BIOGRAPHICAL SKETCH
JOHN S. LOWENGRUB

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EDUCATION

Sept 1985–Oct 1988	**Ph.D. in Applied Mathematics** Courant Institute of Mathematical Sciences Thesis topic: Convergence of the Vortex Method for Vortex Sheets Advisor: Professor Russel Caflisch
Sept 1981–May 1985	**B.A. Mathematics** Cornell University cum laude 1985

APPOINTMENTS

7/11–Present	**Co-Leader of Systems, Pathways & Targets Program** Chao Comprehensive Cancer Center University of California, Irvine
7/10–6/12	**Vice Chair for Graduate Studies** Department of Mathematics, University of California, Irvine
7/09–Present	**Chancellor's Professor** University of California, Irvine
1/07–Present	**Professor** Department of Biomedical Engineering Department of Chemical Engineering and Materials Science University of California, Irvine
7/04–6/09	**Chair** Department of Mathematics, University of California, Irvine
9/03–6/04	**Vice Chair for Graduate Studies** Department of Mathematics, University of California, Irvine
Jan 2003–Present	**Professor** Department of Mathematics, University of California, Irvine

Sept 2000–Dec 2003	**Graduate Faculty** Dept Chemical Engineering & Materials Science University of Minnesota
July 1999-Dec 2003	**Professor** School of Mathematics University of Minnesota
July 1999–June 2001	**Professor** Department of Mathematics University of North Carolina
Dec 1998–Dec 2003	**Graduate Faculty** Dept Aerospace Engineering & Mechanics University of Minnesota
July 1995–June 1999	**Associate Professor** School of Mathematics University of Minnesota
July 1992– June 1995	**Assistant Professor** School of Mathematics University of Minnesota
Sept 1991–June 1992	**Member** School of Mathematics Institute for Advanced Study
June 1990–June 1993	**NSF Postdoctoral Fellow** Stanford Advisor: Professor Joseph Keller Minnesota Advisor: Professor Mitchell Luskin
July 1989–Sept 1992	**Szego Assistant Professor** Department of Mathematics Stanford University
Sept 1988–June 1989	**Visiting Member** Courant Institute of Mathematical Sciences New York University

HONORS AND GRANTS

2014	**Julian Cole Lectureship** Society for Industrial & Applied Math
Sept 2011 - Aug 2016	**NSF Grant for Undergraduate Research** UBM-Institutional: UCI Mathematical and computational biology for undergraduates (MCBU) (co-PI; PI: F. Wan)
Sept 2011 - Aug 2015	**NSF Grant in Division of Materials Science** FRG: Development and validation of novel computational tools for modeling the growth and self-assembly of crystalline nanostructures (co-PI; PI: K. Thornton)
Sept 2010 - Aug 2014	**NSF Grant in Chemistry** SOLAR: Phase-field crystal modeling and analytical surface analysis of iron pyrite for thin-film photovoltaics (co-PI; PI: Matt Law)

Sept 2010 - Aug 2014	**Balsells Postdoctoral Fellowship** Awarded for Esteban Meca
Aug 2010	**Visiting Professor** Aalto University (formerly Helsinki Institute of Technology (TKK)) Helsinki, Finland
Oct 2009- Sept 2012	**NIH Grand Opportunity Award** Feedback, lineages and cancer: A multidisciplinary approach National Institutes of Health (PI; co-PI Arthur Lander, UCI)
June 2008	**Chancellor's award for Excellence in Fostering Undergraduate Research** UC Irvine
April 2008	**Distinguished Mid-Career Faculty Award for Research** UC Irvine
June 2006 - May 2009	**NSF Grant in the Division of Materials Research** New epitaxial nanostructures in the limited adatom mobility regime (co-PI, with Professor Robert Hull, U. Va.(PI))
August 2005 - July 2009	**NSF Grant in the Division of Materials Research** NSF-EC Cooperative Activity in Computational materials research: Bridging the atomistic to the continuum– Multiscale investigation of self-assembling magnetic dots during epitaxial growth (co-PI, with Professors M. Asta (co-PI), P.W. Voorhees (co-PI) and K. Thornton (PI))
Jul 1994-Aug 2017	**NSF Grants in the Division of Mathematical Sciences** Current Grants: (1) Reactive instabilities, colloids and interfacial flows (2) Modeling and simulation of graphene growth (3) Multiscale modeling of mammary gland development
Jul 2006-June 2007	**University of California, Irvine Research Experience for Undergraduates** Agent-based models of tumor growth (awarded for Aaron Abajian). Also awarded Henry Samueli Engineering School Undergraduate Fellowship.
June 2006-Sept 2006	**University of California, Irvine Research Experience for Undergraduates** Turing instability for irregular domains (awarded for Katiya Pavlova)
Jul 2004-June 2005	**University of California, Irvine Research Experience for Undergraduates** Nonlinear 3D modeling of tumor growth (awarded for Genevieve Brown)
Jan 2002-July 2003	**University of Minnesota Research Experience for Undergraduates** The development of a three dimensional adaptive tetrahedal mesh (awarded for Tony Anderson)
July 2001-June 2002	**Minnesota Supercomputer Institute Research Scholarship** Numerical Simulation of Microstructured Materials (awarded for Dr. Vittorio Cristini)

Jan 1998-Dec 2004	**DOE Grants in the Basic Energy Sciences Division** Fundamental Studies of Topological Transitions in Liquid/Liquid Flows (PI, with Professor E.K. Longmire (co-PI)).
May 2000	**Plenary Invited Address** 3rd SIAM Conference on Math. Methods in Materials Science
Nov 1998	**Francois Frenkiel Award** American Physical Society, Fluid Dynamics Division
Sept 1996-2001	**NSF Group Infrastructure Grant** Infrastructural Needs for Preparing Students for the Industrial and Business Workforce (co-PI, with Professors B.Cockburn (co-PI), A. Friedman (co-PI), and F. Santosa (PI))
Sept 1995-1997	**Sloan Foundation Fellowship**
July 1994-1996	**McKnight Foundation Professorship** University of Minnesota
June 1990-1993	**NSF Postdoctoral Fellowship**

PUBLICATIONS

1. *The Convergence of the Vortex Method for Vortex Sheets*, with R.C. Caflisch, SIAM J. Num. Anal., **26**, pp. 1060-1080, 1989.
2. *The Convergence of the Vortex Method for Vortex Sheets*, **Mathematical Aspects of Vortex Dynamics**, ed. R.C. Caflisch, SIAM, pp. 120-127, 1989.
3. *The Convergence of the Point Vortex Method for the 2-D Euler Equations*, with J. Goodman and T.Y. Hou, Comm. Pure Appl. Math, **XLIII**, pp. 415-430, 1990.
4. *The Convergence of the Point Vortex Method for the 3-D Euler Equations*, with T.Y. Hou, Comm. Pure Appl. Math, **XLIII**, pp. 965-981, 1990.
5. *Smooth Grid Methods for the Vorticity Formulation of the Euler Equations*, with M.J. Shelley, in **Vortex Dynamics and Methods**, ed. C. Anderson and C. Greengard, Lectures in Applied Mathematics, **28**, AMS, pp. 423-432, 1991.
6. *The Convergence of an Exact Desingularization and Local Regridding for Vortex Methods*, with T.Y. Hou and M.J. Shelley, in **Vortex Dynamics and Methods**, ed. C. Anderson and C. Greengard, Lectures in Applied Mathematics, v. 28, AMS, pp. 341-362, 1991.
7. *The Convergence of a Point Vortex Method for Vortex Sheets*, with T.Y. Hou and R. Krasny, SIAM J. Num. Anal., **28**, pp. 308-320, 1991.
8. *On the Well-Posedness of Two Fluid Interfacial Flows with Surface Tension*, with J.T. Beale and T.Y. Hou, in **Singularities in Fluids, Plasmas and Optics**, ed. R. Caflisch and G. Papanicolaou, NATO ASI Series, Kluwer Publishers, pp. 11-38, 1992.
9. *Asymptotic and Numerical Results for Blowing-up Solutions to Semi-Linear Heat Equations*, with J.B. Keller, in **Singularities in Fluids, Plasmas and Optics**, ed. R.C. Caflisch and G. Papanicolaou, NATO ASI Series, Kluwer Publishers, pp. 111-130, 1992.
10. *The Convergence of an Exact Desingularization for Vortex Methods*, with T.Y. Hou and M.J. Shelley, SIAM J. Sci. Comp., **14**, pp. 1-18, 1993.

11. *High Order and Efficient Methods for the Vorticity Formulation of the Euler Equations*, with M.J. Shelley and B. Merriman, SIAM J. Sci. Comp., **14**, pp. 1107-1142, 1993.
12. *Growth Rates for the Linearized Motion of Fluid Interfaces away from Equilibrium*, with J.T. Beale and T.Y. Hou, Comm. Pure Appl. Math., **XLVI**, pp. 1269-1301, 1993.
13. *Removing the Stiffness from Interfacial Flows with Surface Tension*, with T.Y. Hou and M.J. Shelley, J. Comp. Phys., **114**, No. 2, pp. 312-338, 1994.
14. *Spatial and Temporal Stability Issues for Interfacial Flows with Surface Tension*, with J.T. Beale, T.Y. Hou and M.J. Shelley, J. Math. and Comp. Modelling, **20**, No. 10/11, pp. 1-27, 1994.
15. *Numerical Calculations of Precipitate Shape Evolution in Elastic Media*, with H.-J. Jou and P. Leo, to appear in **Proceedings of an International Conference on Solid-Solid Phase Transformations**, ed. W.C. Johnson, J.M. Howe, D.E. Laughlin, W.A. Soffa, The Minerals, Metals and Materials Society, Warrendale, PA, pp. 635-640, 1994.
16. *Convergence of Boundary Integral Methods for Water Waves*, with J.T. Beale and T.Y. Hou, SIAM J. Num. Anal., **33**, 1797, 1996.
17. *The long time motion of vortex sheets with surface tension*, with T.Y. Hou and M.S. Shelley, Phys. Fluids, **9**, pp. 1933-1954, 1997.
18. *Microstructural Evolution in Inhomogeneous Elastic Media*, with H.J.-Jou and P.H. Leo, J. Comp. Phys., **131**, pp. 109-148, 1997.
19. *Stability of Boundary Integral Methods for Water Waves*, with J.T. Beale and T.Y. Hou, AMS/IP Stud. Adv. Math, **3** (Nonlinear Evolutionary Partial Differential Equations, Beijing 1993), pp. 107-127, 1997.
20. *A Diffuse Interface Model for Microstructural Evolution in Elastically Stressed Solids*, with P.H. Leo and H.-J. Jou, Acta Materialia, **46**, pp. 2113-2130, 1998.
21. *Quasi-incompressible Cahn-Hilliard Fluids and Topological Transitions*, with L. Truskinovsky, Proc. Roy. Soc. London A **454**, pp. 2617-2654, 1998.
22. *Almost Optimal Convergence of the Point Vortex Method for Vortex Sheets using Numerical Filtering*, with R.C. Caflish and T.Y. Hou, Math. Comp., **68**, pp. 1465-1496, 1999.
23. *Topological Transitions in Liquid/Liquid Interfaces*, with J. Goodman, H. Lee, E. Longmire, M.J. Shelley and L. Truskinovsky, Chapman & Hall/CRC Res. Notes Math, **409** (Free Boundary Problems: Theory and Applications, Crete 1997), pp. 221-236, 1999.
24. *Microstructural Evolution in Orthotropic Elastic Media*, with P.H. Leo and Q. Nie, J. Comp. Phys., **157**, pp. 44-88, 2000.
25. *A Comparison of Experiments and Simulations on Pinch-Off in Round Jets*, with E.K. Longmire and D.L. Gefroh, in **Proceedings of the 1999 ASME/JSME Meeting**, San Francisco.
26. *Measurement and modeling of latent heat release during freezing in a small container*, with R. V. Devireddy, J.C. Bischof, P.H. Leo, ASME IMECE HTD-368/BED-47 (2000), 23-31.
27. *Boundary Integral Methods for Multicomponent Fluids and Multicomponent Materials*, with T.Y. Hou and M.J. Shelley, J. Comp. Phys. **169** (2001), 302-362.
28. *Focusing of an elongated hole in porous medium flow*, with S.B. Angenent, D.G. Aronson and S.I. Betelu, Physica D **151** (2001), 228-252.
29. *Modeling multiphase flows using a novel 3D adaptive remeshing algorithm*, with R. Hooper V. Cristini, S. Shakya, C. W. Macosko and J. J. Derby, *In* **Computational Methods**

in Multiphase Flow, *Eds.: C.A. Brebbia and H. Power, Series: Advances in Fluid Mechanics, Vol. 29, Wessex Institute of Technology Press, UK, 2001.*

30. *On an Elastically Induced Splitting Instability*, with P.H. Leo and Q. Nie, Acta Mater. **49** (2001), 2761-2772.
31. *Modelling Pinchoff and Reconnection in a Hele-Shaw Cell Part I: The Models and their Calibration*, with H. Lee and J. Goodman, Phys. Fluids **14** (2002), 492-513.
32. *Modelling Pinchoff and Reconnection in a Hele-Shaw Cell Part II: Analysis and Simulation in the Nonlinear Regime*, with H. Lee and J. Goodman, Phys. Fluids **14** (2002), 514-545.
33. *Measurement and numerical analysis of freezing in solutions enclosed in a small container*, R. Devireddy, P. Leo and J. Bischof, Int. J. Heat Mass Transfer **45** (2002), 1915-1931.
34. *Three dimensional crystal growth. I. Linear analysis and self-similar evolution*, with V. Cristini, J. Crystal Growth, **240** (2002) 267.
35. *Nonlinear simulation of tumor growth*, with V. Cristini and Q. Nie, J. Math. Biol. **46** (2003) 191.
36. *Microstructure evolution in three-dimensional inhomogeneous elastic media*, with X. Li, Q. Nie, P.H. Leo and V. Cristini, Met. Mater. Trans. A **34A** (2003) 1421.
37. *Conservative multigrid methods for Cahn-Hilliard fluids*, with J.-S. Kim, K. Kang, J. Comp. Phys. **193** (2004) 511-543.
38. *Three dimensional crystal growth II. Nonlinear simulation and control of the Mullins-Sekerka instability*, with V. Cristini, J. Crystal Growth **266** (2004) 552.
39. *Conservative multigrid methods for ternary Cahn-Hilliard systems*, with J.-S. Kim and K. Kang, Comm. Math. Sci. **2** (2004) 53.
40. *Nonlinear theory of self-similar growth and melting*, with S. Li, P.H. Leo and V. Cristini, J. Crystal Growth **267** (2004) 703.
41. *A surfactant conserving volume-of-fluid method for interfacial flows with insoluble surfactant*, with A. James, J. Comp. Phys. **201** (2004) 685-722.
42. *Two- and three dimensional equilibrium morphology of a misfitting particle and the Gibbs-Thomson effect* , with X. Li, K. Thornton, Q. Nie and P.W Voorhees, Acta Metall. **52** (2004) 5829-5843.
43. *Efficient phase-field simulation of quantum dot formation in a strained heteroepitaxial film*, with S.M. Wise, J.S. Kim and W.C. Johnson, J. Superlattices and Microstructures **36** (2004) 293-304.
44. *Experiments and computations on drop impact at a liquid/liquid interface, with Z. Mohamed Kassim, E.K. Longmire, J.-S. Kim, X. Zheng* , Proc. 5th Int. Conf. Multiphase Flow, paper no. 122 (2004) in press.
45. *Phase-field modeling of step dynamics*, with Z. Hu, S.M. Wise, J.S. Kim and A. Voigt, MRS Proceedings **859E** (JJ8.6), J. Evans, C. Orme, M. Asta and Z. Zhang eds., 2004.
46. *Evolving interfaces via gradients of geometry dependent interior Poisson problems: Application to tumor growth*, with P. Macklin, J. Comp. Phys. **203** (2005) 191-220.
47. Nonlinear stability analysis of self-similar crystal growth: Control of the Mullins-Sekerka Instability, with S. Li, P.H. Leo and V. Cristini, J. Crystal Growth **277** (2005) 578-592.
48. *Modeling coarsening dynamics using interface tracking methods*, invited review, Handbook of Materials Modeling, vol 1., S. Yip ed., Springer (2005) 2205-2222.

49. *Interfaces and multicomponent fluids*, with J.-S. Kim, Encyclopedia of Math. Phys., J.-P. Francoise, G. Naber and T.-S. Tsun eds., Elsevier (2005), 135-144.
50. *Adaptive unstructured volume remeshing algorithms II: Application to two- and three- dimensional level-set simulations of multiphase flows*, with X. Zheng, A. Anderson and V. Cristini, J. Comp. Phys., **208** (2005) 626-650.
51. *Phase field modeling and simulation of three phase flows*, with J.-S. Kim, Int. Free Bound. **7** (2005) 435-466.
52. *Nonlinear morphological control of growing crystals*, with S.W. Li and P.H. Leo, Physica D **208** (2005) 209-219.
53. *Quantum dot formation on a strain-patterned epitaxial thin film*, with S.M. Wise, J.S. Kim, K. Thornton, P.W. Voorhees and W.C. Johnson, Appl. Phys. Lett. **87** (2005) 133102.
54. *A level-set method for interfacial flows with surfactant*, with J.J. Xu, Z.L. Li and H.-K. Zhao, J. Comp. Phys. **212** (2006) 590-616.
55. *Phase reconstruction by the weighted least action principle*, with C.M. Lee J. Rubinstein and X.M. Zheng, J. Optics A- Pure Appl. Optics **8** (2006) 279-289.
56. *An improved geometry-aware curvature discretization for level set methods: Application to tumor growth*, with P. Macklin, J. Comp. Phys. **215** (2006) 392-401.
57. *Analysis of cell growth in three-dimensional scaffolds*, with J.C.Y. Dunn, W.Y. Chan, V. Cristini, J.S. Kim, S. Singh, B.M. Wu, Tissue Eng. **12** (2006) 705-716.
58. *Numerical evidence of nonuniqueness in the evolution of vortex sheets*, with M.C. Lopes, H.J.N. Lopes and Y. Zheng, ESAIM-Math. Model. Numer. Anal. **40** (2006) 225-237.
59. *An adaptive coupled level-set/volume of fluid interface tracking method for unstructured triangular grids*, with X. Yang, A. James, X. Zheng and V. Cristini, J. Comp. Phys. **217** (2006) 364-394.
60. *Non-monotone temperature boundary conditions in dendritic growth*, with M.E. Glicksman and S. Li, Proc. Modelling of Casting, Welding and Adv. Solid Processes XI, ed. C.A. Gandin, M. Bellet, (2006) 512-528.
61. *A deterministic mechanism for dendritic solidification kinetics*, with M.E. Glicksman and S. Li, JOM **59** (2007) 27-34.
62. *Nonlinear three-dimensional simulation of solid tumor growth*, with X. Li, V. Cristini and Q. Nie, Discrete Contin. Dyn. System B **7** (2007) 581-604.
63. *Nonlinear simulation of the effect of the microenvironment on tumor growth*, with P. Macklin, J. Theor. Biol. **245** (2007) 677-704.
64. *A rescaling scheme with application to the long time simulation of viscous fingering in a Hele-Shaw cell*, with S. Li and P.H. Leo, J. Comp. Phys. **225** (2007) 554-567.
65. *Surface phase separation and flow in a simple model of multicomponent drops and vesicles*, with J.-J. Xu and A. Voigt, Fluid Dyn. Mater. Proc., **3** (2007) 1-19.
66. *Computer simulation of glioma growth and morphology*, with H.B. Frieboes, S. Wise, X. Zheng, P. Macklin, E. Bearer, V. Cristini, NeuroImage **37** (2007) S59-S70.
67. *Morphological stability analysis of the epitaxial growth of a circular island: Application to nanoscale shape control*, with Z. Hu and S. Li, Physica D **233** (2007) 151-166.
68. *Solving the regularized, strongly anisotropic Cahn-Hilliard equation by an adaptive nonlinear multigrid method*, with S.M. Wise and J.-S. Kim, J. Comp. Phys. **226** (2007) 414-446.

69. *A linear stability analysis for step meandering instabilities including the effects of elastic interactions and ES Barriers*, with D.-H. Yeon, P.-R. Cha, A. Voigt and K. Thornton, Phys. Rev. E **76** (2007) 011601.

70. *A deterministic mechanism for side-branching in dendritic growth*, with S. Li, X. Li and M. Glicksman, Fluid Dyn. Mater. Proc. **2** (2007) 1-8.

71. *Nonlinear modeling and simulation of tumor growth* , with V. Cristini, H.B. Frieboes, X. Li, P. Macklin, S. Sanga, S.M. Wise and X. Zheng, in Modeling and Simulation in Science, Engineering and Technology, ed. N. Bellomo, M. Chaplain and E. DeAngelis, Birkhauser, Boston, (2008) 113-181.

72. *A ghost-cell/level-set method for nonlinear moving boundary problems* , with P. Macklin, J. Sci. Comput. **35** (2008) 266-299.

73. *Three-dimensional multispecies nonlinear tumor growth- I. Model and numerical method*, with S.M. Wise, H.B. Frieboes and V. Cristini, J. Theor. Biol. **253** (2008) 524-543. .

74. *A new method for simulating strongly anisotropic Cahn-Hilliard equations* , with S. Torabi, S. Wise, A. Ratz and A. Voigt, Proc. Mater. Sci. Tech. 2007.

75. *Phase-field modeling of nanoscale island dynamics* , with Z. Hu, S. Li, S. Wise and A. Voigt, Proc. TMS 2008 (137th meeting) Supplemental Proceedings: Materials Processing and Properties (2008) 111-16.

76. *Nonlinear simulations of solid tumor growth using a mixture model: Invasion and branching*, with V. Cristini, X. Li and S.M. Wise, J. Math. Biol. **58** (2009) 723-763.

77. *Multiscale modeling and nonlinear simulation of vascular tumour growth* , with P. Macklin, S. McDougall, A.R.A. Anderson, M.A.J. Chaplain and V. Cristini, J. Math. Biol. **58** (2009) 765-798.

78. *Multiparamter computational modeling of tumor invasion*, with E.L. Bearer, Y.-L. Chuang, H.B. Frieboes, F. Jin, S.M. Wise, M. Ferrari, D.B. Agus, V. Cristini, Cancer Res. **69** (2009) 4493-4501.

79. *Phase-field modeling of the dynamics of multicomponent vesicles: Spinodal decomposition, coarsening, budding and fission*, with A. Rätz and A. Voigt, Phys. Rev. E **79** (2009) 031926.

80. *A new phase-field model for strongly anisotropic systems*, with S. Torabi, A. Voigt and S.M. Wise, Proc. R. Soc. London A **465** (2009) 1337-1359.

81. *Geometric evolution laws for thin crystalline films: Modeling and numerics*, with B. Li, A. Rätz and A. Voigt, Comm. Comp. Phys. **6** (2009) 433-482. (invited review)

82. *Stable and efficient finite-difference nonlinear multigrid schemes for the phase-field crystal equation*, with Z. Hu, S.M. Wise, C. Wang, J. Comput. Phys. **228** (2009) 5323-5339.

83. *An energy stable and convergent finite-difference scheme for the phase-field crystal equation*, with S.M. Wise and C. Wang, SIAM J. Numer. Anal. **47** (2009) 2269-2288.

84. *Solving PDES in complex geometries: A diffuse domain approach*, with X. Li, A. Ratz and A. Voigt, Commun. Math. Sci. **7** (2009) 81-107 .

85. *Control of viscous fingering patterns in a radial Hele-Shaw cell* , with S. Li, J. Fontana and P. Palffy-Muhoray, Phys. Rev. Lett. **102** (2009) 174501.

86. *Coarsening of 3D thin films under the influence of strong surface anisotropy, elastic stresses*, with P. Zhou and S.M. Wise, TMS 2009 (138th annual meeting), Supplemental Proceedings: Materials Characterization, Computation and Modeling (2009) 39-46.

87. *Dynamics of multicomponent vesicles in a viscous fluid*, with J.-S. Sohn, Y.-H. Tseng, S. Li, A. Voigt, J. Comput. Phys. **229** (2010) 119-144.

88. *A diffuse-interface approach for modeling transport, diffusion and adsorption/desorption of material quantities on a deformable interface*, with K.E. Teigen, X. Li, F. Wang and A. Voigt, Comm. Math. Sci. **7** (2009) 1009-1037.

89. *Selection in spatial stochastic models of cancer: Migration as a key modulator of fitness*, with C.J. Thalhauser, D. Stupack and N.L. Komarova, Biology Direct **5** (2010) 21.

90. *Nonlinear modeling of cancer: Bridging the gap between cells and tumors*, with H.B. Frieboes, F. Jin, Y.-L. Chuang, X. Li, P. Macklin, S.M. Wise and V. Cristini, Nonlinearity **23** (2010) R1-R91 (invited review).

91. *Three-dimensional multispecies nonlinear tumor growth-II: Tumor invasion and angiogenesis.* with H.B. Frieboes, F. Jin, Y.-L. Chuang, S.M. Wise, V. Cristini, J. Theor. Biol. **264** (2010) 1254-1278.

92. *Two-phase flow in complex geometries: A diffuse domain approach*, with S. Aland and A. Voigt, CMES-Comput. Model. Eng. Sci. **57** (2010) 77-107.

93. *Mathematical oncology: How are the mathematical and physical sciences contributing to the war on cancer?*, with A.H. Chauviere, H. Hatzikirou, H.B. Frieboes, A.M. Thompson, V. Cristini, Curr. Breast Canc. Rep. **2** (2010) 121-129.

94. *Predictions of tumour morphological stability and evaluation against experimental observations*, with K. Pham, H.B. Frieboes, V. Cristini, J. Roy. Soc. Interface **8** (2010) 16-29.

95. *Applications of a new In vivo tumor spheroid based shelless chorioallantoic membrane 3-D model in bioengineering research*, with N. De Magalhaes, L.H.L. Liaw, M. Berns, V. Cristini, Z. Chen, D. Stupack, J. Biomed. Sci. Eng. **3** (2010) 20-26.

96. *An adaptive multigrid algorithm for simulating solid tumor growth using mixture models*, with S.M. Wise and V. Cristini, Math. Comput. Model. (2011) **53** (2011) 1-20.

97. *A diffuse-interface method for two-phase flows with soluble surfactants*, with K.E. Teigen, P. Song, and A. Voigt, J. Comput. Phys. **230** (2011) 375-393.

98. Physical oncology: A bench-to-bedside quantitative and predictive approach, with H.B. Frieboes, M.A.J. Chaplain, A.M. Thompson, E.L. Bearer, and V. Cristini, Cancer Res. **71** (2011) 298-302.

99. *Numerical study of surfactant-laden drop-drop interactions*, with J.-J. Xu, Z. Li, H. Zhao, Comm. Comp. Phys. **10** (2011) 453-473.

100. *A grid based particle method for solving partial differential equations on evolving surfaces and modeling high order geometrical motion*, with S.-Y. Leung and H.-K. Zhao, J. Comput. Phys. **230** (2011) 2540-2561.

101. *A continuum model of colloid-stabilized interfaces*, with S. Aland and A. Voigt, Phys. Fluids **23** (2011) 062103.

102. *Density-dependent quiescence in glioma invasion: instability in a simple reaction diffusion model for the migration/proliferation dichotomy*, with K. Pham, A. Chauviere, H. Hatzikirou, X. Li, H.M. Byrne, V. Cristini, J. Biol. Dyn. **6** (2011) 54-71.

103. *A geometric evolution law for modeling strongly anisotropic thin films*, with C. Ograin, Phys. Rev. E **84** (2011) 061606.

104. *Coarsening of elastically stressed, strongly anisotropic driven thin films*, with P. Zhou, S. Wise, X. Li, Phys. Rev. E **86** (2012) 019901 .

105. *Axisymmetric multicomponent vesicles: A comparison of geometric and fluid models*, with J. Sohn, S. Li, X. Li, Int. J. Biomed. Eng. **28** (2012) 346-368.
106. *Modeling an elastic fingering instability in a reactive Hele-Shaw flow*, with A. He and A. Belmonte, SIAM J. Appl. Math. **72** (2012) 842-856.
107. *Phase-field modeling of epitaxial growth: Applications to step trains and island dynamics*, with Z. Hu, S.M. Wise, A. Voigt, **241** (2012) 77-94.
108. *Interated intravital microscopy and mathematical modeling to optimize nanotherapeutics delivery to tumors*, with A. van de Ven, M. Wu, S.R. McDougall, M.A.J. Chaplain, V. Cristini, M. Ferrari, H.B. Frieboes, AIP Advances **2** (2012) 011208.
109. *Dynamic density functional theory of solid tumor growth: Preliminary models*, with A. Chauviere, H. Hatzikirou, I.G. Kevrekidis, V. Cristini, AIP Advances **2** (2012) 011210.
110. *Efficient coarse simulation of a growing avascular tumor*, M.E. Kavousanakis, P. Liu, A.G. Boudouvis, I.G. Kevrekidis, Phys. Rev. E **85** (2012) 031912.
111. Simulating interfacial anisotropy in thin film growth using an extended Cahn-Hilliard model, with S. Torabi, Phys. Rev. E **85** (2012) 041603.
112. *Locomotion, wrinkling, and budding of a multicomponent vesicle in a viscous fluid*, with S. Li, A. Voigt, Commun. Math. Sci. **10** (2012) 645-670.
113. *A level-set continuum method for two phase flows with insoluble surfactant*, with J.-J. Xu, Y. Yang, J. Comput. Phys. **231** (2012) 5897-5909.
114. *Multispecies model of cell lineages and feedback control in solid tumors*, with H. Youssefpour and A.D. Lander, J. Theor. Biol. **304** (2012) 39-59.
115. *Self-similar evolution of a precipitate in inhomogeneous elastic media*, A. Barua, S. Li, X. Li, J. Crystal Growth **351** (2012) 62-71.
116. *Particles at fluid-fluid interfaces: A new Navier Stokes Cahn Hilliard surface phase field crystal model*, Phys. Rev. E **86** (2012) 046321.
117. *The effect of interstitial pressure on tumor growth: Coupling with the blood and lymphatic vascular systems*, with M. Wu, H.B. Frieboes, S.R. McDougall, M.A.J. Chaplain, V. Cristini, J. Theor. Biol. (2013), **320**, 131-151.
118. *A computational model for predicting nanoparticle accumulation in tumor vasculature*, with H.B. Frieboes, M. Wu, P. Decuzzi, V. Cristini, PLoS One (2013), **8**, e56876.
119. *Energy stable and efficient finite-difference nonlinear multigrid schemes for the modified phase field crystal equation*, with A. Baskaran, Z. Hu, C. Wang, P. Zhou, S. M. Wise, J. Comput. Phys. (2013), **250**, 270-292. (Oct publication date)
120. *An efficient rescaling algorithm for simulating the evolution of multiple elastically stressed precipitates*, with A. Barua, S.W. Li, H. Feng, X.F. Li, Commun. Comput. Phys. (2013), **14**, 940-959. (Oct publication date)
121. *Analysis of a mixture model of tumor growth*, with E. Titi, K. Zhao, Eur. J. Appl. Math. (2013), **24**, 691-734.
122. *Epitaxial Graphene Growth and Shape Dynamics on Copper: Phase-Field Modeling and Experiments*, with E. Meca, H. Kim, C. Mattevi, V.B. Shenoy, Nano Letters (2013), **13**, 5692-5697.
123. *Phase-field modeling of two-dimensional crystal growth with anisotropic diffusion*, with E. Meca, V.B. Shenoy, Phys. Rev. E (2013), **88**, 052409.
124. *The effects of cell compressibility, motility and contact inhibition on the growth of tumor cell clusters using the Cellular Potts Model*, with J. Li, J. Theor. Biol. (2014), **343**, 79-91.
125. *A stable scheme for a nonlinear, multiphase tumor growth model with an elastic membrane*, with Y. Chen, S.M. Wise, V.B. Shenoy, Int. J. Numer. Meth. Biomed. Eng. (2014), **30**,

726-754.

126. *The effect of interstitial pressure on therapeutic agent transport: Coupling with the tumor blood and lymphatic vascular systems*, with M. Wu, H.B. Frieboes, M.A.J. Chaplain, S.R. McDougall, V. Cristini, J. Theor. Biol. (2014), **355**, 194-207.
127. *A numerical method for the quasi-incompressible Cahn-Hilliard-Navier-Stokes equations for variable density flows with a discrete energy law*, with Z. Guo, P. Lin, J. Comput. Phys. (2014), **276**, 486-507.
128. *Second order convex splitting schemes for periodic nonlocal Cahn-Hilliard and Allen-Cahn equations*, with Z. Guan, C. Wang, S.M. Wise, J. Comput. Phys. (2014), **277**, 48-71.
129. *Diffuse interface models of locally inextensible vesicles in a viscous fluid*, with S. Aland, S. Egerer, A. Voigt, J. Comput. Phys. (2014), **277**, 32-47.
130. *Kinetic density functional theory of freezing*, with Ar. Baskaran, Ap. Baskaran, J. Chem. Phys. (2014), **141**, 174506.
131. *Tumor growth in complex, evolving microenvironmental geometries: A diffuse domain approach*, with Y. Chen, J. Theor. Biol. (2014), **361**, 14-30.
132. *The effect of spontaneous curvature on a two-phase vesicle*, with G. Cox, Nonlinearity (2015), **28**, 773-793.

STUDENTS

1. H.-J. Jou (Aerospace and Mechanics, UMN, Aero. Advisor: P.H. Leo, PhD 1995) Thesis topic: *Microstructure evolution in inhomogeneous elastic media.* Current position: Senior materials design engineer, QuesTek Innovations LLC.

2. Doug Clancey (Mathematics, UMN, M.S. 1996)

3. Yilen Qiu (Mathematics, UMN, M.S. 1996)

4. Matthew Gast (Aerospace and Mechanics, UMN, B.S. 1999, joint with Aero. Advisor: E.K. Longmire, sponsored URI research project in 1999) Honors thesis: *A Research Study of Pinch-off and Reconnection in Liquid/Liquid Hele-Shaw Flows.*

5. Jacob Hageman (Aerospace and Mechanics, UMN, joint with Aero. Advisor: E.K. Longmire, M.S. 1999) Thesis: *Pinch-Off and Reconnection of an Unstably Stratified Fluid Layer.*

6. Nicolas Vera (Mathematics, UMN, M.S. 1999) Thesis: *A diffuse interface model for microstructure evolution in anisotropic homogeneous media.*

7. Russell Hooper (Chemical Engineering and Materials Science, UMN (Chem. Eng. Advisors: C. Macosko and J. Derby) Ph.D. 2001) Thesis topic: *Drop dynamics in polymer processing flows.* Current position: Sandia National Laboratory, N.M.

8. Trygve Kristiansen (Norges Teknisk-Naturvitenskapelige Universitet (NTNU, Norwegian University of Science and Technology), Norway; M.A. 2002). Thesis topic: *Theory and simulation of a shape-preserving drop/crystal motion.* Current position: Marintek (Norway).

9. Jun-Seok Kim (Mathematics, UMN, Ph.D. 2002) Thesis topic: *Theory and simulation of multi-component fluid flows.* Current position: Dept. Math., Korea University.

10. Grady Cantrell (Burnsville High School class of 2003, Burnsville, Minn.) Research experience for high school students, sponsored by the Minnesota Academy of Sciences (summer 2001). Topic: *Analysis of a mathematical model for tumor growth.*

11. Tony Anderson (Dept. Chem. Eng. Mat. Sci, UMN, B.S. 2004). Honors thesis advisor (joint with V. Cristini). Topic: *The development of an adaptive, unstructured 3-d tetrahedral mesh.* Current: Postdoctoral researcher, DAMTP, Cambridge University.

12. Frank Gonzalez (Mathematics, UCI, M.S. 2005). Research topic: Models of angiogenesis in tissue scaffolds.

13. Xiaoming Zheng (Mathematics, UCI, Ph.D., June 2005), (joint with V. Cristini), Thesis topic: *Adaptive 2D and 3D simulations of interfacial flows.* Current: Asst. Prof., Dept. Math., U. Central Michigan.

14. Shuwang Li (Aerospace and Mechanics, UMN, joint with Aero. Advisor: P.H. Leo, Ph.D. 2005), Thesis topic: *Morphological control of crystal growth.* Current: Asst. Prof., Dept. Math, Ill. Inst. Techn..

15. Genevieve Brown (Mathematics, UCI, B.S. 2006). Undergraduate researcher. Topic: Modeling 3D tumor growth. Ph.D. 2011 in Appl. Math., Northwestern University.

16. Anders Lagoni (Mathematics, Visiting Student 2005-06. Undergraduate researcher. Topic: Multigrid methods and applications to diffusion equations.

17. Katiya Pavlova (Mathematics, UCI, B.S. 2006. Joint with E. Titi). Undergraduate researcher. Topic: Leray-α regularization for discontinuous solutions of the inviscid Burger's equation.

18. Paul Macklin (Mathematics, UCI, Ph.D. 2007), Thesis topic: *Modeling and simulation of solid tumor growth.* Current position: Asst. Prof., Center for Applied and Molecular Medicine, University of Southern California.

19. Xiangrong Li (Mathematics, UCI, Ph.D. 2007), Thesis topic: *Analysis and simulation of solid tumor growth.* Current position: General Electric.

20. Aaron Abajian (Mathematics and Computer Sci. Eng., UCI, B.S. 2008), Research topic: *Agent-based tumor modelling and simulation.* (Honors thesis). Current: Yale Medical School MD program.

21. Sam Lee (Biomedical Engineering, UCI, B.S. 2008), Research topic: *Three-dimensional modeling of solid tumor growth*

22. Zhengzheng Hu (Mathematics, UCI, Ph.D. 2008). Thesis topic: Adaptive phase-field modeling of epitaxial growth: Quantum dot formation and stability of step motion. Current: Postdoctoral researcher North Carolina State University.

23. Nzola De Magalhaes (Biomed. Eng., UCI, Ph.D. 2008.) Thesis topic: Theoretical and experimental models of angiogenesis. Current: Asst. Prof. Rochester Inst. Technol.

24. Laura Ciardiello (Mathematics, U. Torino, M.S. 2008) Multiscale modeling of chemotaxis: From the cell-level to the continuum.

25. Dustin Phan (Mathematics, UCI, B.S. 2009). Cell motility increases fitness in solid tumors. Current: Ph.D. student in Dept. Ecol. Evol. Biol., UC Irvine.

26. Yu-Hau (Howard) Tseng (Mathematics, National Chiao Tung University, Taiwan, Ph.D. 2009). The dynamics of multicomponent vesicles. Current: Dept. Math, York University.

27. Cristina Mooradorian (Mathematics, Cornell University, B.S. 2012). Summer student (2009). Topic: Cell lineages in cancer.

28. Monica Villaron (Mathematics, UC Santa Cruz, B.S. 2010). Summer student (2009) through UC Leads. Topic: Cell lineages in cancer.

29. Jinsun Kim (Mathematics, UCI, Ph.D. 2010). Thesis topic: Modeling and simulation of biomembranes. Current: CAM Asst. Prof., UCLA.

30. Chris Ograin (Mathematics, UCI, Ph.D. 2010). Thesis topic: Modeling, analysis and simulation of strongly anisotropic thin films. Current: Lecturer PSOE, UC Santa Barbara.

31. Geoff Cox (Mathematics, UCI, Ph.D. 2010). Thesis topic: Modeling, analysis and simulation of interactions among pattern formation and domain growth. Current: Asst. Prof., Virginia Military Institute.

32. Solmaz Torabi (Mater. Sci. Eng., UCI, Ph.D. 2010). Thesis topic: Strongly anisotropic Cahn-Hilliard type equations. Current: INTEL Corporation (Portland).

33. Jonathan Li (High-School degree 2010). Multiscale modeling of tumor growth. Current: Harvard University.

34. Hong Nguyen (Mathematics, Mt. San Antonio College, B.S. 2010). Summer student (2009) NSF-SSTEM Research Scholarship. Topic: Cell lineages in cancer.

35. Andrea Park (Mathematics, MIT, B.S. 2013). Summer student (2010). Topic: Cell lineages in cancer.

36. Knut Erik Teigen (Mechanical Engineering, Norwegian U. Sci. Techn., Ph.D. 2010). Phase field modeling for drops with surfactant. Current: SINTEF.

37. Kara Pham (Mathematics, UCI, Ph.D. 2011). Predictions of the morphological stability of growing tumors: A theoretical analysis and experimental validation. Current: Aleks Corporation.

38. Catherine Ta (Mathematics, UCI, B.S. 2011). Undergraduate Research Topic: Mathematical analysis and numerical simulation of lineages, feedback and cancer. Current; Ph.D. program in Mathematics, UC Irvine.

39. Vidhi Patel (MCBU Student, Summer/Fall 2012). Undergraduate Research Topic: Radiotherapy and solid tumor growth.

40. Huy Nghiem (MCBU Student, Summer 2012). Undergraduate Research Topic: Radiotherapy and solid tumor growth.

41. Da Thao Huynh (MCBU Student, Summer 2012). Undergraduate Research Topic: Radiotherapy and solid tumor growth.

42. Nadia Alvarez (NSF-SSTEM Student, Summer 2012). Undergraduate Research Topic: Radiotherapy and solid tumor growth.

43. Shabnam Moobed (Mathematics, UCI, Ph.D. 2012. Thesis topic: Multiscale models of solid tumor growth: From the cell-level to the continuum. Current: UC Irvine.

44. Min Wu (Mathematics, UCI, Ph.D. 2012). Modeling of vascular tumor growth. Current: University Pierre et Marie Curie, Paris.

45. Ying Chen (Mathematics, UCI, Ph.D. 2012). Modeling solid tumor growth in complex, dynamic geometries. Current: Dept. Math, Purdue University.

46. Sebastian Aland (Mathematics, TU Dresden, Ph.D. 2012): Modeling of two-phase flow with surface active particles. Current: Dept Math, TU Dresden.

47. Hamed Youssefpour (Chem. Eng. Mater. Sci., UCI, Ph.D. 2013.) Topic: Lineages, feedback and cancer. Current: Center for Complex Biological Systems, UC Irvine. Current: self-employed.

48. Karl Lervag (Dept. Energy & Process Engineering, Norwegian University of Science and Technology, Ph.D. 2013.) Topic: Diffuse domain methods. Current: SINTEK Corporation (Norway).

49. Huaming Yan (Mathematics, UCI., Ph.D. Expected 2015). Topic: Mathematical modeling of branching morphologenesis.
50. Mary Lee (Mathematics, UCI, Ph.D. expected 2015). Topic: Mathematical modeling of tumor growth and metabolism.
51. Vili Heinonen (Physics, Aalto University, Ph.D. expected 2015). Topic: Mathematical modeling of mesoscale fluid flow and phase transitions.
52. Anna Konstorum (Mathematics, UCI, Ph.D. Expected 2015). Topic: Mathematical modeling of tumor-host interactions.

53. Monica Romero (Biomed. Eng., UCI, Ph.D. Expected 2016). Topic: Tumor growth on scaffolds: Experiments and mathematical models

54. Mariano Franco (Math, UCI, Ph.D. Expected 2016). Topic: Computational modeling of geometric evolution laws.

55. Kevin Lee (University High Student, 2012-2014; current: Harvard). Topic: Electromechanical Modeling of the Heart in Moving Domains Using the Phase-Field Method. Intel STS 2nd place.

56. Kevin Huang (University High Student, 2012-2014; current: Yale). Topic: Individual based models of cell lineage dynamics in tumors.

57. Anthony Gusman (Vangard University, (UCI SURP, Summer 2013-2014). Topic: A mathematical and computational model of branched cell lineages: The effect of branching and feedback.

58. Abdon Iniguez, (UCI MCBU, Summer 2013-2014). Topic: Cancer stem cells, feedback and radiation.

59. Daniel Ramirez-Guerreo (UCI MCBU, Summer 2013-Present, B.S. degree 2015 expected). Undergraduate Research Topic: Cancer stem cells, feedback and radiation.

60. Andrew Thomas (UCI Math, Jul 2014-Present; Ph.D. expected 2016). Mathematical and computational modeling of hierarchically organized tissues.

61. Garrett Chow (UCI Dev. Cell Biol., Jun 2014-Present; B.S. degree 2015 expected). Cancer, lineages and radiotherapy.

62. Michelle Chen (Sage High School, Spring 2014-Present; degree expected 2015). Mathematical modeling of radiotherapy.

63. Jana Lipkova (TU Munich, Oct 2014-Present; Ph.D. expected 2017); Mathematical modeling of glioblastoma.

64. Fei Yu (UCI Math, Sept 2014-Present; Ph.D. expected 2018); High-order diffuse-domain methods for solving PDEs in complex geometries.

POSTDOCTORAL STUDENTS AND MENTORING

1. Thomas Little (Mathematics, UMN, 1996; P. Leo joint advisor). Topic: *Theory and simulation of the ledge mechanism in metallic alloys.*

2. Hyeonggi Lee (Mathematics, UMN, 1996-2000). Topic: *Diffuse interface models for multiple component fluid flows.*

3. Qing Nie (Institute for Math and its Applications, UMN, 1996-1997; served as faculty mentor). Topic: *Simulations of diffusional phase transformations in aniosotropic, inhomogeneous elastic media.* Current position: Professor of Mathematics, U.C. Irvine.

4. Matthew Killough (School of Math, UMN, 1998-2000; served as faculty mentor). Topic: *Phase transitions in elastically stressed media*

5. Vittorio Cristini (Mathematics and Chemical Engineering, UMN, (C. Macosko joint advisor), 2000-2002); Topic: *Computational science of microstructure: fluids, materials, biology.* Current: Victor & Ruby Hansen Surface Professor, Dept. Pathology, U. New Mexico.

6. Hua Zhou (Chemical Engineering, UMN, (C. Macosko joint advisor), 2001-2003), Topic: *Theory and simulations of interfacial fluid flows with surfactants in 3-D.*

7. Galyna Vasko (Dept. Oral Sciences-Biomaterials, UMN, (A. Versluis, W. Douglas and V. Cristini joint advisors), Oct 2001-2002); Topic: *Experiments and adaptive simulations of crack propagation in teeth and arteries.*

8. Lan Pham (Depts. of Mathematics and Bioengineering, UCI (V. Cristini joint advisor), Oct 2002-2003); Topic: *3D growth of solid tumors and crystals* .

9. Jun-Seok Kim (Dept. of Mathematics, UCI and UMN, Oct 2002-2006); Topic: *Numerical simulation of microstructured materials* . Current: Asst. Prof., Dept. Math, Korea University.

10. Steve Wise (Depts. of Mathematics and Bioengineering, UCI, (V. Cristini joint advisor), March 2003-2007); Topic: *Analysis and numerical simulation of tumor growth and microstructured materials* . Current: Assoc. Prof., Dept. Math., University of Tennessee.

11. Jianjun Xu (Dept. Math., UCI), 2005-2007. Topic: *Interfacial flows with surfactants.* Current: Asst. Prof. Xiangtan University, China.

12. Shuwang Li (Visiting Asst. Prof.,Dept. Math., UCI), 2005-2008. Topic: *Prediction and control of micro- and nano- scale materials.* Current: Asst. Prof., Math Dept., Ill. Inst. Technol.

13. Yao-Li Chuang (Dept. Math., UCI), 2007-2008. Topic: *Upscaling of discrete, agent-based tumor models.* Current: Postdoctoral researcher, U. New Mexico (Dept Pathology).

14. Fang Jin (Dept. Math., UCI), 2007-present. Topic: *Three-dimensional tumor modeling and modeling of multicomponent, elastic membranes.* Current: MetroStar systems.

15. Peng Zhou (Dept. Math., UCI), 2007-2011. Topic: *Modeling and simulation of microstructures in materials science and biology. Current: Dept. Astronaut. Sci. & Mech., Harbin Inst. Technol., China.* .

16. Peng Song (Dept. Math., UCI; joint with H-K. Zhao), Sept. 2008- Jul. 2010. Topic: *Modeling and simulation of 3D vesicles.* . Current: Asst. Prof., Inst. Appl. Phys. Comp. Math. (Beijing).

17. Arvind Baskaran (Dept. Math., UCI), Sept. 2009-2014. Topic: *Modeling heterogeneous nanomaterials.* Current: NIST.

18. Yucheng Hu (Dept. Math., UCI), Aug 2010-present. Topic: *Multiscale modeling of cell lineages in solid tumors.* Current: Asst. Prof., Zhou Pei-yuan Center for Appl. Math., Tsinghua University, China.

19. Esteban Meca (Dept. Math., UCI), Sept 2010-2014. Topic: *Mathematical modeling of graphene.* Current: Weierstrass Institute, Berlin.

20. Zhen Guan (Dept. Math., UCI), Sept 2012-present. Topic: *Mathematical modeling nanoscale systems.*

21. Kai Liu (Dept. Math., UCI), Sept 2014-Present. Topic: *Mathematical modeling of biomembranes.*

22. Zhenlin Guo (Dept. Math., UCI), Jan 2015-Present. Topic: *Mathematical modeling of interfaces with surfactant.*

RESEARCH INTERESTS

Applied analysis and numerical analysis of free boundary problems: Multicomponent fluid flows; fluid flows with deformable elastic boundaries; phase transformations in liquids, solids and biological tissues; tumor modeling; tissue engineering.

REFERENCES

R.C. Caflisch (UCLA); Mark Chaplain (U. Dundee, Scotland); T.Y. Hou (Caltech); J. Keller (Stanford); G.B. McFadden (NIST); M.J. Shelley (Courant). Others available upon request.

SERVICE

1. Developed graduate and undergraduate curricula in numerical analysis. Directed numerous seminar series. Served on examination committees in Engineering, Physics, Chemistry, Earth Systems Science, and Biology.

2. Associate Editor for the journal Communications in the Mathematical Sciences (2000-2003; 2010-Present).

3. Editorial board member for the journal of Bioengineering & Biomedical Science (2010-Present).

4. Editorial board member for the journal Nonlinearity (2011-Present).

5. Editorial board member for the journal Multiscale Methods and their Applications (2011-Present).

6. Editorial board member for the journal Interfaces and Free Boundaries (2014-Present).

7. Co-Chief editor for the journal Advances in Computational Mathematics (2013-Present).

8. Referee for numerous journals.

9. Organized a mini-symposium (4 sessions) on computational methods in materials science for the 3rd SIAM conference on math. methods in materials science (May 2000, with Bo Li).

10. Organizing committee member for the biennial Snowbird Dynamical Systems meeting (2002).

11. Taught summer course for COSMOS (California State Summer School for Mathematics and Science) on Mathematical and Computer Modeling for Biology (for high school students). July-August 2004; July-August 2005.

12. Organized a focus session on fluid interfaces at the Int. Conference on Free Boundary Problems, Coimbra Portugal, 2005.

13. Organizing committee member (with F. Wan, Q. Nie and V. Cristini) for a minisymposium on the Biomechanics of Tissues at the 15th US National Congress of Theoretical and Applied Mechanics, Boulder 2006.

14. Organizing committee member for a 3-month long workshop at IPAM. Cells and materials: At the interface between mathematics, biology and engineering. Mar 13-June 16, 2006.

15. U.C. Santa Barbara IGERT Advisory board member (2006).

16. Reviewer for Auburn University Mathematics Department (2007).

17. Guest editor, Fluid Dynamics and Materials Processing, v3 no. 1 (2007).

18. Co-organizer (with Q. Nie) of the 1st UCI Symposium on Mathematical Systems Biology. Spatial Dynamics of Growth and Signaling (Feb 28/29 2008).

19. Taught summer courses for COSMOS (California State Summer School for Mathematics and Science) on Mathematical Materials Science and Engineering (for high school students). July-August 2007 and June-July 2008.

20. Faculty advisor for Aaron Abajian for UCI UTeach program. This program is designed to offer undergraduate students, (junior/senior) with the guidance of a faculty advisor, the opportunity to design, develop and facilitate a lower division seminar (Mathematical Biology in our case).

21. Organized minisymposia on modeling and simulation of heteroepitaxial growth (3 parts, with K. Thornton and A. Voigt) at the 2008 SIAM Conference on mathematical aspects of materials science.

22. Organized minisymposium on multiscale modeling of solid tumor growth and angiogenesis at the Society for Mathematical Biology Annual Meeting 2008.

23. Taught summer course for COSMOS (California State Summer School for Mathematics and Science) on Mathematical Modeling of Tissue and Tumor Biology (for high school students). July 2009-Present.

24. Faculty advisor for COSMOS program, 2007-present.

25. Gave minicourse in summer school at Int. Center for Mech. Sci. (CISM, Udine Italy) 2009.

26. Lead faculty for graduate program (Ph.D., M.S.) in Mathematical and Computational Systems Biology. In charge of writing proposal. 2010-Present.

27. Served 3-year term, 2010-2013, on the UCI Committee-on-Committees. Appointed and recruited faculty members across UCI to serve on UCI faculty committees.

28. Co-organized 3 minisymposia at the 2010 SIAM meeting on Mathematical Materials Science.

29. Reviewer for the Applied Mathematics Graduate Program at the University of Arizona, Tucson (2010).

30. Reviewer for the Undergraduate Mathematics Program at UC Merced (2010).

31. Gave minicourse in summer school at Aalto University (Helsinki, Finland) 2010.

32. Co-organizer of workshop on solid tumor modeling at NIMBioS (Knoxville, Tenn) 2011.

33. Co-organizer of minisymposium on multiscale modeling of biological systems at ECTMB (Krakow) 2011.

34. Summer course on mathematical & computational models of tumor growth. RTG program, Dept. Math., U. Washington (2012).

35. Co-organizer of IPAM Workshop on mesoscale and continuum scale modeling of materials defects (2012).

36. Review panelist for DFG-Priority program SPP 1506 Transport Processes at Fluidic Interfaces (2010 and 2013).

37. Co-organizer of minisymposia at the 2013 SIAM meeting on Mathematical Materials Science.

38. Co-organizer of the MBI emphasis year on cancer and its environment (2014-2015).

39. Vice Chair, SIAM activity group for mathematical aspects of materials science (2014-Present).

INVITED LECTURES

1988 Workshop on Singularities in Nonlinear Partial Differential Equations at the University of Arizona; S.I.A.M. Workshop on Mathematical Vortex Dynamics at Leesburg, VA.

1989 Stanford University; University of California at Berkeley; University of California at Los Angeles; University of Rome I (La Sapienza).

1990 California Institute of Technology (Applied Mathematics Dept.); S.I.A.M. Workshop on Vortex Dynamics and Methods at Seattle, WA; S.I.A.M. National Meeting at Chicago, Il; University of Rome I.

1991 Institute for Advanced Study; Princeton University; Rutgers University; State University of New York at Buffalo.

1992 Brown University (Applied Mathematics Dept.); Georgia Institute of Technology; New Jersey Institute of Technology; Northwestern University; NATO Meeting on Singularities in Fluids, Plasmas and Optics at Heraklion, Crete (Greece); University of California at Irvine; University of Chicago; University of Minnesota (School of Mathematics); University of Utah.

1993 California Institute of Technology (Applied Mathematics Dept.); New York University (Courant Institute); University of California at Los Angeles; University of Minnesota (Army High Performance Computing Research Center); University of Rome II (Tor Vergata).

1994 American Mathematical Society Conference at Stillwater, OK; University of Chicago; University of Minnesota (Dept. of Aerospace and Mechanics colloquium, Dept. of Chemical Engineering).

1995 University of Chicago; University of Minnesota (School of Math colloquium); Institute for Pure and Applied Math (IMPA), Rio de Janiero, Brasil; University of Campinas, Campinas, Brasil (series of lectures on interfaces in fluids and materials at Summer Program in Partial Differential Equations); Sixth International Symposium on Computational Fluid Dynamics at Lake Tahoe, Nevada.

1996 Institute for Mathematics and its Applications (plenary lecture in workshop on "Interfaces and Thin Films"); University of Chicago; U. Minnesota (Numerical Analysis Seminar).

1997 U. Minnesota (Dept. Aero. and Mech. colloquium); U. Maryland (Dept. Math colloquium), Brigham Young University (PDE seminar); U. Utah (applied math seminar); U.C. Irvine (Applied Math Seminar); International Congress on Free Boundary Problems (Crete); SIAM national meeting (Palo Alto).

1998 Computational Science Initiative Panel on Nonlinear Complex Phenomena (organized by DOE); U. Minnesota (Dept. Chemical Engineering); U. Chicago (Applied Math Colloquium); 13th US National Congress of Applied Mechanics; Georgia Tech (Applied Math Seminar).

1999 University of North Carolina (Applied Math Seminar and Colloquium); Johns Hopkins University (Mechanical Engineering Seminar, February); Caltech (Applied Math Seminar,

April); Midwest PDE Seminar (I.M.A., U. Minnesota); Seventeeth Symposium on Energy Engineering Sciences (Argon National Lab, May); Eindhoven University of Technology in the Netherlands (Chemical Engineering Seminar).

2000 North Carolina State University (Applied Math Seminar); 3^{rd} SIAM meeting on Mathematical Aspects of Materials Science (Plenary speaker).

2001 University of Minnesota (Institute for Math and its Applications); Illinois Institute of Technology (Math Colloquium); University of California Irvine (Math Colloquium); Medtronic Corporation; Ford Motor Company; University of Minnesota (Dept. Pharmacology); American Physical Society Division of fluid dynamics annual meeting (San Diego).

2002 AMS Meeting (San Diego); U.C. Irvine (Math colloquium); U.C. Davis (Math Colloquium), University of Minnesota (Math); University of Minnesota (Chem. Eng. Mat. Sci.).

2003 TMS Meeting (San Diego); CIMMS workshop on multiscale techniques for dynamic interfaces (Caltech); I.P.A.M. workshop on tissue engineering (U.C.L.A.); U.C. Santa Barbara (Dept. Chem. Eng. colloquium); CSCAMM workshop on nonequilibrium interface dynamics (U. Maryland); 15th Amer. Conf. on Crystal Growth and Epitaxy (Keystone, CO); U.C. Irvine (Math); U.C.L.A. (Craniofacial research center colloquium; Dental school); American Physical Society Division of fluid dynamics annual meeting (East Rutherford).

2004 U.C.I. (Math); USC (Math colloquium, March); International Conference on Theoretical and Applied Mechanics (ICTAM 21, August, Warsaw– given by M. Glicksman); UCLA (Level-set seminar series); 4th SIAM Conference on Mater. Sci. (Los Angeles); Third Ann. Workshop on the Evolution and Self-Assembly of Quantum Dots (Northwestern U.); AIMS 5th Int. Conf. on Dynamical Systems and Differential Equations (Pomona); New York University (Math); New Jersey Institute of Technology (Math); Mater. Res. Soc. Ann. Meeting (Boston).

2005 Kent State University (Liquid Crystal Institute); San Diego State (Math); Workshop on Cancer Modeling (U. Michigan); University of Minnesota (Math Biology); Third MIT Conference on Computational Fluid and Solid Mechanics (Boston, declined); 16th Am. Conf. on Crystal Growth and Epitaxy (Montana); Eur. Conf. on Mathematical and Theoretical biology (Dresden, declined); AIMS Conf. on Modeling Cancer Progression and Immunotherapy (Palo Alto, declined).

2006 Workshop on mathematical models and problems in tumor growth and angiogenesis (principal speaker (3 lectures), NCTS, Taiwan); University of Bonn (Math); IPAM Workshop on Cells and Materials (3 introductory talks, 1 specialized talk); 15th US National Congress of Theoretical and Applied Mechanics (Colorado, 2 talks); Society of Math. Biology Annual Meeting (Raleigh); Cancer modeling workshop (Dundee, Scotland); Miniworkshop on anisotropic motion laws (Oberwolfach, Germany); Purdue U. (Thematic Seminar Series, Center Comp. App. Math., October); U.C. Berkeley (Math, November); Stanford U. (Math, November);

2007 Multiphase Flows and multi-material interface problems (Inst. Math. Sci., U. Singapore, Jan 2007, keynote speaker); SIAM Conf. Comp. Sci. Eng. (Los Angeles, February); Thematic Seminar Series Disting. Speaker Series in Appl. Comp. Math. (Simon Fraser U./Centre for Sci. Comp., PIMS, March); Colloquium (University of Maryland); Colloquium (UCLA); Math. Modeling and analysis of cancer invasion of tissue (Dundee, March, plenary talk); U.S. National Congress on Computational Mechanics (USNCCM IX, Berkeley) declined; 6th Int. Cong. on Industrial and Applied Math (talks in 3 different minisymposia); 3rd Int. Conf. on Theoretical and Numerical Fluid Mechanics (Vancouver, plenary talk); Society of Mathematical Biology Annual Meeting (San Jose);

Random Media Opening Workshop (SAMSI); Workshop on Ion Channels and Membranes (Radon Institute for Comp. Appl. Math (RICAM) Linz, Austria, Oct 2007); Applied mathematics seminar (Caltech, Oct 2007);

2008 Workshop on epitaxial growth and thin films (Banff research station, Feb. 2008, declined); Singularities in Mechanics (month-long invitation to Inst. Henri Poincare, Paris. Winter/Spring 2008, declined); Colloquium (Tulane, April 2008); SAMSI Random Media Closing Workshop (May 2008); Month-long invited visitor to Paris, France for School on Singularity problems (Winter 2008, declined); SIAM Conference on Mathematical Aspects of Materials Science (Philadelphia, May 2008); Frontiers in Applied and Computational Mathematics (NJIT, May 2008); AIMS Int. Conf. Dyn. Systems, Diff. Equations and Applications (Texas, May 2008); Workshop on Ferroelectric Phenomena in Soft Matter Systems (Am. Inst. Math., May 2008, declined); Workshop on multiscale modeling of soft matter/complex fluid (Beijing, May 2008, declined); European Conf. on Math. and Theor. Biology (Edinburgh, June 2008); Society for Math. Biology Annual Meeting (July 2008); SIAM Annual Meeting (July 2008); Workshop on Geometric Singularities and Singular Geometries (IMA, July 2008, declined); Workshop on Mathematical and Quantitative Oncology (Fields Institute, Toronto, August 2008); SIAM Conference on Life Science (August 2008; lecture given by student); Illinois Institute of Technology Applied Math Colliquium (October 2008)

2009 Workshop on new directions in computational partial differential equations (Warwick); Algoritmy 2009: Conference on Scientific Computing (Slovakia, declined); UC San Diego (Center for Theoretical Biophysics); MIT Applied Math Colloquium; Workshop for Computational Materials Simulation and Design (Inst. Math. Sci., Singapore, declined); Workshop on Geometric Evolution Equations (Inst. for Math. Applications, declined); SIAM Computational Science and Engineering Meeting (talk given by postdoc); International Center for Mechanical Sciences (Udine, 6 lectures); US-Europe Cancer Modeling Workshop (Rostock); 3rd International Workshop on Physics and Technology (Helsinki); Workshop on PDEs on Surfaces (Frieburg, declined); Workshop on fluid structure interaction (Inst. Math. Appl., declined); Americas Conference on Diff. Eqs. (Minicourse, 3 lectures); Workshop on computational challenges in integrative biology (Math. Biosci. Institute, declined); Workshop on density functional theory methods (CECAM-ETHZ, Zurich, declined)

2010 Workshop on new directions for control of interfaces and free boundaries (Oberwolfach, Jan; declined); IAMCS/Kaust Disting. Lecture Series (Texas A&M, March 1); UCI Cancer Symposium; Osher Life-Long Learning Center; SIAM Meeting on Mathematical Aspects of Materials Science; SIAM Life Sciences Meeting; SIAM Annual Meeting (talks given by students); Fluid dynamics, Analysis and Numerics 2010 (Duke University); Workshop on Cancer Modeling (Dundee, Scotland, Aug); Seminar (North Carolina State U., June), Workshop on fluid motion driven by immersed surfaces (Fields Institute, Toronto, Aug); Aalto University (Helsinki, 2 talks, Aug); Young Researchers Workshop (Mathematical Biosciences Institute, Ohio State, Sept); Workshop on Mathematical Foundations of Mechanical Biology (Banff Int. Research Station, Sept); AMS Meeting (Notre Dame, declined), Int. Workshop on Stat. Phys. Biol. Collective Motion (MPI for Physics of Complex Systems, Dresden; declined); Colloquium (U. British Columbia).

2011 NIMBios Cancer workshop (Knoxville, Tenn); Workshop on phase field models in fluid flow (Regensberg, Germany); SIAM Comp. Sci. Eng. Minisymposium on computational algorithms for simulating particulate flows (Reno, declined); Workshop on computational challenges in partial differential equations (Swansea, Wales, declined); Colloquium (Texas

A& M); AMS Western Sectional Meeting Minisymposium on fluid-structure interactions (Las Vegas, declined); Math across campus colloquium (U. Washington, Seattle); NCTS Workshop on fluid-structure interactions (Hsinchu, Taiwan; declined); Canadian Mathematical Society Summer Meeting Minisymposium on new mathematical tools for the modeling of cellular processes (Edmonton); ECMTB Multiple minisymposia (Krakow, Poland; declined); ICIAM Multiple minisymposia (Vancouver); Colloquium (Fullerton College); ENUMATH Minisymposium on new techniques and models for interface treatment in multiphase flow (Leciester, UK); Workshop on geometric partial differential equations (Oberwolfach, declined); Texas A&M (colloquium); UCSB (seminar, Dept. Mech. Eng.).

2012 UCSB (colloquium, Dept. Mech. Eng.); Gordon Conference on Cornea, Biology & Pathobiology (Ventura, CA); Claremont-McKenna College (Colloquium); AIMS Conf. Dyn. Syst. (declined); SIAM Life Science Meeting (given by Min Wu); SIAM Annual Meeting (2 talks: given by Ying Chen and by Arvind Baskaran); ICERM Workshop (given by Arvind Baskaran); SIAM SEAS (declined); U. South Carolina (declined); UC Davis SIAM Chapter (declined); Workshop in Cellular Automata (Santorini, declined); Tulane University (colloquium, declined); IPAM Workshop on Atomistic and Mesoscale modeling on materials defects; USC Keck School of Medicine (declined).; Ecole Normale Superieure (colliquium); UCLA Dept. Radiology; (Many invitations declined due to birth of child).

2013 AIM Meeting on problems related to our environment; Workshop on diffuse interface methods (Levico Terme Italy); SIAM Comput. Sci. Eng. (Boston; postdoc gave talk); SIAM Annual Meeting (several talks); SIAM Conf. on Mathematical Materials Science; Oberwolfach workshop on interfaces and free boundaries (declined); Courant Inst. Math. Sci. (declined); US National Congress on Computational Mechanics (declined); Soc. Math. Biol. Annual Meeting; Duke University/Math; NC State University/Math; Workshop on free boundaries in Laplacian growth phenomena (Sendai, Japan); Frontiers in Applied Math (NJIT, postdoc gave talk).

2014 Harvard University/Applied Math; IPAM; Int. workshop on numerical methods and emerging computational challenges in math biology (Dundee, Scotland); CECAM- Multiscale modeling of materials with atomic resolution using phase field methods (Laussane, Switzerland); PASC Conference (Zurich, Switzerland); Int. Conf. Free Boundary Problems (Cambridge, UK); Int. conf. phase field methods (Penn State, declined); Center for Math. Biol. (Columbus, OH); U. Tennessee/Math; UCLA/Biomath.

2015 U. Michigan; Purdue U.; Pasadena City College (Pi-day speaker); Center for Math. Biol. (Columbus, OH; April); Workshop on Materials and Fluids (Rome, May); Cancer Modeling Workshop (Edinburgh, June); Newton Institute (Cambridge, July); ICIAM (Beijing, Aug.)