of Aaron Fogelson's 60th Birthday, Salt Lake City, Utah, 2015
16. Cardiac fluid-structure and electro-mechanical interaction. SIAM Conference on Computational Science & Engineering, Salt Lake City, Utah, 2015
17. Immersed boundary-finite element models of the native and prosthetic aortic root. Biomedical Engineering Society Annual Meeting, San Antonio, Texas, 2014
18. Cardiac fluid-structure and electro-mechanical interaction. World Congress of Biomechanics, Boston, Massachusetts, 2014
19. Simulating the dynamics of aortic dissection. World Congress of Biomechanics, Boston, Massachusetts, 2014
20. Fluid-structure interaction models of the aortic valve. World Congress of Biomechanics, Boston, Massachusetts, 2014
21. Parallel and adaptive simulation infrastructure for fluid-structure interaction. High-Performance Computational Science with Structured Meshes and Particles (HPCS-SMP) Workshop, Berkeley, California, 2014
22. Modeling cardiac fluid-structure interaction. Mathematical Biosciences Institute Current Topics Workshop: Mathematics Guiding Bioartificial Heart Valve Design, Columbus, Ohio, 2013
23. Modeling cardiac fluid-structure interaction. Cardiac Physiome Society Meeting, Bar Harbor, Maine, 2013
24. Simulating the dynamics of an aortic valve prosthesis in a pulse duplicator: Numerical methods and initial experience. ASME Frontiers in Medical Devices: Applications of Computer Modeling and Simulation, Hyattsville, Maryland, 2013
25. Multiphysics and multiscale modeling of cardiac dynamics. Seventh MIT Conference on Computational Fluid and Solid Mechanics, Cambridge, Massachusetts, 2013
26. Approaches to using large-deformation continuum mechanics models with the immersed boundary method. SIAM Conference on Computational Science & Engineering, Boston, Massachusetts, 2013
27. An approach to using finite element mechanics models with the immersed boundary method. American Mathematical Society Southeastern Section Meeting, Tulane University, New Orleans, Louisiana, 2012
28. Cardiac fluid-structure and electro-mechanical interaction. SIAM Conference on the Life Sciences, San Diego, California, 2012
29. Cardiac fluid-structure and electro-mechanical interaction. 10th World Congress on Computational Mechanics,

São Paulo, Brazil, 2012

30. Cardiac fluid-structure and electro-mechanical interaction. Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, New Jersey, 2012
31. Cardiac fluid-structure and electro-mechanical interaction. Lehigh High Performance Computing Symposium, Lehigh University, Bethlehem, Pennsylvania, 2012
32. Cardiac fluid-structure and electro-mechanical interaction. Glasgow Workshop on Soft Tissue Modelling, University of Glasgow, Glasgow, Scotland, UK, 2012
33. Adaptive numerical methods for fluid-structure interaction. Winter Workshop on Neuromechanical Locomotion, Princeton University, Princeton, New Jersey, 2012
34. Cardiac fluid-structure and electro-mechanical interaction. NIMS Hot Topic Workshop on Fluid Dynamics: Vortex Dynamics, Biofluids and Related Fields, Daejeon, Korea, 2011
35. Hybrid immersed boundary-immersed interface methods for fluid-structure interaction. Society of Engineering Science 48th Annual Technical Meeting, Evanston, Illinois, 2011
36. Cardiac fluid dynamics by an immersed boundary method with finite element elasticity. Seventh International Congress on Industrial and Applied Mathematics, Vancouver, Canada, 2011
37. Adaptive multiscale model of cardiac conduction. Fourth Cardiac Physiome Workshop, Oxford, England, United Kingdom, 2011
38. Modeling cardiac electromechanics using the immersed boundary method. SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2011
39. Immersed boundary methods for simulating fluid-structure interaction. Spring Workshop on Nonlinear Mechanics, Xi'an Jiaotong University, Xi'an, Shaanxi, China, 2011
40. Simulating aortic heart valve dynamics by the immersed boundary method. Second International Conference on Mathematical and Computational Biomedical Engineering, Fairfax, Virginia, 2011
41. Immersed boundary method with finite element elasticity. First North American Meeting on Industrial and Applied Mathematics, Huatulco, Oaxaca, México, 2010
42. Two extensions to the immersed boundary method: Physical boundary conditions and finite element elasticity. Workshop on Fluid Motion Driven by Immersed Structures, Fields Institute, Toronto, Canada, 2010
43. A comparison of two adaptive versions of the immersed boundary method. ASME 2010 First Global Congress on NanoEngineering for Medicine and Biology, Houston, Texas, 2010
44. Adaptive numerical methods for simulating biological fluid dynamics and electrophysiology. Computational Challenges in Integrative Biological Modeling, Mathematical Biosciences Institute, The Ohio State University, Columbus, Ohio, 2009
45. Simulating cardiac fluid-structure interaction by the immersed boundary method. The Cardiac Physiome: Multi-scale and Multi-physics Mathematical Modelling Applied to the Heart, Cambridge, United Kingdom, 2009
46. Simulating cardiac fluid-structure interaction by the immersed boundary method. Tenth U.S. National Congress on Computational Mechanics, Columbus, Ohio, 2009
47. Simulating the fluid dynamics of the aortic heart valve. A Conference in Memory of Thomas Bringley, New York, New York, 2009
48. Adaptive immersed boundary methods for simulating cardiac fluid dynamics. SIAM Conference on Computational Science and Engineering, Miami, Florida, 2009
49. Simulating cardiovascular fluid dynamics by the immersed boundary method. 47th AIAA Aerospace Sciences Meeting, Orlando, Florida, 2009
50. Simulating cardiac fluid-structure interaction by the immersed boundary method. SIAM Conference on the Life Sciences, Montreal, Canada, 2008
51. Cardiac fluid dynamics. Summer 2008 Mathematics Workshop on Applications of Analysis in Mathematical Biology/NSF Summer Research Experience for Undergraduates (REU), University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, 2008
52. Simulating cardiac fluid dynamics by the immersed boundary method. Inaugural International Conference of the Engineering Mechanics Institute, Minneapolis, Minnesota, 2008

53. A parallel and adaptive immersed boundary method for simulating cardiac fluid dynamics. Modeling and High Performance Computing Workshop, U.S.-France Young Engineering Scientists Symposium, Washington, DC, 2007
54. Towards an electro-mechano-fluidic model of the heart. Applications of Mathematics in Biology, Physiology, and Medicine—A Conference in Honor of Charles S. Peskin's and David M. McQueen's 60$^{\text{th}}$ Birthdays, New York, New York, 2006
55. Simulating cardiac blood-muscle-valve mechanics by an adaptive version of the immersed boundary method. Joint SIAM-SMB Conference on the Life Sciences, Raleigh, North Carolina, 2006
56. Simulating cardiac blood-muscle-valve mechanics by an adaptive version of the immersed boundary method. Seventh World Congress on Computational Mechanics, Los Angeles, California, 2006
57. SIAM Student Paper Prize Presentation: On the order of accuracy of the immersed boundary method: Higher order convergence rates for sufficiently smooth problems. SIAM Annual Meeting, New Orleans, Louisiana, 2005
58. Simulating cardiac electrophysiology using the bidomain equations: Numerical methods and computational results. SIAM Annual Meeting, New Orleans, Louisiana, 2005
59. Parallel implicit methods for the bidomain equations. SIAM Conference on Applications of Dynamical Systems, Salt Lake City, Utah, 2005
60. Numerical approaches and computational results for fluid dynamics problems with immersed elastic structures. DOE Computational Science Graduate Fellowship Annual Fellows' Conference, Washington, DC, 2003
61. Recovering quasi-active properties of dendritic neurons from dual potential recordings. SIAM Annual Meeting, Rio Grande, Puerto Rico, 2000

Other Talks

1. Multiphysics and multiscale modeling of cardiac dynamics. Seminar, IBM T. J. Watson Research Center, Yorktown Heights, New York, 2018
2. Multiphysics and multiscale modeling of cardiac dynamics. Seminar, Department of Mechanical Engineering and Materials Science, Duke University, Durham, North Carolina, 2017
3. Modeling and simulation of cardiovascular dynamics. Colloquium, Joint Department of Biomedical Engineering, University of North Carolina at Chapel Hill and North Carolina State University, Chapel Hill, North Carolina, 2016
4. A short history of the immersed boundary method. Special Applied Mathematics Seminar in Celebration of Charlie Peskin's 70$^{\text{th}}$ Birthday, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2016
5. Towards experimentally validated immersed boundary models for cardiovascular device design applications. Centre for Mathematics Applied to the Life Sciences Seminar, University of Glasgow and University of Strathclyde, Glasgow, Scotland, UK, 2015
6. Multiphysics and multiscale modeling of cardiac dynamics. Colloquium, Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester, Massachusetts, 2015
7. Multiphysics and multiscale modeling of cardiac dynamics. Bioinformatics and Computational Biology Seminar, University of North Carolina, Chapel Hill, North Carolina, 2015
8. Multiphysics and multiscale modeling of cardiac dynamics. Biomathematics Seminar, North Carolina State University, Raleigh, North Carolina, 2014
9. Multiphysics and multiscale modeling of cardiac dynamics. Lawrence Berkely National Laboratory, Berkeley, California, 2014
10. Multiphysics and multiscale modeling of cardiac dynamics. Applied Mathematics and Scientific Computing Seminar, Temple University, Philadelphia, Pennsylvania, 2013
11. Multiphysics and multiscale modeling of cardiac dynamics. Technical Lunch, Kitware, Inc., Clifton Park, New York, 2013
12. Multiphysics and multiscale modeling of cardiac dynamics. Applied Mathematics Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2013
13. Multiphysics and multiscale modeling of cardiac dynamics. Institute for Applied Computational Science

Seminar, Harvard University, Cambridge, Massachusetts, 2013

14. Multiphysics and multiscale modeling of cardiac dynamics. Scientific Computing Seminar, University of Houston, Houston, Texas, 2013
15. Multiphysics and multiscale modeling of cardiac dynamics. Computational and Applied Mathematics Colloquium, Rice University, Houston, Texas, 2013
16. Multiphysics and multiscale modeling of cardiac dynamics. Applied Mathematics Seminar, Duke University, Durham, North Carolina, 2013
17. Multiphysics and multiscale modeling of cardiac dynamics. Special Mathematics Colloquium, University of North Carolina, Chapel Hill, North Carolina, 2013
18. Adaptive numerical methods and multiscale mathematical models in cardiology. Mathematical Biology Seminar, University of California, Davis, California, 2010
19. Immersed boundary method with finite element elasticity. Mathematical Biology Seminar, University of Glasgow, Glasgow, Scotland, UK, 2010
20. Adaptive numerical methods and multiscale mathematical models in cardiology. Department of Mathematical Sciences Colloquium, Indiana University-Purdue University Indianapolis, Indianapolis, Indiana, 2010
21. Adaptive numerical methods and multiscale mathematical models in cardiology. Department of Mathematical Sciences Colloquium, University of Cincinnati, Cincinnati, Ohio, 2010
22. Recent work on the immersed boundary method: Adaptivity, physical boundary conditions, and finite element elasticity. Mostly Biomathematics Lunchtime Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2009
23. A comparison of two adaptive versions of the immersed boundary method. Applied Mathematics Colloquium, University of North Carolina, Chapel Hill, North Carolina, 2009
24. Two short talks: Progress towards an efficient implicit immersed boundary method, and an extended version of the bidomain model of cardiac electrophysiology. Mathematical Biology Seminar, University of Glasgow, Glasgow, Scotland, UK, 2009
25. Adaptive numerical methods for simulating cardiovascular fluid dynamics and electrophysiology. Mathematical Biology Seminar, University of Glasgow, Glasgow, Scotland, UK, 2008
26. Adaptive numerical methods for simulating cardiovascular fluid dynamics and electrophysiology. Department of Biomedical Engineering Seminar, Columbia University, New York, New York, 2008
27. IBAMR: A framework for building parallel and adaptive immersed boundary simulations. Center for Computational Science Seminar, Tulane University, New Orleans, Louisiana, 2008
28. Adaptive numerical methods for cardiac fluid-structure interaction and electrophysiology. Computer Science and Mathematics Division Seminar Series, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 2008
29. Adaptive numerical methods for cardiac fluid-structure interaction and electrophysiology. Department of Computational and Applied Mathematics Colloquium, Rice University, Houston, Texas, 2008
30. An adaptive immersed boundary method for fluid-structure interaction with applications to cardiac fluid dynamics. Applied and Computational Mathematics Seminar, School of Mathematics, Georgia Institute of Technology, Atlanta, Georgia, 2007
31. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Mathematical Biology Seminar, New Jersey Institute of Technology, Newark, New Jersey, 2006
32. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Computational Science and Engineering Seminar, College of Computing, Georgia Institute of Technology, Atlanta, Georgia, 2006
33. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Computational Science and Engineering Seminar, Department of Applied and Computational Mathematics, California Institute of Technology, Pasadena, California, 2006
34. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Applied Mathematics Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2006

35. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Centre for Scientific Computing, Simon Fraser University, Burnaby, Canada, 2006
36. Adaptive immersed boundary methods for simulating cardiac blood-muscle-valve mechanics and electrophysiology. Center for Applied Mathematics Colloquium, Cornell University, Ithaca, New York, 2006
37. Adaptive methods for simulating cardiac blood-muscle-valve mechanics. Courant Instructor Day, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2005
38. Computational methods for modeling cardiac physiology: A parallel and adaptive version of the immersed boundary method and bidomain simulations of electrical conduction in murine ventricular tissue. Mathematical Biology Seminar, Department of Mathematics, University of Utah, Salt Lake City, Utah, 2005
39. A parallel, locally adaptive implementation of the immersed boundary method using SAMRAI, *hypre*, and PETSc. Mostly Biomathematics Lunchtime Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2004
40. A SAMRAI-based implementation of the immersed boundary method. Mostly Biomathematics Lunchtime Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2002
41. Computational cardiac electrophysiology with the bidomain equations. Mostly Biomathematics Lunchtime Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2002
42. Recovering quasi-active properties of dendritic neurons from dual potential recordings. Mostly Biomathematics Lunchtime Seminar, Courant Institute of Mathematical Sciences, New York University, New York, New York, 2000

Conference and Workshop Posters

1. Computational and experimental models of prosthetic heart valve dynamics. Biomedical Engineering Society Annual Meeting, Minneapolis, Minnesota, 2016
2. An experimentally validated fluid-structure interaction model of left ventricular filling. Biomedical Engineering Society Annual Meeting, Minneapolis, Minnesota, 2016
3. Toward an experimentally validated immersed boundary model of left ventricular fluid dynamics using in vitro experiments. Summer Biomechanics, Bioengineering and Biotransport Conference, Snowbird, Utah, 2015
4. IBAMR: Parallel and adaptive simulation infrastructure for biological fluid-structure interaction. University of North Carolina Research Computing Symposium, Chapel Hill, North Carolina, 2015
5. IBAMR: Parallel and adaptive simulation infrastructure for biological fluid-structure interaction. National Science Foundation Software Infrastructure for Sustained Innovation Principal Investigators Meeting, Arlington, Virginia, 2015
6. IBAMR: Parallel and adaptive simulation infrastructure for biological fluid-structure interaction. National Science Foundation Software Infrastructure for Sustained Innovation Principal Investigators Meeting, Arlington, Virginia, 2014
7. Fluid-structure interaction model of the aortic root. Biomedical Engineering Society (BMES) Annual Meeting, Seattle, Washington, 2013
8. Dynamic fluid-structure interaction model of aortic dissection. Biomedical Engineering Society (BMES) Annual Meeting, Seattle, Washington, 2013
9. Parallel and adaptive simulation infrastructure for biological fluid-structure interaction. National Science Foundation Software Infrastructure for Sustained Innovation Principal Investigators Meeting, Arlington, Virginia, 2013
10. Simulating cardiac mechanics by an adaptive version of the immersed boundary method. Second Young Researchers Workshop in Mathematical Biology, Mathematical Biosciences Institute, The Ohio State University, Columbus, Ohio, 2006
11. Convergence results for a spatially adaptive immersed boundary method. DOE Computational Science Graduate Fellowship Annual Fellows' Conference, Washington, DC, 2004
12. Numerical methods for the bidomain equations. DOE Computational Science Graduate Fellowship Annual Fellows' Conference, Washington, DC, 2002
13. An FFT-based method for simulating cardiac conduction in a three-dimensional bidomain. Society for Mathematical Biology Annual Meeting, Hilo, Hawaii, 2001

Teaching Record

Courses taught

(UG=undergraduate, GR=graduate, IS=independent study, CH=credit hour)

University of North Carolina at Chapel Hill

Fall 2019	ENVR 661/MATH 661: Scientific Computing I (GR, 3 CH, enrollment: 33)
Spring 2018	MATH 296: Directed Exploration (UG, 1 CH/student, enrollment: 1)
	MATH 547: Linear Algebra for Applications (UG, 3 CH, enrollment: 102)
	MATH 692H: Honors Research in Mathematics (UG IS, 3 CH/student, enrollment: 1)
	MATH 891: Computational and experimental models of prosthetic heart valves (GR, 1 CH, enrollment: 7, co-instructors: P.-Y. Passaggia and J. Vavalle)
Fall 2017	ENVR 661/MATH 661: Scientific Computing I (GR, 3 CH, enrollment: 35)
	MATH 691H: Honors Research in Mathematics (UG IS, 3 CH/student, enrollment: 1)
Spring 2017	MATH 692H: Honors Research in Mathematics (UG IS, 3 CH/student, enrollment: 1)
Fall 2016	MATH 691H: Honors Research in Mathematics (UG IS, 3 CH/student, enrollment: 2)
Spring 2016	BIOL 890/MATH 891: Neuromechanics (GR, 1 CH, enrollment: 7, lead instructors: L. Miller and K. Newhall, role: co-instructor)
	MATH 290: Directed Exploration (UG IS, 1 CH/student, enrollment: 2)
	MATH 383H: First Course in Differential Equations (Honors) (UG, 3 CH, enrollment: 22)
Fall 2015	ENVR 761/MASC 781/MATH 761: Numerical Partial Differential Equations I (Finite Elements and Fast Iterative Solvers with Applications in Incompressible Fluid Dynamics) (GR, 3 CH, enrollment: 11)
	MATH 290: Directed Exploration (UG IS, 1 CH/student, enrollment: 1)
Spring 2015	MATH 290: Directed Exploration (UG IS, 1 CH/student, enrollment: 1)
	MATH 564: Mathematical Modeling (UG, 3 hours, enrollment: 27)
Fall 2014	ENVR 761/MASC 781/MATH 761: Numerical Partial Differential Equations I (Finite Difference, Element, and Volume Methods) (GR, 3 CH, enrollment: 10)
	MATH 920: Seminar and Directed Readings (GR IS, 1 CH/student, enrollment: 1)

New York University

Spring 2006	MATH-UA 252: Numerical Analysis (UG, 3 CH)
Fall 2005	MATH-UA 140: Linear Algebra (UG, 3 CH)

Postdoctoral advisees

1. Saad Qadeer, 2018–present
2. David Wells, 2018–present
3. Simone Rossi, 2016–present
4. Ebrahim M. Kolahoduz, 2015–present
5. Charles Puelz, 2017–2018 (first position: Courant Instructor, Courant Institute of Mathematical Sciences, New York University)
6. Amneet P. S. Bhalla, 2014–2016 (first position: Postdoctoral Fellow, Applied Numerical Algorithms Group, Lawrence Berkeley National Laboratory; present: Assistant Professor of Mechanical Engineering, San Diego State University)
7. Vittoria Flamini, 2011–2014 (first position/present: Industry Assistant Professor of Mechanical and Aerospace Engineering, NYU Tandon School of Engineering)
8. Jordan E. Fisher, 2011–2012 (first position: independent software developer; present: Co-founder and CEO, Standard Cognition)
9. Paul E. Hand, 2009–2010 (first position: Postdoctoral Fellow, Department of Mathematics, Massachusetts Institute of Technology; present: Assistant Professor of Mathematics and Computer Science, Northeastern University)

Undergraduate honors thesis advisees

1. Elijah DeLee, BS in Mathematics (UNC-Chapel Hill), Spring 2018 (first position: Red Hat)
2. Ali Hasan, BS in Mathematics (UNC-Chapel Hill), Spring 2017 (first position: IBM T. J. Watson Research Center; present: PhD student, Department of Biomedical Engineering, Duke University)

Member of PhD thesis committee

1. Alex Kaiser, PhD in Mathematics (NYU; advisor: C. S. Peskin), Fall 2017
2. Sean Smith, PhD in Biomedical Engineering (UNC-Chapel Hill and NCSU; advisor: D. A. Zaharoff), Summer 2017
3. Nicholas Battista, PhD in Mathematics (UNC-Chapel Hill; advisor: L. A. Miller), Spring 2017
4. Caitlin Hult, PhD in Mathematics (UNC-Chapel Hill; advisor: M. G. Forest), Spring 2017
5. Isaac Nault, PhD in Mathematics (UNC-Chapel Hill; advisor: S. Mitran), Spring 2017
6. Timothy Wessler, PhD in Mathematics (UNC-Chapel Hill; advisor: M. G. Forest), Spring 2017
7. Michael Malahe, PhD in Mathematics (UNC-Chapel Hill; advisor: S. Mitran), Summer 2016
8. Alexander Hoover, PhD in Mathematics (UNC-Chapel Hill; advisor: L. A. Miller), Summer 2015
9. Thomas Fai, PhD in Mathematics (NYU; advisor: C. S. Peskin), Spring 2014
10. Amneet Bhalla, PhD in Mechanical Engineering (Northwestern University; advisor: N. A. Patankar), Spring 2013
11. Dharshi Devendran, PhD in Mathematics (NYU; advisor: C. S. Peskin), Spring 2012
12. Jinguo Zhao, PhD in Mathematics (NYU; advisor: C. S. Peskin), Fall 2011

Member of Master's thesis committee

1. Duo Zhou, MS in Mathematics and in Computer Science (UNC-Chapel Hill; advisor: J. F. Prins), Spring 2015

Member of undergraduate honors thesis committee

1. Fuhui Fang, BS in Mathematics (UNC-Chapel Hill; advisor: J. Huang), Spring 2016

Other students supervised

Graduate students

1. Jordan Brown, PhD student, Mathematics (UNC-Chapel Hill), Fall 2018–present
2. Robert Hunt[†], PhD student, Mathematics (UNC-Chapel Hill), Fall 2017–present
3. Charles Talbot, PhD student, Mathematics (UNC-Chapel Hill), Fall 2017–present
4. Fuhui Fang[‡], PhD student, Mathematics (UNC-Chapel Hill), Spring 2017–present
5. Yanni Lai, PhD student, Mathematics (UNC-Chapel Hill), Fall 2016–present
6. Aaron Barrett, PhD student, Mathematics (UNC-Chapel Hill), Fall 2014–present
7. Jae Ho Lee, PhD student, Mathematics (UNC-Chapel Hill), Fall 2014–present
8. Benjamin Vadala-Roth, PhD student, Mathematics (UNC-Chapel Hill), Fall 2014–present
9. Michael Chambers, MD student (UNC School of Medicine), Summer 2017–Summer 2018
10. Mohammad Manzari, PhD student, Mathematics (UNC-Chapel Hill), Summer 2015–Spring 2017
11. Asif Yeahia, MS student, Mechanical Engineering (Polytechnic Institute of New York University[§]), Summer 2012–Fall 2012

Undergraduate students

1. Marc Rovener, BS student, Mathematics and Statistics and Analytics (UNC-Chapel Hill), Summer 2018–present
2. Raveena Kshatriya, BA student, Computer Science and Mathematics (UNC-Chapel Hill), Summer 2017–Summer 2018
3. Elijah DeLee, BS student, Mathematics (UNC-Chapel Hill), Spring 2016–present
4. Ali Hasan, BS student, Mathematics (UNC-Chapel Hill), Fall 2015–Spring 2017
5. Skyler Jones, BS student, Mathematics and BA student, Communications (UNC-Chapel Hill), Fall 2014–Fall

[†] Jointly advised by R. M. McLaughlin and R. Camassa

[‡] Jointly advised by M. G. Forest

[§] Now the NYU Tandon School of Engineering

2016

6. Walter Bartellino, BS student, Mechanical Engineering (Polytechnic Institute of New York University[§]), Summer 2012–Fall 2013
7. Weilun Du, BA student, Mathematics and Computer Science (NYU), Summer 2012

Research Funding

Total research funding as PI: $8,720,172
Total research funding as PI, Co-PI, or Subaward PI: $8,997,729
Total consortium research funding as PI, Co-PI, or Subaward PI: $10,809,503

Active awards as principal investigator

Title: *NSF/FDA SIR: Patient-specific computational assessment of inferior vena cava filter performance*
Sponsor: National Science Foundation (CBET 1757193)
Duration: 9/15/2018–8/31/2020
Award amount: $160,000 ($139,130 direct costs)
PI: Boyce E. Griffith (no sponsored effort)

Title: *Multiscale modeling of clotting risk in atrial fibrillation*
Sponsor: National Institutes of Health (U01HL143336)
Duration: 8/1/2018–7/31/2023
Award amount: $2,781,374 ($2,257,159 direct costs to UNC, including subaward indirect costs)
PI: Boyce E. Griffith (sponsored effort: 0.5 summer month/year)

Title: *CAREER: Numerical methods and computational infrastructure for simulating prosthetic heart valve function and dysfunction*
Sponsor: National Science Foundation (OAC 1652541)
Duration: 8/1/2017–7/31/2022
Award amount: $500,000 ($345,777 direct costs)
PI: Boyce E. Griffith (sponsored effort: 1 summer month/ year)

Title: *FRG: Collaborative Research: Computational methods for complex fluids: Adaptivity, fluid-structure interaction, and applications in biology*
Sponsor: National Science Foundation (DMS 1664645)
Duration: 7/1/2017–6/30/2020
Consortium award amount: $1,200,000; award amount to UNC: $600,000 ($404,005 direct costs)
PIs: Robert D. Guy (University of California, Davis) and Boyce E. Griffith (UNC)
UNC PI: Boyce E. Griffith (sponsored effort: 0.5 summer month/year)

Title: *Collaborative Research: SI2-SSI: Scalable infrastructure for enabling multiscale and multiphysics applications in fluid dynamics, solid mechanics, and fluid-structure interaction*
Sponsor: National Science Foundation (OAC 1450327)
Duration: 8/1/2015–7/31/2020
Consortium award amount: $1,700,000; award amount to UNC: $924,376 ($696,403 direct costs to UNC, including subaward indirect costs)
Summer 2016 REU supplement to UNC (OAC 1640930): $8000 direct costs (no indirect costs)
Summer 2017 REU supplement to UNC (OAC 1744080): $7680 direct costs (no indirect costs)
PIs: Boyce E. Griffith (UNC), Neelesh A. Patankar (Northwestern University), and Matthew G. Knepley (University of Buffalo)
UNC PI: Boyce E. Griffith (sponsored effort: 0.75 summer month/year)

Title: *Mathematical modeling and computer simulation of aortic dissection*
Sponsor: National Institutes of Health (R01HL117063)
Duration: 8/26/2013–4/30/2019 (inactive 7/1/2014–4/30/2015 pending transfer to UNC-Chapel Hill)
Award amount: $2,376,155 ($1,709,474 direct costs to NYU and UNC, including subaward indirect costs)

PI: Boyce E. Griffith (sponsored effort: 1 summer month/year)

Completed awards as principal investigator

Title: *Collaborative Research: Understanding bacterial flagellar propulsion*
Sponsor: National Science Foundation (DMS 1410873)
Duration: 8/1/2014–7/31/2018
Consortium award amount: $349,999; award amount to UNC: $149,999 ($103,228 direct costs)
PIS: Sookkyung Lim (University of Cincinnati) and Boyce E. Griffith (UNC)
UNC PI: Boyce E. Griffith (sponsored effort: 0.5 summer month/year)

Title: *SI2-SSE: Parallel and adaptive simulation infrastructure for biological fluid-structure interaction*
Sponsor: National Science Foundation (OAC 1047734 to NYU School of Medicine, 9/15/2010–9/30/2014; ACI 1460334 to UNC, 7/1/2014–12/31/2015)
Duration: 9/15/2010–12/31/2015
Award amount: $499,996 ($326,611 direct costs)
PI: Boyce E. Griffith (sponsored effort: 0.5 summer month/year)

Title: *Hybrid adaptive numerical methods and computational software for biological fluid-structure interaction*
Sponsor: National Science Foundation (DMS 1016554 to NYU School of Medicine, 9/1/2010–9/30/2014; DMS 1460368 to UNC, 7/1/2014–8/31/2015)
Duration: 9/1/2010–8/31/2015
Award amount: $299,992 ($177,510 direct costs)
PI: Boyce E. Griffith (sponsored effort: 1.5 summer month/year)

Title: *Mathematical modeling and computer simulation of the aortic valve in health and disease*
Sponsor: American Heart Association (Scientist Development Grant 10SDG4320049)
Duration: 7/1/2010–6/30/2014
Award amount: $308,000 ($280,000 direct costs)
PI: Boyce E. Griffith (sponsored effort: 4.2 months/year)

Title: *Coupled computational models of the His-Purkinje network and the ventricular myocardium*
Sponsor: New York University Whitehead Fellowship for Junior Faculty in Biomedical and Biological Sciences
Duration: 9/1/2009–8/31/2010
Award amount: $24,600 (no indirect costs)
PI: Boyce E. Griffith (no sponsored effort)

Title: *Adaptive and parallel simulations of cardiac fluid dynamics and electrophysiology by the immersed boundary method*
Sponsor: National Science Foundation TeraGrid (MRAC Allocation IBN060008)
Duration: 8/1/2006–3/31/2008; renewed 4/1/2008–3/31/2009
Award amount: 200,000 SUs on the Cray XT3 (`bigben`) at the Pittsburgh Supercomputing Center
PI: Boyce E. Griffith (no sponsored effort)

Title: *Multiphysics and multiscale modeling and simulation of cardiac electrophysiology and mechanics*
Sponsor: American Heart Association (Postdoctoral Fellowship 0626001T)
Duration: 7/1/2006–6/30/2008
Award amount: $80,000 direct costs (no indirect costs)
PI: Boyce E. Griffith sponsored effort: 12 months/year)

Other completed awards

Title: *UNS: Collaborative Research: Role of bristled wings for flying and swimming at low Reynolds numbers*
Sponsor: National Science Foundation (CBET 1511427)
Duration: 7/1/2015–6/30/2018
Consortium award amount: $449,775; award amount to UNC: $213,625 ($146,761 direct costs)

PIs: Arvind Santhanakrishnan (Oklahoma State University) and Laura A. Miller (UNC)
Role: Co-PI (sponsored effort: 0.25 summer month/year)

Title: *Systems Biology Center New York*
Sponsor: National Institutes of Health (P50GM071558)
Duration of UNC Subaward: 9/1/2014–8/31/2015
Award amount to UNC: $63,932 ($45,000 direct costs)
Lead PI: Ravi Iyengar (Ichan School of Medicine at Mt. Sinai)
UNC Subaward PI: Boyce E. Griffith (sponsored effort: 1 summer month/year)

Professional Service

Development of research tools / computation methodologies and algorithms for problem-solving

IBAMR: An adaptive and distributed-memory parallel implementation of the immersed boundary method
IBAMR is an open-source software tool available from `https://ibamr.github.io`. It has been used as key computational technology in a number of ongoing and completed projects at UNC and other institutions, including Chung-Ang University, Cornell College, ETH Zürich, Montana State University, New York University, Northwestern University, Oklahoma State University, Rice University, San Diego State University, Simon Fraser University, Temple University, Trinity University, Tufts University, Tulane University, University of Cincinnati, University of Glasgow, University of California, Davis, and University of Utah. These projects are or have been supported in the U.S. by the American Heart Association, Air Force Office of Scientific Research, Army Research Office, Burroughs Wellcome Fund, Department of Energy, National Institutes of Health, and National Science Foundation, and in the U.K. by the British Heart Foundation, Engineering and Physical Sciences Research Council (EPSRC), Leverhulme Trust, and Medical Research Scotland. IBAMR is also now being actively used by researchers at the U.S. FDA to simulate cardiovascular medical devices. As of Fall 2018, there have been at least 68 peer-reviewed journal articles and book chapters on research that uses IBAMR along with at least 14 PhD theses and three undergraduate theses and many conference abstracts. Details are available at `https://ibamr.github.io/publications`.

Service to the scientific and engineering community

Editorial board: International Journal of Applied Mechanics (2009–2014)

Guest editor: PLOS Computational Biology (2013)

Journal reviewer: Advances in Engineering Software; Advances in Mechanical Engineering; American Journal of Physiology-Heart and Circulatory Physiology; Annals of Biomedical Engineering; Applied Mathematical Modelling; Applied Mathematics Letters; Arteriosclerosis, Thrombosis, and Vascular Biology; Biomechanics and Modelling in Mechanobiology; Biotechnology and Bioengineering; Bulletin of Mathematical Biology; Cardiovascular Engineering and Technology; Chaos; Communications in Applied Mathematics and Computational Science; Communications in Computational Physics; Computational Science & Discovery; Computer Methods in Applied Mechanics and Engineering; Computer Methods in Biomechanics and Biomedical Engineering; Computers & Fluids; Computers & Structures; Discrete and Continuous Dynamical Systems - Series B; Fluid Dynamics Research; Frontiers in Physiology; IEEE Transactions on Biomedical Engineering; Integrative and Comparative Biology; International Journal for Numerical Methods in Biomedical Engineering; International Journal of Numerical Methods in Fluids; Journal of Biological Rhythms; Journal of Biological Systems; Journal of Biomechanical Engineering; Journal of Cardiovascular Magnetic Resonance; Journal of Computational and Applied Mathematics; Journal of Computational Mathematics; Journal of Computational Physics; Journal of Engineering in Medicine; Journal of Fluid Mechanics; Journal of Fluids Engineering; Journal of Fluids and Structures; Journal of Mathematical Biology; Journal of Microscopy; Journal of the Mechanical Behavior of Biomedical Materials; Mathematical Biosciences; Medical & Biological Engineering & Computing; Medical Imaging Analysis; Multiscale Modeling and Simulation; Proceedings of the National Academy of Sciences; PLOS ONE; SIAM Journal on Applied Mathematics; SIAM Journal on Scientific Computing; Simulation

Grant reviewer: Department of Energy (including ad hoc review for the DOE Leadership Computing *INCITE*

Program); National Institutes of Health (including ad hoc review for the *Atherosclerosis and Inflammation of the Cardiovascular System (AICS)*, *Biomedical Computing and Health Informatics (BCHI)*, and *Modeling and Analysis of Biological Systems (MABS)* study sections along with various special emphasis panels, including for the *Multiscale Modeling* program); National Science Foundation; Natural Sciences and Engineering Research Council of Canada; Research Councils United Kingdom (Biotechnology and Biological Sciences and National Centre for the Replacement, Refinement and Reduction of Animals in Research); Swiss National Supercomputing Centre

Conference/workshop organizing committee: *Sixth International Conference on Computational and Mathematical Biomedical Engineering*, Sendai City, Japan, 2019; *Fifth International Conference on Computational and Mathematical Biomedical Engineering*, Pittsburgh, Pennsylvania, 2017; *SIAM Conference on the Life Sciences*, Boston, Massachusetts, 2016; *Fourth International Conference on Computational and Mathematical Biomedical Engineering*, Cachan, France, 2015; *Second Glasgow Workshop on Soft Tissue Modelling*, Glasgow, Scotland, UK, 2015; *Mathematics Guiding Bioartificial Heart Valve Design*, Mathematical Biosciences Institute, The Ohio State University, Columbus, Ohio, 2013; Joint EUROMECH/ERCOFTAC Colloquium 549 on *Immersed Boundary Methods: Current Status and Future Research Directions*, Leiden, The Netherlands, 2013

Conference/workshop session organizer: *Fluid-structure interactions in medicine and biology: Modeling, analysis, and experiments* (with Sookkyung Lim), 12th Biannual Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan 2018; *Computational soft tissue cardiac mechanics* (with Xiaoyu Luo, David Nordsletten, Ray Ogden, and Gerhard Holzapfel), Sixth European Conference on Computational Mechanics / Seventh European Conference on Computational Fluid Dynamics, Glasgow, Scotland, 2018; *Modeling of arteries in health and disease* (with Sae-Il Murtada, Stephane Avril, Shigeo Wada, and Gerhard Holzapfel), 12th World Congress on Computational Mechanics, Seoul, South Korea, 2016; *Celebrating Charles S. Peskin's 70th Birthday: The immersed boundary method and its extensions* (a total of six sessions, co-organized with Samuel Isaacson and Sookkyung Lim), SIAM Conference on the Life Sciences, Boston, Massachusetts, 2016; *Computational modeling and simulation of the cardiovascular system* (with Daniel Balzani, Gerhard Holzapfel, William Klug, and Alison Marsden), 13th U.S. National Congress on Computational Mechanics, San Diego, California, 2015; *The immersed boundary method as a framework for multiphysics and multiscale simulation: numerical methods and applications* (with Charles Peskin), Seventh M.I.T. Conference on Computational Fluid and Solid Mechanics, Cambridge, Massachusetts, 2013; *Recent advances in immersed boundary methods* (with Robert Guy), SIAM Conference on Computational Science and Engineering, Boston, Massachusetts, 2013; *Cardiac fluid dynamics and electromechanics* (with Laura Miller), SIAM Conference on the Life Sciences, San Diego, California, 2012; *Recent advances in implicit immersed boundary and related methods* (with Robert Guy), SIAM Annual Meeting, Pittsburgh, Pennsylvania, 2010

Other conference/workshop organization: *48th International Conference on Parallel Processing (ICPP 2019)*, Program Committee (Applications Track), Kyoto, Japan, 2019; *SC18: The International Conference for High Performance Computing, Networking, Storage and Analysis*, Experiencing HPC for Undergraduates Committee, Dallas, Texas, 2018; *SC17: The International Conference for High Performance Computing, Networking, Storage and Analysis*, Technical Papers Program Committee (Applications), Denver, Colorado, 2017; *SC16: The International Conference for High Performance Computing, Networking, Storage and Analysis*, Technical Papers Program Committee (Applications), Salt Lake City, Utah, 2016

Service at the University of North Carolina at Chapel Hill (2014–present)

University committee assignments and other service

2018–present	Member, SAMSI Vision Development Committee, College of Arts and Sciences
2017–present	Member, Executive Advisory Committee, Undergraduate Major in Neuroscience, College of Arts and Sciences
2016–present	Member, Research Computing Advisory Committee, UNC Information Technology Services
2016, 2017	Member, Summer Graduate Student Fellowship Review Committee, The Graduate School

Departmental committee assignments and other service

2018–present	Member, Junior Faculty Hiring Committee, Department of Applied Physical Sciences

2018	Member, Hiring Committee, Business Services Coordinator, Department of Mathematics
2017–present	Faculty Advisor, SIAM Student Chapter
2017–2018	Member, Junior Faculty Hiring Committee, Department of Applied Physical Sciences
2017	Member, Hiring Committee, Business Services Coordinator, Department of Mathematics
2016–2017	Chair, Applied Mathematics Colloquium, Department of Mathematics
2014–present	Member, Graduate Committee, Department of Mathematics
2014–present	Undergraduate Advisor, Department of Mathematics

Scientific Computing Comprehensive Written Exam Committee, Department of Mathematics

Exam Reader	Winter 2017, Summer 2016, Winter 2015, Summer 2014
Exam Writer	Winter 2018, Summer 2017, Winter 2016, Summer 2015

Service at New York University (2008–2014)

Committee assignments and other service

2011–2012	Member, Microbiome Faculty Search Committee, NYU School of Medicine
2011	Member, Admissions Committee, Program in Computational Biology, Sackler Institute of Graduate Biomedical Sciences, NYU School of Medicine
2011	Member, Bioengineering Initiative Advisory Panel, NYU School of Medicine