

(a) Professional Preparation

- 1986 - 1988 **Ph.D.**, Mathematics, Carnegie Mellon University, Pittsburgh, PA
1984 - 1986 **M.S.**, Applied Mathematics, Carnegie Mellon University, Pittsburgh, PA
1980 - 1983 **B.S.**, Mathematics, Univ. of Sci. and Tech. of China, Hefei, China

(b) Appointments

- 2014 - present **Fu Foundation Professor of Applied Mathematics**,
and Chair of Applied Mathematics Program Committee (2015-),
Fu Foundation School of Engineering and Applied Science, Columbia University
2014 - present **Affiliated Faculty Member**, Data Science Institute, Columbia University
2006 - present **Verne M. Willaman Professor** of Mathematics, Penn State University
2005 - present **Professor**, Dept. of Materials Sciences, Penn State University
2001 - 2006 **Professor**, Dept. of Math., Penn State University
1996 - 2002 **Senior Lecturer and Full Prof.**, Dept. of Math., HK Univ. of Sci. & Tech.
1997 & 1999 **Associate and Full Prof.**, Dept. of Math., Iowa State University
1994 - 1995 **Associate Professor with tenure**, Dept. of Math., Michigan State University
1990 - 1994 **Assistant Professor**, Dept. of Math., Michigan State University
1988 - 1990 **L. E. Dickson Instructor**, Dept. of Math., University of Chicago
1984 - 1988 Teaching and Research Assistant, Carnegie Mellon University
1984 Summer Faculty of Mathematics, University of Science and Technology, China

(c) Visiting and Adjunct Positions

- 2014-present Adjunct Professor, School of Mathematics, Peking University, China
Fall 2012 Long term visitor, Institute of Pure and Applied Mathematics (IPAM), UCLA
2011-present PI, Lab for Applied Mathematics, Beijing Computational Science Research Center
Fall 2011 Visiting Professor, Beijing International Center for Mathematical Research, and
Mt. Everest Program for Gifted Students, School of Mathematics, Peking University
2007-2013 Member, NSF-IUCRC (PennState-GaTech) CCMD, Penn State University
Fall 2006 Senior Fellow, IPAM, UCLA
2005 - 2010 Oversea Outstanding Scholar (program by Chinese Bureau of Foreign Experts and
Chinese Ministry of Education) and Jingshi Scholar, Beijing Normal University
2004-2006 Member, Center for Machine Learning and Applications, Penn State University
Fall 2004 Long term visitor and tutorial lecturer, special program in material sciences, IMA, UMN
2002-present Member, MRI (Materials Research Institute), Penn State University
2002-present Adjunct Professor, Hong Kong University of Science and Technology
1999 - 2002 Adjunct Professor, University of Science and Technology of China
1998 - 2004 Chief Scientist, Large Scale Scientific Computation, a national key basic research project,
Lab for Scientific and Engineering Computing, Chinese Academy of Sciences
Spring 1993 Visiting Associate Professor, Dept. of Math. Sciences and Center of Nonlinear Studies,
Carnegie Mellon University
Summer 1989 Faculty Research Participation, Mathematics & Computer Science Division,
Argonne National Laboratory, Chicago, Illinois
Summer 1988 Staff Research Assistant, Computing & Communication Division,
Los Alamos National Laboratory, Los Alamos, New Mexico
1983 - 1984 Training for inaugural S. S. Chern program selected by a special AMS-SIAM committee.

(d) Research Interests: applied and computational mathematics

- Numerical algorithms and scientific computation:
numerical analysis, applied analysis and PDEs, multiscale models, adaptive algorithms
- Selected applications in physical, biological and materials sciences:
superfluids, vortices, complex fluids, membranes, phase transformations, rare events
- Selected applications in information sciences:
data mining, model reduction, meshing, tessellations and image analysis

(e) **Honors and Awards:**

- 2013 **SIAM Fellow**, for contributions to applied and computational mathematics with applications in materials science, computational geometry, and biology;
- 2007 Recipient of the **Eberly College of Science Medal**, Penn State University;
- 2005 Recipient of the **Feng Kang prize in scientific computing**;
- 2000 Co-recipient of the **Liberal Arts and Sciences Award for outreach/extension**, ISU;
- 1992 Recipient of **Frame Faculty Teaching Award**, Michigan State University;
- 1988 Recipient of 1987 **J. D. Liang Fellowship**, Carnegie Mellon University.

(f) **Service:**

- Editorial boards:
 - Section Editor (2015–), SIAM JOURNAL OF APPLIED MATHEMATICS;
 - Associate Editor (2003–2012, 2014–), SIAM JOURNAL OF NUMERICAL ANALYSIS;
 - Associate Editor (2012–), SIAM JOURNAL OF APPLIED MATHEMATICS;
 - Associate Editor (2000–2005), JOURNAL OF COMPUTATIONAL MATHEMATICS;
 - Member of editorial board (2001–2005), COMMUNICATIONS IN PURE AND APPLIED ANALYSIS;
 - Member of editorial board (2002–2007), CHINESE JOURNAL OF COMPUTATIONAL PHYSICS;
 - Editor (2002–), APPLIED MATHEMATICS RESEARCH EXPRESS;
 - Member of editorial board (2006–), DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS - B;
 - Member of editorial board (2004–2007), JOURNAL OF INFORMATION AND COMPUTATIONAL SCIENCE;
 - Associate editor (2009–), NUMERICAL MATHEMATICS: THEORY, METHODS AND APPLICATIONS;
 - Member of editorial board (2009–), JOURNAL OF MATHEMATICAL RESEARCH AND APPLICATIONS;
 - Associate editor (2010–), COMMUNICATIONS IN COMPUTATIONAL PHYSICS;
 - Member of editorial board (2012–), COMMUNICATIONS IN MATHEMATICS AND STATISTICS;
 - Member of editorial board (2013–), JOURNAL OF MATHEMATICAL STUDY;
 - Member of editorial board (2014–), COMMUNICATIONS IN MATHEMATICAL SCIENCES;
- Professional Societies:
 - Chair (2014–2016), SIAM Activity Group on Mathematical Aspects of Materials Science.
 - Chair (2014–2015), SIAM Peter Henrici Prize Selection Committee.
 - Member (2014–present), 9th Council, Chinese Computational Mathematics Society (CCMS).
 - Standing Committee member (1998–2002), 5th Council, CCMS.

(g) **Publications:**

- Over 210 refereed publications (180+ in professional journals, 25+ in conference proceedings and 5 book-chapters. 1 edited book and 3 edited special journal issues). Over 8000 Google Scholar citations with an H-index 47 and 4000 SCI citations with an H-index 31. Published in many disciplinary fields including computational and applied mathematics, atmospheric, computer, imaging and materials sciences, atomic, biological and condensed matter physics, biomedical and mechanical engineering, etc.
- Full list of publications can be found at www.columbia.edu/~qd2125
- Twenty-five selected publications:
 - *Asymptotically compatible schemes and applications to robust discretization of nonlocal models*, with X. Tian, **SIAM J. Numer. Anal.**, 52, 1641–1665, 2014.
 - *A nonlocal vector calculus, nonlocal volume-constrained problems, and nonlocal balance laws*, with M. Gunzburger, R. Lehoucq and K. Zhou, **Math. Mod. Meth. Appl. Sci.**, 23, 493–540, 2013.
 - *Analysis and approximation of nonlocal diffusion problems with volume constraints*, with M. Gunzburger, R. Lehoucq and K. Zhou, **SIAM Review**, 54, 667–696, 2012.
 - *Robust Modeling of Constant Mean Curvature Surfaces*, with P. Hao, Y.-K. Choi, Y. Liu, W. Hu, K. Polthier, C. Zhang, W. Wang, **ACM Trans. Graphics (SIGGRAPH12)**, 31, Article 85, 2012.
 - *Shrinking Dimer Dynamics and its Applications to Saddle Point Search*, with J.Y. Zhang, **SIAM J. Numer. Anal.**, 50, 1899–1921, 2012.
 - *Analysis of a stochastic implicit interface model for an immersed elastic surface in a fluctuating fluid*, with M. Li, **Archive for Rational Mech. Anal.**, 199, 329–352, 2011.
 - *Vortex solutions of the high- κ high-field Ginzburg-Landau model with an applied current*, with J. Wei and C. Zhao, **SIAM J. Math. Anal.**, 42, 2368–2401, 2010.

- *Numerical approximations of a norm preserving gradient flow and applications to an optimal partition problem*, with F.-H. Lin, **Nonlinearity**, 22, 67-83, 2009.
- *Modelling and simulations of multil-component lipid membranes and open membranes via diffuse interface approaches*, with X. Wang, **J. Mathematical Biology**, 56, 347-371, 2008
- *Adhesion of vesicles on patterned substrates*, with S. Das, **Phy. Rev. E**, 77.011907 (1-7), 2008
(selected for the Jan 15, 2008 issue of *Virtual J. of Biological Phys. Res. by APS*),
- *Diffuse-interface description of strain-dominated morphology of critical nuclei in phase transformations*, with L. Zhang and L.Q. Chen, **Acta Materialia**, 56, 3568-3576, 2008.
- *Morphology of critical nuclei in solid state phase transformations*, with L. Zhang and L. Chen, **Physical Review Letters**, 98, No.25, 265703, 2007.
- *From micro to macro dynamics via a new closure approximation to the FENE model of polymeric fluids*, with C. Liu and P. Yu, **Multiscale Modeling and Simulations**, 3, 895-917, 2005
- *Computing the ground state of the Bose-Einstein condensate via normalized gradient flow*, with W. Bao, **SIAM J. Scientific Comp.**, 25, 1674-1697, 2004
- *A phase field approach in the numerical study of the elastic bending energy for vesicle membranes*, with C. Liu and X. Wang, **J. Computational Physics**, 198, pp450-468, 2004
- *Dissipative flow and vortex shedding in the Painlevé boundary layer of a Bose Einstein condensate*, with A. Aftalion and Y. Pomeau, **Physical Review Letters**, 91, 090407, 2003;
- *Tetrahedral mesh generation and optimization based on centroidal Voronoi tessellations*, with D. Wang, **Int. J. Numer. Meth. Eng.**, 56, No.9, 1355-1373, 2003;
- *Vortices in the Bose-Einstein condensate: the critical velocities and energy diagrams in the Thomas-Fermi regime*, with A. Aftalion, **Physical Review A**, 64, 063603(1-11), 2001;
- *Centroidal voronoi diagrams and its applications*, with V. Faber and M. Gunzburger, **SIAM Review**, 41, pp637-676, 1999;
- *Ginzburg-Landau vortices: dynamics, pinning and hysteresis*, with F.H. Lin, **SIAM J. Math. Anal.**, 28, pp1265-1293, 1997;
- *High-kappa limit of the time dependent Ginzburg-Landau model for superconductivity*, with P. Gray, **SIAM J. Appl. Math.**, 56, pp1060-1093, 1996;
- *Spectral viscosity methods for multidimensional hyperbolic conservation laws*, with G. Chen and E. Tadmor, **Mathematics of Computation**, 61, pp619-643, 1993;
- *Analysis and approximation of the Ginzburg-Landau model of superconductivity*, with M. Gunzburger and J. Peterson, **SIAM Review**, Vol.34, No.1, pp54-81, 1992;
- *Numerical studies of a continuum model of Phase Transition*, with R. A. Nicolaides, **SIAM J. Numer. Anal.**, Vol.28, No.5, pp1310-1322, 1991;
- *A finite difference domain decomposition algorithm for numerical solution of the heat equation*, with C. Dawson, & T. Dupont, **Mathematics of Computation**, 57, pp63-71, 1991;

(h) Selected research grants in last ten years

- 2013 PI for PSU, **AFOSR MURI Grant** (2013-2018), \$1,097,000;
(Lead Institution: Univ of Arizona)
MURI Center for Material Failure Prediction through Peridynamics
- 2013 PI, **NSF Grant DMS-1318586**, (2013-2016), \$250,000;
Algorithms and computation for rare events in complex systems
- 2013 Co-PI, **NSF Grant DMS-1312809** (2013-2016), \$114,906;
PI: T. Mengesha, post-doc advisee at Penn State
Mathematical theory of peridynamics and nonlocal models
- 2012 PI, **IPAM contract**, UCLA, (2013), \$25,000;
Participation in Program on Materials Defects: Mathematics, Computation, and Engineering
- 2010 PI, **NSF Grant DMS-1016073**, (2010-2013), \$264,183
Mathematical and computational studies of interfaces and defects;
- 2010 Co-PI, **NSF Grant IIP-1034965**, (2010-2013), \$160,973.;
IUCRC CGI: Center for Computational Materials Design (CCMD), Phase II;

- 2010 PI, **DOE** Grant DE-SC0005346, (2010-2013), \$450,000;
Mathematical and Numerical Analysis of Peridynamics for Multiscale Problems in Solids;
- 2009 PI, **DOE** Sandia Lab - 926627 (2009), \$65,000;
A functional analytical framework of peridynamics models;
- 2009 PI, **NSF** IUCRC CCMD PF06-7R, (2009-2010), \$79,000;
Efficient and robust simulation codes for nucleation problems;
- 2009 PI, **DOE** Grant DE-SC0001925, (2009-2011), \$208,500;
Transforming how climate system models are used:
a global, multi-resolution approach to regional ocean modeling;
- 2009 PI, **DOE** Sandia Lab - 961673 (2009), \$35,850;
Mathematical studies of peridynamics models;
- 2008 Senior Personnel, **NSF** Grant OCI-0821527, (2008-2012), \$1,855,501;
MRI acquisition of a scalable instrument for discovery through computing instrument;
- 2007 PI, **NSF** IUCRC CCMD PF06-7, (2007-2008), \$79,000;
Nucleation problems in solid-solid transformation;
- 2007 Co-PI, **NIH** NCI-1R01CA125707-01A1, (2007-2011), \$750000;
Multiscale modeling of leukocyte-tumor cell adhesion to endothelium in shear flow;
- 2007 PI, **NSF** Grant DMS-0712744, (2007-2010); \$213,840
Analysis, algorithms & computation of some model problems in interface and defect dynamics;
- 2006 PI, **IPAM** Grant, UCLA 07575GB667, (2006), \$25,000;
Institute for Pure and Applied Mathematics Senior Fellow;
- 2006 Co-PI, **NSF** Grant DMS-0619587, (2006-2007), \$111000;
SCREMS;
- 2004 Co-PI, **NSF** Grant CCF-0430349, (2004-2007), \$215,000;
CAMLET: a combined ab-initio and manifold learning toolbox;
- 2004 PI, **NSF** Grant DMS-0409297, (2004-2007), \$148,923;
Analysis and Computation of problems in physical sciences;
- 2002 Co-PI, **NSF** ITR Grant, DMR-0205232, (2002-2007), \$2,900,000;
Computational Tools for Multicomponent Materials Design.

(i) Other Synergistic Activities:

- Conference/workshop organization:

- Numerous minisymposia organized in national and international meetings, such as: minisymposia on the superconductivity at the SIAM MS 1994 (co-organized with Jon Chapman of Oxford Univ), ICIAM 1999, SIAM MS 2002; SIAM MS 2004, the minisymposium on the mathematical modeling of superconductivity at ICIAM 1999; minisymposia on centroidal Voronoi tessellations at SIAM AN 2005; minisymposia on the biological membranes at SIAM-SMB LS 2006, ICIAM, 2007 (co-organized with A. Voigt of Dresden), 7th AIMS ICDSDE 2007 (co-organized with Tim Healey of Cornell), SIAM LS 2010; minisymposia on nucleation and rare events at ICIAM 2011; minisymposia on mathematics of nonlocal problems at AMS-SIAM-MAA joint meeting 2013, SIAM MS 2013.
- Organizer and co-organizer of a number of international conferences and workshops, such as: Workshop on numerical PDEs, HKUST 1998, Workshop on computational biology, SHNU 2000, Workshop on computational physics and computational material sciences, QinHuang Island 2001, International workshop on multiscale modeling and simulations in materials and biology, Fudan University 2004, International conference on scientific computing in petroleum industry, Beijing 2004, Workshop on Ginzburg-Landau theory and related topics, 2005; International Conference on recent advances in scientific computation, Beijing 2006, Summer program on Mathematical Theory and Numerical Methods for Computational Materials Simulation and Design, Singapore 2009, International Workshop on Scientific Computation and Partial Differential Equations, JiuZhaiGou 2010, Workshop on numerical simulations of complex physical systems in extreme conditions, Beijing 2011, Special Program on Mathematical Theory and Numerical Simulations of Phase Transitions, BICMR 2011, Special program on membrane biophysics: theory and experiment, KITPC Beijing 2012, Workshop on computational and applied mathematics, Beijing 2012, International workshop on computational and applied mathematics, Yellow Mountain 2013, International Workshop on quantum, kinetic and nonlocal problems and related topics, Beijing 2014.

- Member of organizing committees of many international conferences and workshops, such as the 2nd China-Sweden workshop on numerical PDEs 2000, Conference on Advances in Scientific Computation, University of Chicago 2007, SIAM Conference on Mathematical Aspects of Materials Science 2013.

- Invited lectures:

- Over 350 invited and plenary lectures given at conferences and workshop, and colloquia and seminars at academic institutions.
- Invited and plenary lectures at conferences/workshop, such as: Plenary speaker of the 9th International Conference on Computational Physics, 2015; Plenary speaker of the 5th International Conference on Scientific Computing and Partial Differential Equations, 2014; Plenary speaker of International Workshop on Finite Element and Spectral Methods, 2014; Plenary speaker of ICM International Workshop on Computational Mathematics, Korea 2014; Plenary speaker of International Conference on Mathematical Modeling and Computation, China, 2013; Invited speaker of the 7th International Workshop on Meshfree Methods for Partial Differential Equations, Bonn 2013; Invited speaker of Workshop on Computational Methods for Multiscale Modeling of Materials Defects, IPAM, UCLA 2012; Keynote speaker of the 12th International Conference on CAD/Graphics, 2011.
- Invited colloquia and seminars at institutions such as Ames Lab, Argonne, Arizona, Banff, Brown, Carnegie Mellon, Chicago, Columbia, CUHK, Delaware, Florida, FSU, Georgia Tech, HKU, Houston, Kentucky, Maryland, McGill, Michigan, Minnesota, NJU, NTU, NUS, Oberwolfach, Princeton, Purdue, ORNL, Rutgers, Ohio State, Penn State, Paris 6, Peking U, Pittsburgh, SNL, SUNY-SB, TAMU, Tennessee, Tohoku, Tsinghua, TU-Berlin, TU-Munchen, UBC, UNC, UCI, UCLA, UCSB, UCSD, Utah, Virginia, VT Tech, Wisconsin, and research institutes like Courant@NYU, IAS@Princeton, MSRI@Berkeley, IPAM@UCLA, MBI@OSU, Newton Inst@Cambridge, WPI@Vienna, KITP@Beijing, BICMR@PKU, Math Inst@Oxford, IAS@Singapore, RICAM@Linz etc.
- Invited speaker for the John H. Barrett Memorial Lecture (UTK); Invited speaker for the Frontier of Scientific Computing Lecture Series (LSU); Tutorial lecturer on mesh generation and CVTs, IAPCM, Beijing, (2007); Tutorial lecturer on phase field modeling and simulations, Beijing Intern. Center for Mathematical Research and Peking University, (2008); Tutorial Speaker for Workshop on Analysis of Multiphase Biomembranes; Centre de Recherches Mathematiques, McGill University, (2010); Tutorial speaker for mathematics in materials sciences programs at IMA (UMN, 2004) and IMS (Singapore, 2004, 2009). Main speaker, IMA Summer Graduate Program on Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes, IMA, (July 2013).

- Review services:

- Refereed papers for over 70 international journals in many disciplines.
- Reviewer for more than 40 tenure and promotion cases in US, Canada, China, Taiwan, Singapore, Hong Kong and in Israel and a number of scientific award applications. External Ph.D thesis examiner for various institutions. Jury on the habilitation defense committee, University of Paris VI. External examiner for courses in Computational Mathematics, Hong Kong Open Univ (1997-2002).
- Reviewed many research proposals for U.S. NSF and Hong Kong Research Grant Council; Reviewed proposals for U.S. DOD, ARO, AFOSR, ONR, Israel Science Foundation, Portugal Science Foundation, Chinese National Science Foundation, Ministry of Science and Technology of China, Singapore Ministry of Education, Austrian Research Foundation, Natural Science Council of Taiwan, Natural Sciences and Engineering Research Council of Canada, European Union Research Organization for European Young Investigators, American Chemical Society Petroleum Research Fund, KAUST foundation, and some private research foundations and research institutions.
- Panelist for U.S. NSF; Member of NSF Mathematics Institute site visit team; Panelist for CBMS grants; Panelist for Portugal Foundation of Science and Technology; Panelist for DOE grants.