

Mansoor A. Haider

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A. EDUCATION

Ph.D. (1996) Mathematical Sciences, Rensselaer Polytechnic Institute (RPI), Troy, NY
B.Math (1991) Applied Mathematics & Computer Science, University of Waterloo, Canada

B. EMPLOYMENT (post-PhD)

2011-Present - *Professor*, Department of Mathematics, NCSU
2012-2016 - *Director of Graduate Programs*, Department of Mathematics, NCSU (Mathematics & Applied Mathematics MS & PhD programs)
2005-2011 - *Associate Professor*, Department of Mathematics, NCSU
1999-2005 - *Assistant Professor*, Department of Mathematics, NCSU
1997-1999 - *Instructor/NSF Post-Doc*, Department of Mathematics, Duke University
- *Postdoctoral Associate*, Center for Mathematics and Computation in the Life Sciences and Medicine, Duke University
1996-1997 - *Visiting Assistant Professor*, Department of Mathematics, Duke University
Current Affiliations - *Associate Faculty*, Center for Research in Scientific Computation, NCSU
- *Associate Faculty*, Center for Quantitative Sciences in Biomedicine, NCSU
- *Associate Faculty*, Biomathematics Graduate Program, NCSU
- *Associate Faculty*, Dept. of Biomedical Engineering, NCSU

C. RESEARCH AREAS

- Applied mathematics: PDEs, continuum mechanics, boundary integral equations, perturbation methods, multiscale modeling
- Bio-mathematical modeling: biomechanics and mechano-biology of soft tissues, elasticity, viscoelasticity, poroelasticity, continuum mixture theories, contact problems, cell-matrix interactions, articular cartilage, osteoarthritis, tissue engineering, tissue development, ultrasonic imaging, OCT imaging
- Scientific computing: boundary element methods, finite element methods, artificial neural networks, machine learning, data clustering algorithms

D. HONORS, AWARDS & APPOINTMENTS

- Editorial Board, Journal of Biomechanics (2007-Present)
- NCSU Gertrude M. Cox Award for Excellence in Teaching & Learning with Technology (2013)
- NCSU Academy of Outstanding Teachers (2005-Present)
- NCSU Outstanding Teacher Award (2004-05)
- ASME Richard Skalak Award for best paper in Journal of Biomechanical Engineering (2004)
- NSF Mathematical Sciences Postdoctoral Research Fellowship (1997-2000)
- NSF Graduate Research Fellowship (1993-1996)
- Huston Prize – Teaching award in Mathematical Sciences Department, R.P.I. (1993)

E. FUNDING

Active

1. *NSF-DMS-Math Biology*, \$430,000, 8/1/16-7/31/19
“Remodeling of Pulmonary Cardiovascular Networks in the Presence of Hypertension,”
Co-Principal Investigator, (PI: M. Olufsen, Co-PI: M.U. Qureshi)
2. *Distance Education and Learning Technology Applications (DELTA)*, \$119,000, 7/1/16-6/30/17
“Postbaccalaureate Graduate Certificate in Mathematics: Initiating an Online Track,” with P.A. Gremaud (lead PI)

Previously Held

3. *NCSU Research Innovation Seed Funding (RISF)*, \$33,876, 1/1/16 to 12/31/16
“Discovery and modeling of clonality in forebrain stem cells during gliogenesis,”
Co-Principal Investigator, (other Co-PIs Troy Ghashghaei (College of Veterinary Medicine) and John Meitzen (Biological Sciences))
4. *NSF-DMS-Math Biology*, \$343,687, 10/1/11-9/30/16
“Arterial wall viscoelasticity and cardiovascular networks,”
Co-Principal Investigator, (PI: M. Olufsen)
5. *Distance Education and Learning Technology Applications (DELTA)*, \$63,272, 8/15/11-6/30/13
“Large Course Redesign (LCR) of Applied Differential Equations I (MA341),” with Dr. Alina Duca
6. *NSF – DMS – EMSW21 – Research Training Groups*, \$1,537,646, 7/1/07-6/30/13
“EMSW21-RTG Mathematics of materials: model development, analysis, simulation and control”
Co-Principal Investigator – Grant#DMS-0636590 (PI: Dr. Ralph Smith)
7. *North Carolina Biotechnology Ctr* (via subcontract), Subcontract Amount:\$39,319, 8/1/10-6/30/12
“Optimizing in situ cross-linking of hyaluronic acid for cartilage tissue engineering”
Principal Investigator on NCSU subcontract to Dept. of Chemistry, Duke University, Duke PI: Dr. Stephen Craig
8. *NIH – National Institute on Aging* (via subcontract), Subcontract Amount: \$254,752, 4/1/08-3/31/12
“Viscoelastic properties of normal and OA chondrons”
Principal Investigator on NCSU subcontract to NIH R01 grant# 2R01AG015768-11, Dept. of Surgery, Duke University Medical Center, Duke PI: Dr. Farshid Guilak
9. *NIH – National Institute of Biomedical Imaging and Bioengineering*, \$100,074, 9/29/03-7/31/07
“Genetically designed materials for cartilage repair,”
Principal Investigator on subcontract to NIH-1R01EB002263-01 via Dept. of Biomedical Engineering, Duke University
Duke PIs: Dr. Lori Setton, Dr. Ashutosh Chilkoti
10. *The Whitaker Foundation*, \$238,675, 9/1/03-12/31/06
“Multiphasic mechanics of the chondron: effects of the physicochemical environment”
Principal Investigator – Grant#RG-02-0933 (funding rate: 44 out of 334 invited proposals)
11. *NSF – DMS – Applied Mathematics*, \$94,700, 9/1/02-8/31/05
“Modeling mechanical cell-matrix interactions in articular cartilage”
Principal Investigator – Grant#DMS-0211154
12. *DARPA/ONR*, \$97,941, 6/1/02-2/28/03
“Time-reversal for electromagnetic waves in complex media”
Co-Principal Investigator- Grant#N00014-02-1-0739 (PI: Dr. Jean-Pierre Fouque)
13. *NIH – National Institute on Aging*, 15% annual effort, 6/1/98-7/31/99
“Viscoelastic properties of normal and osteoarthritic chondrons”
Co-Investigator - NIH Grant#R01AG015768-01 (PI: Dr. Farshid Guilak)
14. *NSF- Mathematical Sciences Postdoctoral Research Fellowship*, \$75,000, 7/1/97-5/31/00
“Modeling deformation in a biological soft tissue”

F. PUBLICATIONS

Peer-reviewed journals & book chapters

- F62.** (in review) T Andrew, JD Nance and MA Haider, Direct simulation of a two-dimensional interacting particle system: Uncertainty quantification and development of a Markov chain surrogate model, 15 pages
- F61.** (in review) L.M. Paun, M.U. Qureshi, M. Colebank, N.A. Hill, M.S. Olufsen, M.A. Haider and D. Husmeier, MCMC methods for inference in a mathematical model of pulmonary circulation, 35 pages
- F60.** (in review) M.U. Qureshi, M. Colebank, D. Schreier, D.M. Tabima, M.A. Haider, N.C. Chesler and M.S. Olufsen, Characteristic Impedance: Frequency or time domain approach?, 28 pages
- F59.** (2016) C. Battista, D. Bia, Y. Zocalo, R.L. Armentano, M.A. Haider and M.S. Olufsen, Wave propagation in a 1D fluid dynamics model using pressure-area measurements from ovine arteries, *Journal of Mechanics in Medicine and Biology*, Vol. 16, DOI: 10.1142/S021951941650007X.
- F58.** (2014) A. Aristotelous and M.A. Haider, Evaluation of diffusive transport and cellular uptake of nutrients in tissue engineered constructs using a hybrid discrete mathematical model, *Processes*, Vol. 2, pp. 333-344.
- F57.** (2014) A. Aristotelous and M.A. Haider, Use of hybrid discrete cellular models for identification of macroscopic nutrient loss in reaction-diffusion models of tissues, *International Journal for Numerical Methods in Biomedical Engineering*, Vol. 20, pp. 767-780.
- F56.** (2011) Z. Hu and M.A. Haider, Algebraic multigrid preconditioning for finite element solution of inhomogeneous elastic inclusion problems in articular cartilage, *Advances in Applied Mathematics and Mechanics*, Vol. 3, pp. 729-744
- F55.** (2011) B.N. Steele, D. Valdez-Jasso, M.A. Haider and M.S. Olufsen, Predicting arterial flow and pressure dynamics using a 1D fluid dynamics model with a viscoelastic wall, *SIAM Journal on Applied Mathematics*, Vol. 71, pp. 1123-1143
- F54.** (2011) M.A. Haider, J.E. Olander, R.F. Arnold, D.R. Marous, A.J. McLamb, K.C. Thompson, W.R. Woodruff and J.M. Haugh, A phenomenological mixture model for biosynthesis and linking of cartilage extracellular matrix in scaffolds seeded with chondrocytes, *Biomechanics and Modeling in Mechanobiology*, Vol. 10, pp. 915-924
- F53.** (2011) D. Valdez-Jasso, D. Bia, Y. Zocalo, R.L. Armentano, M.A. Haider and M.S. Olufsen, Linear and nonlinear viscoelastic modeling of aorta and carotid pressure-area dynamics under in vivo and ex vivo conditions, *Annals of Biomedical Engineering*, Vol. 39, pp. 1438-1456
- F52.** (2010) M. Stuebner and M.A. Haider, A fast quadrature-based numerical method for the continuous spectrum biphasic poroviscoelastic model of articular cartilage, *Journal of Biomechanics*, Vol. 43, pp. 1835-1839
- F51.** (2010) E. Kim, F. Guilak and M.A. Haider, An axisymmetric boundary element model for determination of articular cartilage pericellular matrix properties in situ via inverse analysis of chondron deformation, *Journal of Biomechanical Engineering*, Vol. 132:031011, 13 pages
- F50.** (2010) M.A. Haider, B.A. Benedict, E. Kim and F. Guilak, Computational modeling of cell mechanics in articular cartilage, in *Computational Modeling in Biomechanics* (eds. S. De, F. Guilak and M.R.K. Mofrad), Springer, New York, pp. 329-352.
- F49.** (2010) D.L. Nettles, M.A. Haider, A. Chilkoti and L.A. Setton, Neural network analysis identifies scaffold properties necessary for in vitro chondrogenesis in elastin-like polypeptide biopolymer scaffolds, *Tissue Engineering Part A*, Vol. 16, pp. 11-20.
- F48.** (2009) D. Valdez-Jasso, M.A. Haider, H.T. Banks, D.B. Santana, Y.Z. German, R. Armentano and M.S. Olufsen, Analysis of viscoelastic wall properties in ovine arteries, *IEEE Transactions on Biomedical Engineering*, Vol. 56, pp. 210-219.

- F47.** (2009) S.D. Olson and M.A. Haider, A level set reaction-diffusion model for tissue regeneration in articular cartilage, *International Journal of Pure and Applied Mathematics*, Vol. 53, pp. 333-353.
- F46.** (2009) D. Valdez-Jasso, H.T. Banks, M.A. Haider, D. Bia, Y. Zocalo, R.L. Armentano and M.S. Olufsen, Viscoelastic models for passive arterial wall dynamics, *Advances in Applied Mathematics and Mechanics*, Vol. 1, pp. 151-165.
- F45.** (2008) E. Kim, F. Guilak and M.A. Haider, The dynamic mechanical environment of the chondrocyte: A biphasic finite element model of cell-matrix interactions under cyclic compressive loading, *Journal of Biomechanical Engineering*, Vol. 130:061009, 10 pages.
- F44.** (2008) F.W. Mauldin, M.A. Haider, E.G. Loba, R.H. Behler, L.E. Euliss, T.W. Pfeiler and C.M. Gallippi, Monitored steady-state excitation and recovery (MSSER) radiation force imaging using viscoelastic models, *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Controls*, Vol. 55, pp. 1597-1610.
- F43.** (2007) M.A. Haider and F. Guilak, Application of a three-dimensional poroelastic BEM to modeling the biphasic mechanics of cell-matrix interactions in articular cartilage, *Computer Methods in Applied Mechanics and Engineering*, Vol. 196, pp. 2999-3010.
- F42.** (2006) M.A. Haider, R.C. Schugart, L.A. Setton and F. Guilak, A mechano-chemical model for the passive swelling response of an isolated chondron under osmotic loading, *Biomechanics and Modeling in Mechanobiology*, Vol. 5, pp. 160-171.
- F41.** (2006) M.A. Haider and R.C. Schugart, A numerical method for the continuous spectrum biphasic poroviscoelastic model of articular cartilage, *Journal of Biomechanics*, Vol. 39, No. 1, pp. 177-183.
- F40.** (2006) H.A. Leddy, M.A. Haider and F. Guilak, Diffusional anisotropy in collagenous tissues: fluorescence imaging of continuous point photobleaching, *Biophysical Journal*, Vol. 91, pp. 311-316.
- F39.** (2006) F. Guilak, L.G. Alexopoulos, M.L. Upton, I. Youn, J.B. Choi, L.A. Setton and M.A. Haider, The pericellular matrix as a transducer of biomechanical and biochemical signals in cartilage, *Annals of the New York Academy of Sciences*, 1068:498-512.
- F38.** (2006) F. Guilak, M.A. Haider, F.P.T. Baaijens, T.A. Laursen and L.A. Setton, Multiphasic models of cell mechanics, in *Cytoskeletal Mechanics: Models and Measurements* (eds. M. Kaazempur-Mofrad and R. Kamm), pp. 84-102, Cambridge University Press, New York.
- F37.** (2005) F. Guilak, L.G. Alexopoulos, M.A. Haider, H.P. Ting-Beall and L.A. Setton, Zonal uniformity in mechanical properties of the chondrocyte pericellular matrix: micropipette aspiration of canine chondrons isolated by cartilage homogenization, *Annals of Biomedical Engineering*, Vol. 33, pp. 1312-1318.
- F36.** (2004) M.A. Haider, A radial biphasic model for local cell-matrix mechanics in articular cartilage, *SIAM Journal on Applied Mathematics*, Vol. 64, pp. 1588-1608.
- F35.** (2004) M.A. Haider, K.J. Mehta and J.P. Fouque, Time-reversal simulations for detection in randomly layered media, *Waves in Random Media*, Vol. 14, pp. 185-198.
- F34.** (2003) L.G. Alexopoulos, M.A. Haider, T.P. Vail and F. Guilak, Alterations in the mechanical properties of the human chondrocyte pericellular matrix with osteoarthritis, *Journal of Biomechanical Engineering*, Vol. 125, pp. 323-333.
- F33.** (2002) M.A. Haider and F. Guilak, An axisymmetric boundary integral model for assessing elastic cell properties in the micropipette aspiration contact problem, *Journal of Biomechanical Engineering*, Vol. 124, pp. 586-595.
- F32.** (2002) M.A. Haider, S. Venakides and S.P. Shipman, Boundary-integral calculations of two dimensional electromagnetic scattering in infinite photonic crystal slabs: Channel defects and resonances, *SIAM Journal on Applied Mathematics*, Vol. 62, No. 6, pp. 2129-2148.
- F31.** (2000) M.A. Haider and F. Guilak, An axisymmetric boundary integral model for incompressible linear viscoelasticity: Application to the micropipette aspiration contact problem, *Journal of Biomechanical Engineering*, Vol. 122, No. 3, pp. 236-244.
- F30.** (2000) S. Venakides, M.A. Haider and V. Papanicalou, Boundary integral calculations of 2-d electromagnetic scattering by photonic crystal Fabry-Perot structures, *SIAM Journal on Applied Mathematics*, Vol. 60, No. 5, pp. 1686-1706.

- F29.** (2000) S. Venakides, M.A. Haider and V. Papanicolaou, Wave propagation in photonic crystal media, in *Scattering Theory and Biomedical Engineering Modelling and Applications* (eds. C. Dassios et al.), World Scientific, New Jersey, pp. 120-134.
- F28.** (1999) M.M. Beaky, J.B. Burk, H.O. Everitt, M.A. Haider and S. Venakides, Two dimensional photonic crystal Fabry-Perot resonators with lossy dielectrics, *IEEE Transactions on Microwave Theory and Techniques*, Vol. 47, No. 11, pp. 2085-2091.
- F27.** (1997) M.A. Haider and M.H. Holmes Analytic approximations to the deformation of a thin compressible elastic layer by a rigid flat indenter, in *Applied Mathematics: Methods and Applications* (ed. G. Oyibo), pp. 257-288, Nova Science.
- F26.** (1997) M.A. Haider and M.H. Holmes, A mathematical approximation for the solution of a static indentation test, *Journal of Biomechanics*, Vol. 30, pp. 747-752.
- F25.** (1997) M.A. Haider and M.H. Holmes, Three dimensional viscoelasticity in finite strain: Formulation of a rate-type constitutive law consistent with dissipation, *IMA Volumes in Mathematics and its Applications*, Vol. 98, pp. 67-88.
- F24.** (1996) M.A. Haider and M.H. Holmes, Analytic approximations to the deformation of a thin elastic layer by a rigid flat indenter, *Nova Journal of Mathematics, Game Theory and Algebra*, Vol. 5, pp. 1-32.
- F23.** (1995) M.A. Haider and M.H. Holmes, Indentation of a thin compressible elastic layer: Approximate analytic and numerical solutions for rigid flat indenters, *Journal of the Mechanics and Physics of Solids*, Vol. 8, pp. 1199-1219.

Thesis

F22. (1996) M.A. Haider, *Analytic Approximations for the Indentation of a Thin Linear Elastic Layer and a Viscoelastic Formulation in Finite Strain with Applications to the Mechanics of Biological Soft Tissues*, PhD Thesis, Rensselaer Polytechnic Institute, Troy, NY.

Peer-reviewed conference proceedings

- F21.** (2017) LM Paun, MU Qureshi, M Colebank, MA Haider, MS Olufsen, NA Hill, D Husmeier, Parameter inference in the pulmonary blood circulation of mice, *Proceedings of the 32nd International Workshop on Statistical Modeling (IWSM)*, Groningen, Netherlands, 3-7 July 2017, 4 pages, submitted.
- F20.** (2017) M.U. Qureshi, M.A. Haider, N.C. Chesler and M.S. Olufsen, Simulating the effects of hypoxia on pulmonary hemodynamics in mice, *Proceedings of the 5th International Conference on Computational and Mathematical Biomedical Engineering*, 10-12 April 2017, 4 pages.
- F19.** (2010) D. Valdez-Jasso, D. Bia, M.A. Haider, Y. Zocalo, R.L. Armentano and M.S. Olufsen, Linear and nonlinear viscoelastic modeling of ovine aortic biomechanical properties under in vivo and ex vivo conditions, *Proceedings of the 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 4 pages
- F18.** (2010) E. Kim, F. Guilak and M.A. Haider, Determination of in situ articular cartilage pericellular matrix properties via inverse BEM analysis of chondron deformation, *Proceedings of the ASME 2010 Summer Bioengineering Conference*, abstract 19308, Naples, FL, June 16-19, 2010, 2 pages.
- F17.** (2009) D. Valdez-Jasso, M.A. Haider, S.L. Campbell, D. Bia, Y. Zocalo, R.L. Armentano and M.S. Olufsen, Modeling viscoelastic properties of ovine arteries, *Proceedings of the ASME 2009 Summer Bioengineering Conference*, abstract 205640, Lake Tahoe, CA, June 17-21, 2009, 2 pages.
- F16.** (2007) F.W. Mauldin, O.B. Davis, M.A. Haider, E.G. Loba, T.W. Pfeiler and C.M. Gallippi, On the potential of combined ARFI and elastography to improve differentiation of material structure in viscoelastic tissue, *2007 IEEE Ultrasonics Symposium Proceedings*, 28-31 Oct. 2007, New York, NY, pp. 2040-2045.
- F15.** (2006) J.H. Levy, R. Behler, M.A. Haider, J.S. Marron and C. Gallippi, Discrimination of mechanical response to ARFI excitation in a raised atherosclerotic plaque, *The 1st International Workshop on Computer Vision for Intravascular and Intracardiac Imaging* (G Unal, I Kakadiaris, G Slabaugh and A Tannebaum, Eds.), pp. 58-65.

- F14.** (2006) M.A. Haider and F. Guilak, A three-dimensional poroelastic boundary element method applied to modeling biphasic cell-matrix interactions in articular cartilage, *Proceedings of the ASME 2006 Bioengineering Conference*, abstract 157465, Amelia Island, FL, June 21-25, 2006, 2 pages.
- F13.** (2005) M.A. Haider, R.C. Schugart, L.A. Setton and F. Guilak, A mechano-chemical model of osmotic loading of an isolated chondron, *Proceedings of the ASME 2005 Summer Bioengineering Conference*, ASME, abstract 168184, Vail, CO, June 22-26, 2005, 2 pages.
- F12.** (2005) M.A. Haider, D.L. Nettles, K. Trabbic-Carlson, A. Chilkoti and L.A. Setton, Predictive modeling of polypeptide hydrogel mechanical properties for cartilage repair using artificial neural networks, *Proceedings of the ASME 2005 Bioengineering Conference*, ASME, abstract 173514, Vail, CO, June 22-26, 2005, 2 pages.
- F11.** (2003) M.A. Haider, S. Beun, J. Latulippe and F. Guilak A spherical biphasic model for radial deformation in a chondron, *Proceedings of the Bioengineering Conference*, ASME, pp. 569-570.
- F10.** (2003) L.G. Alexopoulos, M.A. Haider, T.P. Vail and F. Guilak, Alterations in the mechanical properties of the human chondrocyte pericellular matrix with osteoarthritis, *Transactions of the Orthopaedic Research Society*, 28:107, 1 page.
- F9.** (2002) L.G. Alexopoulos, M.A. Haider and F. Guilak, The mechanical role of the chondrocyte pericellular matrix in articular cartilage: Micropipette aspiration of mechanically isolated chondrons, *Proceedings of the 3rd European Symposium in Biomedical Engineering and Medical Physics*, pp. 7-8.
- F8.** (2002) F. Guilak, L. Alexopoulos, R. Nielsen, H. Ting-Beall and M.A. Haider, The biomechanical properties of the chondrocyte pericellular matrix: Micropipette aspiration of mechanically isolated chondrons, *Transactions of the Orthopaedic Research Society*, 27:405.
- F7.** (2001) L.G. Alexopoulos, M.A. Haider and F. Guilak, An axisymmetric elastic layered half-space model for micropipette aspiration of the chondrocyte pericellular matrix, *BED-Advances in Bioengineering-Proceedings of the 2001 Bioengineering Conference*, ASME, Vol. 51, 2 pages.
- F6.** (1999) M.A. Haider and F. Guilak, A viscoelastic boundary element model of contact in the micropipette aspiration test, *BED-Advances in Bioengineering-Proceedings of the 1999 Bioengineering Conference*, ASME, 42:339-340.
- F5.** (1998) MA Haider and F Guilak, Boundary element analysis of contact problems in cartilage cell mechanics, in "Modeling and Simulation Based Engineering" (Eds. S.N. Alturi and P.E. O'Donoghue), *Proceedings of the International Conference on Computational Engineering Science*, Atlanta, GA, Oct. 1998, II:1769-1774, Tech Science Press.
- F4.** (1994) M.H Holmes and M.A. Haider, The role of matrix viscoelasticity and fluid flow in the compressive behavior of cartilage, *Proceedings of the Second World Congress of Biomechanics*, II: 29, Stichting.
- F3.** (1994) M.A. Haider and M.H. Holmes, An approximation to the steady-state deformation of articular cartilage under indentation, *Proceedings of the Second World Congress of Biomechanics*, II: 214, Stichting.

Technical Reports

- F2.** (2006) *Twelfth Industrial Mathematical and Statistical Modeling Workshop for Graduate Students* (Edited by A Chertock, MA Haider, MS Olufsen and R Smith), CRSC-TR06-23, 167 pages.
- F1.** (2005) *Eleventh Industrial Mathematical and Statistical Modeling Workshop for Graduate Students* (Edited by RT Buche, MA Haider, RC Smith and HT Tran), CRSC-TR05-46, 145 pages.

G. RESEARCH DIRECTION

PhD students – Current

- G29.** [Chair] Mallory McMahon (PhD, Applied Math)
- G28.** [Chair] Tricity Andrew (PhD, Applied Math)
- G27.** [Chair] Christine Mennicke (PhD, Applied Math), NSF Graduate Research Fellowship awardee
- G26.** [Chair] Micaela Mendlow (PhD, Applied Math)

PhD students – Graduated

G25. [Co-Chair] Christina Battista (PhD, 2015, Applied Math, with M. Olufsen)

- Post-PhD position: Post-Doc, Hamner Institute, RTP, NC

G24. [Chair] Ahlam Elashgh (PhD, 2015, Applied Math), returned to Libya for faculty position

G23. [Chair] Amanda Mangum (PhD, 2014, Biomathematics)

- Post-PhD position: Assistant Professor (tenure track), Mathematics Dept., Niagara Univ.

G22. [Chair] Janine Haugh (PhD, 2010, Applied Math)

- Post-PhD position: Assistant Professor (tenure track), Dept. of Mathematics, UNC-Asheville

G21. [Co-Chair] Daniela Valdez-Jasso (PhD, 2010, Biomathematics, with M. Olufsen)

- Post-PhD position: Research Associate, Cardiovascular Biomechanics Laboratory, Dept. of Bioengineering & McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh
- Current position: Assistant Professor (tenure track), Dept. of Bioengineering, Univ. of Illinois at Chicago

G20. [Chair] Eunjung Kim (PhD, 2009, Applied Math)

- Post-PhD positions:
(2009-10) Postdoctoral Research Associate, Dept. of Mathematics & Interdisciplinary Center for the Study of Biocomplexity, University of Notre Dame
(2010-present) Postdoctoral Associate, Integrated Mathematical Oncology, Moffitt Cancer Center

G19. [Chair] Sarah Olson (PhD, 2008, Biomathematics)

- Post-PhD position: (2008-11) VIGRE Postdoctoral Fellow, Mathematics Department, Tulane University
- (2011-present) Assistant Professor (tenure track), Dept. of Mathematics, Worcester Polytechnic Institute, NSF CAREER award winner

G18. [Chair] Brandy Benedict (PhD, 2008, Applied Math with Computational Math concentration)

- Post-PhD position: Assistant Professor (tenure track), Dept. of Mathematics, Merrimack College

G17. [Chair] Richard Schugart (PhD, 2005, Applied Math)

- Post-PhD position: Postdoctoral Fellow, Mathematical Biosciences Institute, Ohio State University
- Current position: Associate Professor, Dept. of Mathematics, Western Kentucky University

MS students - Graduated

G16. [Co-Chair] Dominic Pafundi (MS, 2015, Applied Math)

G15. [Chair] Katherine Henry (MS, 2013, Applied Math)

G14 [Chair] Amanda Smith (MS, 2012, Applied Math)

G13. [Co-Chair] Daniela Valdez-Jasso (MS, 2008, Applied Math)

G12. [Chair] Carrie Ward (MS, 2005, Applied Math)

Postdoctoral fellows

G11. Andreas Aristotelous (SAMSI post-doc), 2011-14

G10. Zhengzheng Hu (NSF RTG post-doc), 2009-12

G9. Michael Stuebner (NSF RTG post-doc), 2008-10

Undergraduate research students

G8. Timothy Wessler, NCSU math undergraduate (Fall 2010-Summer 2012)

G7. Jeff Olander, NCSU math undergraduate (Spring 2008-Summer 2009)

G6. Leslie Watkins, NCSU math undergraduate (Spring 2009)

G5. Project Faculty, 2010 NCSU summer *REU Program in Modeling and Industrial Applied Mathematics*, Project: “Tissue engineering of the intervertebral disc,” 4 students

- G4.** Project Faculty, 2009 NCSU summer *REU Program in Modeling and Industrial Applied Mathematics*, Project: “Modeling ultrasound imaging in cardiovascular tissue,” 3 students
- G3.** Project Faculty, 2008 NCSU summer *REU Program in Modeling and Industrial Applied Mathematics*, Project: “Mathematical modeling of cartilage regeneration via hydrogels,” 5 students
- G2.** Project Faculty, 2007 NCSU summer *REU Program in Modeling and Industrial Applied Mathematics*, Project: “Monte Carlo simulation of diffusion in hyaluronan-based scaffolds with applications to tissue engineering of articular cartilage,” 3 students
- G1.** Project Faculty, 2006 NCSU summer *REU Program in Modeling and Industrial Applied Mathematics*, Project: “Mechano-chemical models for chondron deformation in articular cartilage subject to osmotic loading,” 3 students

H. PRESENTATIONS

Invited Talks - Conferences & Workshops

- (2017) “Fast algorithms for integral equation models of viscoelasticity in biological soft tissues,” minisymposium on *Computational methods in interfacial dynamics*, 41st SIAM Southeastern Atlantic Section (SIAM-SEAS) Conference, Florida State University, Tallahassee, FL, March 18-19, 2017
- (2016) “Biomass and water accumulation in plant cells during fruit growth,” *The Thirteenth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY , 6/7/16
- (2014) “Modeling cartilage tissue engineering in cell-seeded scaffolds,” Minisymposium on *Modeling and simulation of complex biological systems*, 2014 SIAM Conference on the Life Sciences, Charlotte, NC, August 4-7, 2014.
- (2013) “Mathematical and computational mixture models for cartilage regeneration in cell-seeded scaffolds,” *12th U.S. National Congress on Computational Mechanics*, Special Session on “Cartilage Mechanics: Characterization & Computational Modeling,” Raleigh NC, July 22-25, 2013.
- (2012) “Continuum mixture models for cartilage tissue engineering in cell-seeded scaffolds,” *2012 Canadian Applied & Industrial Mathematics Annual Meeting*, special session on “Mathematical Biology & Medicine,” University of Toronto, June 24-28, 2012
- (2012) “Cell-substrate interactions in orthopaedic tissue engineering,” *The Ninth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY , 6/5/12
- (2012) “Porous mixture models for cartilage regeneration in cell-seeded scaffolds,” *4th International Conference on Porous Media*, Purdue University, May 14-16, 2012, invited talk in minisymposium on “Biological Porous Media”
- (2012) “Bridging cell and tissue scale models for cell-matrix interactions in articular cartilage,” *SAMSI UQ Transition Workshop*, RTP, May 21-23, 2012
- (2011) “Mixture models for cartilage tissue engineering using cell-seeded scaffolds,” *AMS Fall Southeastern Section Meeting*, Special Session on “Applications of Difference and Differential Equations to Biology,” Wake Forest University, Winston-Salem, NC, Sep. 24-25, 2011
- (2010) “Mechano-chemical models of ionic effects in the cellular microenvironment of articular cartilage,” *2010 SIAM Annual Meeting*, Minisymposium on “Fluids with Dynamic Microstructure,” Pittsburgh, PA, July 12-16, 2010
- (2010) “Continuum mixture models of biomechanical cell-matrix interactions in articular cartilage,” *2010 InterPore Conference and Annual Meeting*, Texas A&M University, College Station, TX, March 14-17, 2010, invited talk [single track conference]
- (2009) “Axisymmetric elastic BEM for in situ determination of articular cartilage micromechanical properties,” *10th U.S. National Congress on Computational Mechanics*, Special Session on “Computational Bioengineering,” Columbus, OH, July 16-19, 2009
- (2008) “Multiphasic models of cell-matrix interactions in articular cartilage,” Minisymposium on “Analysis and Simulations of Technological and Biological Complex Fluids,” *2008 SIAM Annual Meeting*, San Diego, CA, July 7-11, 2008

- (2008) "Turning gels into cartilage: modeling tissue regeneration in cell-seeded scaffolds," *The Fifth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY , 6/10/08
- (2007) "Poroelastic BEMs for modeling biphasic mechanics of cell-matrix interactions in articular cartilage," *9th U.S. National Congress on Computational Mechanics*, Special Session on "Computational Methods in Bioengineering," San Francisco, CA, July 23-26, 2007
- (2007) "Continuum mixture models of the cellular microenvironment in articular cartilage," *Applications of Analysis to Mathematical Biology Conference*, Duke University, 5/21/07
- (2007) "Biphasic poroelastic models for deformation in the cellular microenvironment of articular cartilage," *2007 SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Minisymposium on "Flow and Deformation Processes in Porous Media," Santa Fe, NM, March 19-22, 2007
- (2006) "Multiscale biphasic continuum mixture models of the pericellular microenvironment in articular cartilage," *2006 AMS Fall Central Sectional Meeting*, Special Session on "Mathematical Modeling of Biological Systems," University of Cincinnati, Cincinnati, OH, 10/21/06
- (2006) "Optimal design of biocompatible materials for cartilage repair", *The Third Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY , 6/6/06
- (2005) "Mechano-chemical modeling of the local cellular environment in articular cartilage," *2005 SIAM Annual Meeting*, Minisymposium on "Biological and Chemical Modeling with Applications," July 2005, New Orleans, LA
- (2004) "Time reversal numerical simulations for randomly layered media," *4th SIAM Conference on Mathematical Aspects of Materials Science*, Minisymposium on "Light and Wave Propagation in Inhomogeneous Media: Theory and Modeling", May 2004, Los Angeles, CA
- (2003) "Mixture models of cell-matrix mechanics in articular cartilage and alterations with osteoarthritis," *2003 AMS Fall Southeastern Section Meeting*, Special Session on "Mathematical Modeling in Physiology and Medicine," October 2003, Chapel Hill, NC
- (2003) "A radial biphasic model for local cell-matrix mechanics in articular cartilage," *2003 Spring Southeastern Sectional Meeting of the AMS*, Special Session on "Applied Mathematics and Materials Science," March 2003, Baton Rouge, LA
- (2002) "A time-marching boundary element method for standard linear viscoelasticity," *International Conference on Mathematics and Biology and 2002 Annual Meeting of the Society for Mathematical Biology*, Minisymposium on "Computational Biofluid Dynamics", July 2002, Knoxville, TN
- (1999) "A viscoelastic boundary element model of contact in the micropipette aspiration test," *ASME Summer Bioengineering Conference*, Symposium on "Cell and Tissue Engineering," June 1999, Big Sky, MT
- (1998) "Boundary element analysis of contact problems in cartilage cell mechanics," *International Conference on Computational Engineering Science*, Special Session on "Contact Mechanics," October 1998, Atlanta, GA
- (1995) "Analytic approximations to the deformation of a thin compressible elastic layer by a rigid flat indenter," *Workshop on Applied Mathematics: Methods and Applications*, Winter, 1995, Troy, NY

Invited Talks - External Colloquia & Seminars

- (2017) "Mathematical models for matrix regeneration and remodeling in biological soft tissues," Biomathematics Seminar, Virginia Commonwealth University, 9/22/2017
- (2016) "Continuum mixture models for extracellular matrix regeneration in cartilage tissue engineering," SoftMech research seminar, School of Mathematics & Statistics, Univ. of Glasgow, 9/21/16
- (2015) "Mathematical modeling of extracellular matrix regeneration in cartilage tissue engineering," Colloquium, College of the Holy Cross, Dept. of Mathematics and Computer Science, 11/18/15
- (2011) "Mixture models for cartilage tissue engineering in biomaterial scaffolds seeded with chondrocytes," Mathematical Sciences Colloquium, Worcester Polytechnic Institute, 11/18/11
- (2011) "Mixture models for cartilage tissue engineering in biomaterial scaffolds seeded with chondrocytes," Duke University Mathematical Biology Colloquium, 9/23/11

- (2010) “Mathematical modeling of cell-matrix interactions in natural and tissue engineered articular cartilage,” Colloquium and SIAM Student Chapter Seminar, University of Tennessee, 4/30/10
- (2009) “Mathematical modeling of cell-matrix interactions in articular cartilage,” Mathematics Department Colloquium, Tulane University, 1/29/09
- (2007) “Multiphasic models of cell-matrix interactions in articular cartilage,” Applied Math Colloquium, UNC-Chapel Hill, 10/26/07
- (2006) “The role of mechanics in osteoarthritis: modeling the cellular microenvironment in articular cartilage,” Seminar, Mathematical Biosciences Institute, Ohio State University, 10/23/06
- (2005) “Mechanical and chemical models of the pericellular microenvironment in articular cartilage,” Duke Applied Math & Analysis Seminar, 11/28/05
- (2002) “Modeling the role of the pericellular matrix in cartilage mechanics,” Cell Mechanics Group Seminar, Duke University Medical Center, May 2002
- (1999) “Boundary integral computations of electromagnetic scattering in photonic crystal structures,” Dept. of Mathematics and Statistics, Simon Fraser University, February 1999
- (1999) “Boundary integral computations of electromagnetic scattering in photonic crystal structures,” Dept. of Mathematics and Statistics, University of Maryland-Baltimore County, February 1999
- (1999) “Boundary integral computations of electromagnetic scattering in photonic crystal structures,” Dept. of Mathematics and Statistics, Bowling Green State University, February 1999
- (1999) “Boundary integral computations of electromagnetic scattering in photonic crystal structures,” Dept. of Mathematics, NCSU, February 1999
- (1998) “Contact problems for assessing cartilage matrix and cell mechanical properties,” Dept. of Applied Mathematics, University of Western Ontario, March 1998
- (1998) “Contact problems for assessing cartilage matrix and cell mechanical properties,” Dept. of Mathematical Sciences, Worcester Polytechnic Institute, February 1998
- (1998) “Contact problems for assessing cartilage matrix and cell mechanical properties,” Dept. of Mathematics and Statistics, McMaster University, February 1998
- (1997) “Approximate solution of a contact problem in soft tissue biomechanics,” Dept. of Applied Mathematics, University of Washington (Seattle), January 1997
- (1997) “Approximate solution of a contact problem in soft tissue biomechanics,” Dept. of Mathematics, Harvey Mudd College, February 1997

Contributed Presentations - Conferences & Workshops

- (2017) “Incorporating vessel wall remodeling into 1D cardiovascular network models of pulmonary hypertension,” 2017 Biology and Mathematics Through Medicine Conference, Virginia Commonwealth University, May 18-20, 2017 (talk)
- (2017) “A phenomenological mixture model for growth of tissue engineered cartilage in cell-seeded scaffolds,” 2017 Biology and Mathematics Through Medicine Conference, Virginia Commonwealth University, May 18-20, 2017 (poster)
- (2017) “Modeling cell proliferation in the transition from neurogenesis to gliogenesis,” 2017 Biology and Mathematics Through Medicine Conference, Virginia Commonwealth University, May 18-20, 2017 (poster)
- (2016) “Stochastic modeling of cell proliferation and differentiation in developmental neurobiology,” *MBI Workshop Population Models in the 21st Century*, November 14-18, 2016 (poster)
- (2016) “Models and algorithms for 3D corneal biometry from optical coherence tomography,” *SIAM Conference on Imaging Science*, Albuquerque, NM, May 23-26, 2016 (poster)
- (2015) “Mixture models for cartilage extracellular matrix regeneration in cell-seeded scaffolds,” *SMB Annual Meeting*, Atlanta, GA, June 3-July 3, 2015, (talk)
- (2014) “Computational model for optical coherence tomography imaging of the human eye,” *MBI Workshop on Integrating Modalities and Scales in Life Science Imaging*, March 17-21, 2014 [poster]
- (2012) “Bridging cell and tissue scale models for nutrient diffusion and uptake in articular cartilage,” 2012 SIAM Conference on the Life Sciences, Aug 7-10, 2012, San Diego, CA (poster)

(2010) “A fast quadrature-based numerical method for the continuous spectrum biphasic poroviscoelastic model of articular cartilage,” *2010 SIAM Conference on the Life Sciences*, July 12-15, 2010, Pittsburgh, PA (poster)

(2010) “Determination of in situ articular cartilage pericellular matrix properties via inverse BEM analysis of chondron deformation,” Poster session on “Musculoskeletal Soft Tissues,” *2010 Summer Bioengineering Conference*, June 16-19, 2010, Naples, FL (poster)

(2010) “Biomechanics of the cellular microenvironment in articular cartilage,” *34th SIAM Southeastern-Atlantic Section Annual Meeting*, Minisymposium on “Modeling in biomechanics and bioengineering,” 3/20/10, Raleigh, NC (talk)

(2009) “Modeling viscoelastic properties of ovine arteries,” *2009 Summer Bioengineering Conference*, June 17-21, Lake Tahoe, CA (poster)

(2008) “Mechano-chemical models of swelling in the microscopic environment of articular cartilage,” minisymposium on “Swelling Porous Materials,” *2008 SIAM Conference on Mathematical Aspects of Materials Science*, May 11-14, 2008, Philadelphia, PA (talk)

(2007) “Artificial neural network modeling of structure-function relationships for ELP hydrogels in the cartilage repair problem,” *IMA Annual Program on Applications of Algebraic Geometry, Workshop on Applications in Biology, Dynamics and Statistics*, March 5-9, 2007, Minneapolis, MN (poster).

(2007) “Modeling articular cartilage regeneration using hydrogel scaffolds,” *Applications of Analysis to Mathematical Biology Conference*, Duke University, 5/21/07 (poster)

(2006) “A three-dimensional poroelastic boundary element method applied to modeling biphasic cell-matrix interactions in articular cartilage,” *2006 Summer Bioengineering Conference*, June 21-25, 2006, Amelia Island, FL (podium talk).

(2005) “A mechano-chemical model of osmotic loading of an isolated chondron,” *2005 Summer Bioengineering Conference*, June 22-26, 2005, Vail, CO (podium talk).

(2005) “Predictive modeling of polypeptide hydrogel mechanical properties for cartilage repair using artificial neural networks,” *2005 Summer Bioengineering Conference*, June 22-26, 2005, Vail, CO (podium talk)

(2004) “Mechano-chemical properties of articular chondrocytes under osmotic loading,” *2004 BMES Annual Fall Meeting*, Philadelphia, PA, October 2004, (podium talk).

(2004) “Modeling mechanotransduction in articular cartilage: The role of the pericellular matrix,” *2004 SIAM Conference on the Life Sciences*, Minisymposium on “Mathematical Modeling of the Musculoskeletal System,” July 2004, Portland, OR (talk)

(2004) “Osmotic loading of articular cartilage cells using triphasic theory,” *2004 SIAM Conference on the Life Sciences*, July 2004, Portland, OR (poster).

(2004) “A biphasic model for local cell-matrix mechanics in articular cartilage,” *4th SIAM Conference on Mathematical Aspects of Materials Science*, May 2004, Los Angeles, CA (poster).

(2003) “Numerical method for time-reversal of waves in random media,” *SIAM Conference on Computational Science and Engineering*, February 2003, San Diego, CA (poster).

(2002) “Integral equation models of cell mechanics in articular cartilage,” *First SIAM Conference on the Life Sciences*, March 2002, Boston, MA (poster).

(2000) “Boundary integral model for 2-D electromagnetic scattering by photonic crystal structures,” *3rd SIAM Conference on Mathematical Aspects of Materials Science*, May 2000, Philadelphia, PA (talk).

(1999) “Boundary integral model of the micropipette aspiration contact problem,” *IMA Workshop on Computational Modeling in Biological Fluid Dynamics*, January 1999, Minneapolis, MN (poster).

(1998) “A computational model for mechanical testing of individual cartilage cells,” *SIAM Annual Meeting*, July 1998, Toronto, Canada (talk).

(1994) “The role of matrix viscoelasticity and fluid flow in the compressive behavior of cartilage,” *Second World Congress of Biomechanics*, July 1994, Amsterdam (podium talk).

(1994) “An approximation to the steady-state deformation of articular cartilage under indentation,” *Second World Congress of Biomechanics*, July 1994, Amsterdam (podium talk).

Internal Talks

- (2017) “Exploiting analytical structure to develop accelerated numerical solutions in continuum modeling of materials,” SIAM Student Chapter, 4/19/17
- (2013) “Mathematical and computational mixture models for cartilage regeneration in cell-seeded scaffolds,” Biomathematics Seminar, NCSU, 12/3/13
- (2013) “Mathematical modeling of cartilage tissue engineering,” SUM Club talk, 11/20/13
- (2011) “A fast quadrature-based numerical method for the continuous spectrum biphasic poroviscoelastic model of articular cartilage,” Numerical Analysis Seminar, NCSU, 1/25/11
- (2009) “Computational models for biomechanics of the pericellular matrix in articular cartilage,” Numerical Analysis Seminar, NCSU, 3/10/09
- (2007) “Continuum mixture models for mechanics in the cellular microenvironment of articular cartilage,” Mechanics and Materials Seminar, NCSU, 2/21/07
- (2007) “Finite element models of biphasic deformation in the cellular microenvironment of articular cartilage,” Numerical Analysis Seminar, NCSU, 2/13/07
- (2006) “Artificial neural networks for analysis of cartilage repair using hydrogel scaffolds,” Biomathematics Seminar, NCSU, 11/7/06
- (2005) “An accelerated numerical method for the continuous spectrum biphasic poroviscoelastic model of articular cartilage,” Numerical Analysis Seminar, NCSU, September 2005
- (2003) “The role of cartilage mechanics in osteoarthritis: models and experiments,” Biomathematics Seminar, NCSU, April 2003
- (2002) “Numerical simulation of time reversal for waves in random media,” Numerical Analysis Seminar, NCSU, December 2002
- (2002) “Modeling the role of the pericellular matrix in cartilage mechanics,” Numerical Analysis Seminar, NCSU, April 2002
- (2001) “Boundary integral models of 2-D electromagnetic scattering in photonic crystals,” VISTA Seminar, Dept. of Electrical and Computer Engineering, NCSU, April 2001
- (2000) “A boundary integral model for mechanical testing of individual cartilage cells,” Numerical Analysis Seminar, NCSU, February 2000
- (1998) “Boundary integral model for mechanical testing of individual cartilage cells,” Scientific Computation and Applied Mathematics Seminar, Duke University, October 1998.
- (1997) “Viscoelastic modeling of biological soft tissues,” Dept. of Civil Engineering, Duke University, March 1997
- (1996) “Approximate solution of a contact problem in soft tissue biomechanics,” Scientific Computation and Applied Mathematics Seminar, Duke University, October 1996

Training & Outreach

- (2017) “What is Applied Math,” lecture at Girls in Applied Math, Modeling and Analysis (GAMMA) Day, Dept. of Mathematics, NCSU, 4/8/17.
- (2015) Panelist for session on “Paths to the doctorate: finding the right graduate program for you,” *2015 Field of Dreams Conference*, Birmingham, AL, Nov. 6-8, 2015.
- (2015) Panelist for session on “Preparing a Successful Grant Application,” *Joint Math Meetings*, San Antonio TX, Jan 10-13, 2015, organized by Project NEXT
- (2015) Talk on “Writing effective recommendation letters for students applying to mathematics doctoral programs,” *MAA Southeastern Section Meeting*, Project NEXT session, UNC-Wilmington, 3/12/15
- (2010) “Applied mathematics & applications to the biomechanics of orthopaedic soft tissues,” Future Scientists Club, Enloe High School, Raleigh, NC (2/25/10)
- (2008) “Cartilage regeneration,” Scope Academy, NCSU, 10/11/08 (talk to NCSU PAMS alumni)
- (2005) “Mathematical modeling applied to soft tissue biomechanics & understanding osteoarthritis,” presentation to Board of Directors, NCSU PAMS Foundation (4/15/2005)

I. CONFERENCE & WORKSHOP ORGANIZATION

- I15.** (2017) Chair, *SAMSI Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, NC State University, July 16-26, 2017.
- I14.** (2016) Invited Mentor (1 of 4), *The Thirteenth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY, June 7-19, 2016.
- I13.** (2015) Minisymposium on “Multiscale models of biophysical and biomechanical effects in soft tissues,” SMB Annual Meeting, Atlanta, GA, June 3-July 3, 2015, co-organized with Sarah Olson (WPI)
- I12.** (2014) Minisymposium on “Modeling arterial wall mechanics and adaptation using structurally based constitutive laws,” 2014 SIAM Conference on the Life Sciences, Charlotte, NC, August 4-7, 2014, co-organized with Mette Olufsen (NCSU)
- I11.** (2012) Invited Mentor (1 of 4), *The Ninth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY, June 5-8 2012.
- I10.** (2010) Organizing Committee, *34th SIAM Southeastern-Atlantic Section Conference*, North Carolina State University, March 20-21, 2010
- I9.** (2010) Co-organizer (with Sarah Olson, Tulane), Minisymposium on “Modeling in Biomechanics and Bioengineering,” *34th SIAM Southeastern-Atlantic Section Conference*, North Carolina State University, March 20-21, 2010, 8 speakers
- I8.** (2009) Co-organizer (with Greg Forest, UNC-CH), Special Session on “Mathematical Progress and Challenges for Biological Materials,” *2009 AMS Spring Southeastern Section Meeting*, North Carolina State University, April 4-5, 2009, 13 speakers
- I7.** (2008) Invited Mentor (1 of 4), *The Fifth Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY, June 10-13 2008.
- I6.** (2008) Co-organizer (with Lynn Bennethum, UC-Denver), Minisymposium on “Swelling Porous Materials,” *2008 SIAM Conference on Mathematical Aspects of Materials Science*, Philadelphia, PA, May 2008, 8 speakers
- I5.** (2006) Chair, *SAMSI/CRSC 12th Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, North Carolina State University, July 24-August 1, 2006
- I4.** (2006) Invited Mentor (1 of 4), *The Third Annual Graduate Student Math Modeling Camp*, Rensselaer Polytechnic Institute, Troy, NY, June 6-9 2006, designed project and mentored a group of 6 graduate students for one week on the topic: “Optimal design of biocompatible materials for cartilage repair”
- I3.** (2006) Organizer, Minisymposium on “Modeling in Biological Tissues,” *2006 Joint SIAM/SMB Conference on the Life Sciences*, Raleigh, NC, August 2006, 5 speakers
- I2.** (2005) Chair, *SAMSI/CRSC 11th Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, North Carolina State University, July 25-August 2, 2005
- I1.** (2004) Organizer, Minisymposium on “Mathematical Modeling in the Musculoskeletal System,” *2004 SIAM Conference on the Life Sciences*, Portland, OR, July 2004, 8 speakers

J. WORKSHOPS ETC.

- J16.** (2011-12) *Statistical and Applied Mathematical Sciences Institute (SAMSI) Fellow*, 2011-12 Program on Uncertainty Quantification
- J15.** (2009) Faculty Consultant, *15th SAMSI/CRSC Industrial Mathematical & Statistical Modeling Workshop for Graduate Students*, Raleigh, NC, July 19-27, 2009, Project: “Resource issues impacting national security,” Industrial sponsor: MIT-Lincoln Lab
- J14.** (2008) Faculty Consultant, *14th SAMSI/CRSC Industrial Mathematical & Statistical Modeling Workshop for Graduate Students*, Raleigh, NC, July 19-28, 2008, Project: “Estimating position and velocity of flight vehicles using angle-only measurements,” Industrial sponsor: MIT-Lincoln Lab
- J13.** (2007) Faculty Consultant, *23rd Annual Workshop on Mathematical Problems in Industry (MPI)*, June 11-15, 2007, University of Delaware, faculty consultant on project “Modeling diffusion in a lens capsule via fluorescence recovery after photobleaching”

- J12.** (2007) IMA Annual Program on Applications of Algebraic Geometry, Workshop on *Applications in Biology, Dynamics and Statistics*, IMA, Minneapolis, MN, March 5-9, 2007
- J11.** (2004) Faculty Consultant, *10th SAMSII/CRSC Industrial Mathematical & Statistical Modeling Workshop for Graduate Students*, Raleigh, NC, July 26-August 3, 2004, Project: “Identifying respiratory parameters from plethysmography data,” Industrial sponsor: CIIT Centers for Health Research
- J10.** (2004) *Single Cell Mechanics Workshop*, MIT, Cambridge, MA, October 2004, attendance by invitation only
- J9.** (2004) *2004 Whitaker Foundation Biomedical Engineering Research Conference*, La Jolla, CA, August 2004, by invitation only for PIs on Whitaker Foundation research grants
- J8.** (2003) Faculty Consultant, *9th SAMSII/CRSC Industrial Mathematical & Statistical Modeling Workshop for Graduate Students*, Raleigh, NC, July 21-29, 2003, Project: “Modeling the conductivity of concrete,” Industrial sponsor: National Institute of Statistical Sciences
- J7.** (2003) IPAM workshop on *Cells & Materials: at the Tissue Engineering Interface*, UCLA, Los Angeles, CA, February 2003
- J6.** (2002) Faculty Consultant, *8th CRSC Industrial Mathematics Modeling Workshop for Graduate Students*, Raleigh, NC, July 22-30, 2002, Project: “Mathematical models for articular cartilage,” Industrial sponsor: Duke University Medical Center
- J5.** (2002) SIAM symposium on *Computational Models and Simulation for Intra-Cellular Processes*, October 2002, Washington DC
- J4.** (2002) SAMSII workshop on *Inverse Problem Methodology in Complex Stochastic Models*, September 2002, Research Triangle Park, NC
- J3.** (2001) *Teaching Summer Session Courses Professional Development Seminar*, Faculty Center for Teaching and Learning, NCSU
- J2.** (2000) Faculty Consultant, *6th CRSC Industrial Mathematics Modeling Workshop for Graduate Students*, Raleigh, NC, July 24-August 1, 2000, Project: “Diffusion models of photobleaching experiments for articular cartilage,” Industrial sponsor: Duke University Medical Center
- J1.** (1999) IMA Workshop on *Computational Modeling in Biological Fluid Dynamics*, IMA, Minneapolis, MN, January 1999

K. TEACHING (NCSU)

- *Undergraduate*: Calculus III (MA242), Applied Differential Equations I (MA341/H), Applied Differential Equations II (MA401), Introduction to Numerical Analysis II (MA428), Methods of Applied Math I (MA450), Methods of Applied Math II (MA451)
- *Graduate*: Numerical Solution of PDEs – Finite Element Methods (MA587), Introduction to Partial Differential Equations (MA534), Advanced Mathematics for Engineers and Scientists I&II (MA501, 502), Introduction to Complex Variables (MA513), Mathematical Modeling of Physical & Biological Processes I&II (MA 573/574)
- *Graduate Courses Developed (special topics)*: Introduction to Boundary Integral and Fast Multipole Methods (MA797), Introduction to Perturbation Methods (MA797), Introduction to Continuum Mechanics of Elastic and Viscoelastic Solids (MA591/BMA590), Applied Modeling and Analysis Techniques (MA591), Distance Education version of Advanced Mathematics for Engineers and Scientists I (MA 501)

L. SERVICE

Departmental

- *Director of Graduate Programs in Mathematics and Applied Mathematics* (~150 students), 2012-16
- *Regular Committees*: Personnel Evaluation Committee (2008-10), Faculty Advisory Committee (elected, 2005-07, 2009-11, 2014-16), Math Undergraduate Honors Committee (2005-12), PhD

- Prelim Exam Committee (2008-09), Computer Committee (2004-09), Graduate Recruitment Committee (2005-12), Undergraduate Course & Curriculum Committee (2003-04), Undergraduate Committee for Non-Majors (2003-04)
- *Hiring Committees:* General Math Hiring Committee (2011-12, Chair), Applied Analysis Hiring Committee (2010-11, Chair), Interdisciplinary Hiring Committee (2008-09), General Math Hiring Committee (2007-08), PDE Hiring Committee (2002-03, 2005-06, 2006-07), Applied Math Hiring Committee (2001-02)
 - *Ad-hoc Committees:* Applied Math Undergraduate BS Degree Review (2011, Chair), Interdisciplinary Mathematics Grad Program Committee (2005-06, 2009-10), Differential Equations Textbook Selection Committee (2000-01, 2007-08), Teaching Awards Committee (2007-09)
 - *Seminars:* Applied Math Graduate Student Seminar (co-organizer: 2001-02, faculty participant: 2002-03, chair: 2003-05, co-organizer 2006-17), Numerical Analysis Seminar (organizer: 2000-01), NSF RTG program Research Training Modules (co-organizer, 2008-12)
 - *REG Program:* REG Faculty Mentor (Summers 2007, 2010, 2011)
 - Maintained website for NCSU NSF RTG Program on *Mathematics of Materials* (2007-12)
 - Graduate Recruiting Weekend research talks (2001, 2005-07, 2010), Biomathematics Program Graduate Recruiting Weekend talks (2008, 2010)
 - NCSU Mathematics Department representative at Graduate School Career Fair (for minority recruiting), *3rd Annual Iowa Mathematical Field of Dreams Conference* University of Iowa, Iowa City, IA (9/27/09)
 - TA supervisor of 1-2 graduate students each semester since 1999

University

- Member, Cluster Hiring Committee in “Modeling the Living Embryo” (2015-17)
- Faculty Senate Grievance Panel Member (2016-17)
- Member, Cluster Hiring Committee in “Precision Medicine” (2012-15)
- Member, Biomathematics Graduate Admissions Committee (2007-09)
- Member, Biomedical Engineering Undergraduate Admissions Committee (2003-04)
- Chair, Biomathematics Lucas Research Award Committee (2004-05, 2007-08)

External

- Editorial Board, *Journal of Biomechanics* (2007-Present)
- Reviewer for *SIAM Journal on Applied Mathematics*, *SIAM Journal on Numerical Analysis*, *Journal of Fluid Mechanics*, *Journal of Biomechanics*, *Journal of Biomechanical Engineering*, *Biophysical Journal*, *Annals of Biomedical Engineering*, *Biomechanics & Modeling in Mechanobiology*, *Computer Methods in Applied Mechanics & Engineering*, *Osteoarthritis and Cartilage*, *Finite Elements in Analysis & Design*, *Cellular & Molecular Bioengineering*, *Journal of Theoretical Biology*, *International Journal of Solids & Structures*, *Medical Engineering & Physics*, *Scientific Reports*, *International Journal for Numerical Methods in Biomedical Engineering*
- Panel reviewer for NSF programs in the Division of Mathematical Sciences (3 times) and Division of Civil, Mechanical and Manufacturing Innovation (1 time)
- Reviewed book proposal on continuum mechanics of biological materials for Cambridge University Press
- Reviewed Boyce & Brannon differential equations undergraduate textbook for Wiley
- Review Boyce & DiPrima differential equations textbook (9th Ed) for Wiley
- Reviewed 9th edition of Kreysig’s “Advanced Engineering Mathematics” for Wiley & Sons
- Faculty Mentor for Uniform Admissions Process at Mathematical Field of Dreams Conference (Math Alliance)- advised under-represented minority seniors in preparing their graduate school

applications (2013, 2014, 2015)

M. PATENTS

- (2015) Co-author on U.S. Patent#9043156, “Combined Acoustic Radiation Force Impulse (ARFI) Ultrasound and Elastography and Monitored Steady State Excitation Recovery (MSSER) Ultrasound” by UNC-Chapel Hill and Siemens Corp., in collaboration with CM Gallippi (UNC-CH), EG Lobo (NCSU), O Davis (NCSU) and FW Mauldin (Va Tech)

N. SOCIETY MEMBERSHIPS

- Society for Industrial and Applied Mathematics (SIAM), American Society of Mechanical Engineers (ASME), Society for Mathematical Biology (SMB)