

CURRICULUM VITAE

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EDUCATIONAL BACKGROUND:

PhD & Msc, Computational Mathematics, 1995, Tsinghua University
Bsc, Applied Mathematics, 1992, Tsinghua University

EMPLOYMENT HISTORY:

a). Regular Positions

- Provost's Chair Professor (2013–), Professor (2009–2013), Associate Professor (2005–2009) and Assistant Professor (2001–2004), Department of Mathematics, National University of Singapore, Singapore.
- Van Vleck Visiting Assistant Professor (08/2000–12/2000), Department of Mathematics, University of Wisconsin-Madison, USA.
- Visiting Assistant Professor (1998–2000), School of Mathematics, Georgia Institute of Technology, USA.
- EPSRC Postdoc Research Associate (1996–1997), Department of Mathematics, Imperial College, UK.
- Associate Professor (1998–2000), Lecturer (1995–1998) and Teaching Assistant (1992–1995), Department of Mathematics, Tsinghua University, China.

b). Visiting Positions (> One month)

- *Visiting Professor*: Beijing Computational Science Research Center, China (June–July, 2012–2015); Institute of Computational Mathematics, Chinese Academy of Sciences, China (June–July 2011 & Delivered 12 hours lecture to 40 graduate students during the visit); School of Mathematical Sciences, Peking University, China (June–July 2010); Department of Electrical Engineering, Tsinghua University, China (July–August 2008 & Delivered 20 hours lecture to 25 graduate students during the visit); Department of Mathematical Sciences, Tsinghua University, China (June–July 2007 & Delivered 16 hours lecture to 20 graduate students during the visit); CNRS & Institute of Mathematics, University of Paul Sabatier, Toulouse, France (May–June 2007); Wolfgang Pauli Institute, University of Vienna, Vienna, Austria (May–June 2006); Department of Mathematics, Capital Normal University, Beijing, China (June–July 2005 & 2006); Department of Mathematics, Fudan University, China (May–June 2004 & Delivered about 20 hours lecture to 50 students in Shanghai Summer School on “Analysis and Numerics in Modern Sciences” during the visit).

• *Others*: Program Participant, The Institute for Pure and Applied Mathematics (IPAM), University of California Los Angeles (UCLA), USA (May–June, 2008); Visiting Associate Professor, Department of Mathematics, University of California Irvine, USA (January–April, 2008); Visiting Scholar, Department of Applied Physics and Applied Mathematics, Columbia University, USA (October–November 2007). Shapiro Visitor, Department of Mathematics, Penn State University, USA (August–September 2007); Visiting Scientist, Ewin Schrödinger Institute, Vienna, Austria (May–June 2001).

CURRENT FIELDS OF INTEREST:

- Bose-Einstein condensation, Quantized vortices in superfluidity and superconductivity, Computational quantum physics and chemistry, Computational materials science
- Multiscale modeling, simulation and application
- Computational fluid dynamics, Hyperbolic conservation laws, Numerical methods for problems in unbounded domains, Finite element method for some nonlinear problems
- Computational methodology and computer software, Numerical analysis and scientific computing, Computational and applied mathematics in general

REFEREED JOURNAL PUBLICATIONS:

a). Already published and accepted for publication:

- [108] A uniformly accurate (UA) multiscale time integrator pseudospectral method for the Dirac equation in the nonrelativistic limit regime (with Y. Cai, X. Jia and Q. Tang), SIAM J. Numer. Anal., to appear (arXiv: 1507.04103).
- [107] Accurate and efficient numerical methods for computing ground states and dynamics of dipolar Bose-Einstein condensates via the nonuniform FFT (with Q. Tang and Y. Zhang), Commun. Comput. Phys., to appear (arXiv: 1504.02897).
- [106] Solid-state dewetting and island morphologies in strongly anisotropic materials (with W. Jiang, Y. Wang, Q. Zhao, D. J. Srolovitz), Scripta Materialia, Vol. **115** (2016), pp. 123-127 (arXiv: 1510.03303).
- [105] Fractional quantum mechanics in polariton condensates with velocity dependent mass (with F. Pinsky, Y. Zhang, H. Ohadi, A. Dreismann and J. J. Baumberg), Phys. Rev. B, Vol. **92** (2015), article 195310 (arXiv: 1508.03621).
- [104] Computing the ground state and dynamics of the nonlinear Schrödinger equation with nonlocal interactions via the nonuniform FFT (with S. Jiang, Q. Tang and Y. Zhang), J. Comput. Phys., Vol. **296** (2015), pp. 72-89.
- [103] Dimension reduction for anisotropic Bose-Einstein condensates in the strong interaction regime (with L. Le Treust and F. Mehats), Nonlinearity, Vol. **28** (2015), pp. 755-772.
- [102] Ground states and dynamics of spin-orbit-coupled Bose-Einstein condensates (with Y. Cai), SIAM J. Appl. Math., Vol. **75** (2015), pp. 492-517.

- [101] Sharp interface model for solid-state dewetting problems with weakly anisotropic surface energy (with W. Jiang, D. J. Srolovitz, Y. Wang), *Phys. Rev. B*, Vol. **91** (2015), article 045303.
- [100] Mathematical models and numerical methods for Bose-Einstein condensation, *Proceeding of the International Congress for Mathematicians (Seoul 2014)*, Vol. **IV** (2014), pp. 971-996.
- [99] A uniformly accurate multiscale time integrator pseudospectral method for the Klein-Gordon equation in the nonrelativistic limit regime (with Y. Cai and X. Zhao), *SIAM J. Numer. Anal.*, Vol. **52** (2014), pp. 2488-2511.
- [98] Fast and accurate evaluation of nonlocal Coulomb and dipole-dipole interactions via the nonuniform FFT (with L. Greengard and S. Jiang), *SIAM J. Sci. Comput.*, Vol. **36** (2014), pp. B777-B794.
- [97] Uniformly accurate multiscale time integrators for highly oscillatory second order differential equations (with X. Dong and X. Zhao), *J. Math. Study*, Vol. **47** (2014), pp. 111-150.
- [96] Uniform and optimal error estimates of an exponential wave integrator sine pseudospectral method for the nonlinear Schrödinger equation with wave operator (with Y. Cai), *SIAM J. Numer. Anal.*, Vol. **52** (2014), pp. 1103-1127.
- [95] Numerical study of quantized vortex interaction in nonlinear Schrödinger equation on bounded domain (with Q. Tang), *Modeling and Simulation: a SIAM Interdisciplinary Journal*, Vol. **12** (2014), pp. 411-439.
- [94] A variational-difference numerical method for designing progressive-addition lenses (with W. Jiang, Q. Tang and H. Wang), *Computer-Aided Design*, Vol. **48** (2014), pp. 17-27.
- [93] An exponential wave integrator pseudospectral method for the Klein-Gordon-Zakharov system (with X. Dong and X. Zhao), *SIAM J. Sci. Comput.*, Vol. **53** (2013), pp. A2903-A2927.
- [92] A simple and efficient numerical method for computing the dynamics of rotating Bose-Einstein condensates via a rotating Lagrangian coordinate (with D. Marahrens, Q. Tang and Y. Zhang), *SIAM J. Sci. Comput.*, Vol. **53** (2013), pp. A2671-A2695.
- [91] Dimension reduction of the Schrödinger equation with Coulomb and anisotropic confining potentials (with H. Jian, N. J. Mauser and Y. Zhang), *SIAM J. Appl. Math.*, Vol. **73** (2013), pp. 2100-2123.
- [90] Computational methods for the dynamics of the nonlinear Schrödinger/Gross-Pitaevskii equations (with X. Antoine and C. Besse), *Comput. Phys. Commun.*, Vol. **84** (2013), pp. 2621-2633 (**An Invited Featured Article**).
- [89] Efficient methods for computing ground states of spin-1 Bose-Einstein condensates based on their characterizations (with I-L. Chern and Y. Zhang), *J. Comput. Phys.*, Vol. **253** (2013), pp. 189-208.
- [88] Effective dipole-dipole interactions in multilayered dipolar Bose-Einstein condensates (with Y. Cai and M. Rosenkranz), *Phys. Rev. A*, Vol. **88** (2013), article 013616.

- [87] Numerical study of quantized vortex interaction in Ginzburg-Landau equation on bounded domains (with Q. Tang), *Commun. Comput. Phys.*, Vol. **14** (2013), pp. 819-850.
- [86] Numerical methods and comparison for computing dark and bright solitons in the nonlinear Schrödinger equation (with Q. Tang and Z. Xu), *J. Comput. Phys.*, Vol. **235** (2013), pp. 423-445.
- [85] Mathematical theory and numerical methods for Bose-Einstein condensation (with Y. Cai), *Kinet. Relat. Mod.*, Vol. **6** (2013), pp. 1-135 (**An Invited Review Paper**).
- [84] Optimal error estimates of finite difference methods for the Gross-Pitaevskii equation with angular momentum rotation (with Y. Cai), *Math. Comp.*, Vol. **82** (2013), pp. 99-128.
- [83] Subdiffusive expansion of a Bose-Einstein condensate in a speckle potential (with T. Li, B. Min and M. Rosenkranz), *Phys. Rev. A*, Vol. **86** (2012), article 053612.
- [82] Phase field approach for simulating solid-state dewetting problems (with W. Jiang, C. V. Thompson and D. J. Srolovitz), *Acta Mater.*, Vol. **60** (2012), pp. 5578-5592.
- [81] Gross-Pitaevskii-Poisson equations for dipolar Bose-Einstein condensate with anisotropic confinement (with N. Ben Abdallah and Y. Cai), *SIAM J. Math. Anal.*, Vol. **44** (2012), pp. 1713-1741.
- [80] Breathing oscillations of a trapped impurity in a Bose gas (with T. J. Johnson, M. Bruderer, Y. Cai, S. R. Clark and D. Jaksch), *EPL – Europhysics Letters*, Vol. **98** (2012), article 26001.
- [79] Uniform error estimates of finite difference methods for the nonlinear Schrödinger equation with wave operator (with Y. Cai), *SIAM J Numer. Anal.*, Vol. **50** (2012), pp. 492-521.
- [78] Analysis and comparison of numerical methods for Klein-Gordon equation in nonrelativistic limit regime (with X. Dong), *Numer. Math.*, Vol. **120** (2012), pp. 189-229.
- [77] Scattering and bound states in two-dimensional anisotropic potentials (with M. Rosenkranz), *Phys. Rev. A*, Vol. **84** (2011), article 050701(R).
- [76] Numerical methods for computing ground state and dynamics of nonlinear relativistic Hartree equation for boson stars (with X. Dong), *J. Comput. Phys.*, Vol. **230** (2011), pp. 5449-5469.
- [75] Dynamical laws of the coupled Gross-Pitaevskii equations for spin-1 Bose-Einstein condensates (with Y. Zhang), *Methods and Applications of Analysis*, Vol. **17** (2010), pp. 49-80.
- [74] Singular limits of Klein-Gordon-Schrödinger equations to Schrödinger-Yukawa equations (with X. Dong and S. Wang), *Multiscale Modeling and Simulation: a SIAM Interdisciplinary Journal*, Vol. **8** (2010), pp. 1742-1769.
- [73] Mean-field regime of trapped dipolar Bose-Einstein condensates in one and two dimensions (with Y. Cai, M. Rosenkranz and Z. Lei), *Phys. Rev. A*, Vol. **82** (2010), article 043623.

- [72] Ground states of two-component Bose-Einstein condensates with an interanl atomic Josephson junction (with Y. Cai), *East Asia Journal on Applied Mathematics*, Vol. **1** (2010), pp. 49-81.
- [71] Efficient numerical methods for computing ground states and dynamics of dipolar Bose-Einstein condensates (with Y. Cai and H. Wang), *J. Comput. Phys.*, Vol. **229** (2010), pp. 7874-7892.
- [70] Comparisons between sine-Gordon equation and perturbed nonlinear Schrodinger equations for modeling light bullets beyond critical collapse (with X. Dong and J. Xin), *Physica D*, Vol. **239** (2010), pp. 1120-1134.
- [69] A generalized-Laguerre-Fourier-Hermite pseudospectral method for computing the dynamics of rotating Bose-Einstein condensates (with H. Li and J. Shen), *SIAM J. Sci. Comput*, Vol. **31** (2009), pp. 3685-3711.
- [68] Symmetry breaking and self-trapping of a dipolar Bose-Einstein condensate in a doublewell potential (with B. Xiang, J. Gong, H. Pu and B. Li), *Phys. Rev. A*, Vol. **79** (2009), article 013626.
- [67] Numerical methods for computing the ground state of spin-1 Bose-Einstein condensates in uniform magnetic field (with F. Y. Lim), *Phys. Rev. E*, Vol. **78** (2008), article 066704.
- [66] A generalized-Laguerre-Hermite pseudospectral method for computing symmetric and central vortex states in Bose-Einstein condensates (with J. Shen), *J. Comput. Phys.*, Vol. **227** (2008), pp. 9778-9793.
- [65] Quantized vortex stability and interaction in the nonlinear wave equation (with R. Zeng and Y.Z. Zhang), *Physica D*, Vol. **237** (2008), pp. 2391-2410.
- [64] Dynamical self-trapping of Bose-Einstein condensates in shallow optical lattices (with M. Rosenkranz, D. Jaksch and F. Y. Lim), *Phys. Rev. A*, Vol. **77** (2008), article 063607.
- [63] Computing ground states of spin-1 Bose-Einstein condensates by the normalized gradient flow (with F. Y. Lim), *SIAM J. Sci. Comput.*, Vol. **30** (2008), pp. 1925-1948.
- [62] Self-trapping of impurities in Bose-Einstein condensates: Strong attractive and repulsive coupling (with M. Bruderer and D. Jaksch), *Europhys. Lett.*, Vol. **82** (2008), article 30004.
- [61] A uniformly convergent numerical method for constrained singularly perturbed nonlinear eigenvalue problems (with M.-H. Chai), *Commun. Comput. Phys.*, Vol. **4** (2008), pp. 145-160.
- [60] Convergence rate of dimension reduction in Bose-Einstein condensates (with Y.Y. Ge, D. Jaksch, P. A. Markowich and R. M. Weishäupl), *Comput. Phys. Comm.*, Vol. **177** (2007), pp. 832-850.
- [59] Dynamics of vortices in weakly interacting Bose-Einstein condensates (with A. Klein, D. Jaksch and Y. Zhang), *Phys. Rev. A*, Vol. **76** (2007), article 043602.
- [58] The dynamics and interaction of quantized vortices in Ginzburg-Landau-Schrödinger equations (with Q. Du and Y.Z. Zhang), *SIAM J. Appl. Math.*, Vol. **67** (2007), pp. 1740-1775.

- [57] Numerical simulation of vortex dynamics in Ginzburg-Landau-Schrodinger equation (with Q. Du and Y.Z. Zhang), *Eur. J. Appl. Math.*, Vol. **18** (2007), pp. 607-630.
- [56] Dynamics of rotating two-component Bose-Einstein condensates and its efficient computation (with H. Li and Y.Z. Zhang), *Physica D*, Vol. **234** (2007), pp. 49-69.
- [55] A mass and magnetization conservative and energy diminishing numerical method for computing ground state of spin-1 Bose-Einstein condensates (with H. Wang), *SIAM J. Numer. Anal.*, Vol. **45** (2007), pp. 2177-2200.
- [54] Efficient and accurate numerical methods for the Klein-Gordon-Schrödinger equations (with L. Yang), *J. Comput. Phys.*, Vol. **225** (2007), pp. 1863-1893.
- [53] Energy and chemical potential asymptotics for the ground state of Bose-Einstein condensates in the semiclassical regime (with F. Y. Lim and Y.Z. Zhang), *Bulletin of the Institute of Mathematics, Academia Sinica*, Vol. **2** (2007), pp. 495-532.
- [52] Dynamics of the center of mass in rotating Bose-Einstein condensates (Y.Z. Zhang), *Appl. Numer. Math.*, **57** (2007), pp. 697-709.
- [51] A time-splitting spectral method for three-wave interactions in media with competing quadratic and cubic nonlinearities (with C. Zheng), *Commun. Comput. Phys.*, Vol. **2** (2007), pp. 123-140.
- [50] Efficient and Spectrally Accurate Numerical Methods for Computing Ground and First Excited States in Bose-Einstein Condensates (with I-L. Chern and F. Y. Lim), *J. Comput. Phys.*, Vol. **219** (2006), pp. 836-854.
- [49] An efficient and spectrally accurate numerical method for computing dynamics of rotating Bose-Einstein condensates (with H. Wang), *J. Comput. Phys.*, Vol. **217** (2006), pp. 612-626.
- [48] Dynamics of rotating Bose-Einstein condensates and their efficient and accurate numerical computation (with Q. Du and Y.Z. Zhang), *SIAM J. Appl. Math.*, Vol. **66** (2006), pp. 758-786.
- [47] Dynamics of the ground state and central vortex states in Bose-Einstein condensation (with Y.Z. Zhang), *Math. Mod. Meth. Appl. Sci.*, Vol. **15** (2005), pp. 1863-1896.
- [46] A fourth-order time-splitting Laguerre-Hermite pseudo-spectral method for Bose-Einstein condensates (with J. Shen), *SIAM J. Sci. Comput.*, Vol. **26** (2005), pp. 2010-2028.
- [45] On the Gross-Pitaevskii Equation with Strongly Anisotropic Confinement: Formal Asymptotics and Numerical Experiments (with P. A. Markowich, C. Schmeiser and R. M. Weishaupl), *Math. Mod. Meth. Appl. Sci.*, Vol. **15** (2005), pp. 767-782.
- [44] Continuous configuration time-dependent self-consistent field method for polyatomic quantum dynamical problems (with D.H. Zhang, M.H. Yang and S.-Y. Lee), *J. Chem. Phys.*, Vol. **122** (2005), pp. 1101-1104.
- [43] Ground, symmetric and central vortex states in rotating Bose-Einstein condensates (with H.Q. Wang and P.A. Markowich), *Comm. Math. Sci.*, Vol. **3** (2005), pp. 57-88.

- [42] Explicit and unconditionally stable numerical methods for generalized and vector Zakharov System (with F.F Sun), *SIAM J. Sci. Comput.*, Vol. **26** (2005), pp. 1057-1088.
- [41] Numerical methods for nonlinear Schrödinger equation under nonzero far-field conditions, *Methods and Applications of Analysis*, Vol. **11** (2004), pp. 367-388.
- [40] An efficient and stable numerical method for the Maxwell-Dirac system (with X.-G. Li), *J. Comput. Phys.*, Vol. **199** (2004), pp. 663-687.
- [39] Ground states and dynamics of multi-component Bose-Einstein condensates, *Multiscale Modeling and Simulation, a SIAM Interdisciplinary journal*, Vol. **2** (2004), pp. 210-236.
- [38] Computing the ground state solution of Bose-Einstein condensates by a normalized gradient flow (with Q. Du), *SIAM J. Sci. Comput.*, Vol. **25** (2004), pp. 1674-1697.
- [37] Three dimensional simulation of jet formation in collapsing condensates (with D. Jaksch and P.A. Markowich), *J. Phys. B: At. Mol. Opt. Phys.*, Vol. **37** (2004), pp. 329-343.
- [36] Effective one particle quantum dynamics of electrons: a numerical study of the Schrödinger-Poisson- X_α model (with N.J. Mauser and H.P. Stimming), *Comm. Math. Sci.*, Vol. **1** (2003), pp. 809-828.
- [35] Numerical study of time-splitting spectral discretization of nonlinear Schrödinger equations in the semi-classical regimes (with S. Jin and P.A. Markowich), *SIAM J. Sci. Comput.*, Vol. **25** (2003), pp. 27 - 64.
- [34] Approximation and comparison for motion by mean curvature with intersection points, *Computers & Math. Comp.*, Vol. **46** (2003), pp. 1211-1228.
- [33] An explicit unconditionally stable numerical method for solving damped nonlinear Schrödinger equations with a focusing nonlinearity, (with D. Jaksch), *SIAM J. Numer. Anal.* (2003), Vol. **41**, pp. 1406 - 1426.
- [32] Numerical methods for the generalized Zakharov system (with F. Sun and G.W. Wei), *J. Comput. Phys.*, Vol. **190** (2003), pp. 201 - 228.
- [31] Numerical solution of the Gross-Pitaevskii equation for Bose-Einstein condensation (with D. Jaksch and P.A. Markowich), *J. Comput. Phys.*, Vol. **187** (2003), pp. 318 - 342.
- [30] Ground state solution of Bose-Einstein condensation by directly minimizing the energy functional (with W. Tang), *J. Comput. Phys.*, Vol. **187** (2003), pp. 230 - 254.
- [29] Error bounds for the finite element approximation of the exterior Stokes equations in two dimensions, *IMA J. Numer. Anal.*, Vol. **23** (2003), pp. 125-148.
- [28] Error bounds for the finite element approximation of an incompressible material in an unbounded domain (with H. Han), *Numer. Math.*, Vol. **93** (2003), pp. 415-444.
- [27] High-order I-stable central difference schemes for viscous compressible flows (with S. Jin), *J. Comput. Math.*, Vol. **21** (2003), pp. 101-112.
- [26] Error estimates on the random projection methods for hyperbolic conservation laws with stiff reaction terms (with S. Jin), *Appl. Numer. Math.*, Vol. **43** (2002), pp. 315-333.

- [25] An economical finite element approximation of a generalized Newtonian flow, *Comput. Methods Appl. Mech. Engrg.*, Vol. **191**, (2002), pp. 3637-3648.
- [24] The random projection method for stiff multi-species detonation capturing (with S. Jin), *J. Comput. Phys.*, Vol. **178** (2002), pp. 37-57.
- [23] On time-splitting spectral approximation for the Schrödinger equation in the semiclassical regime (with S. Jin and P.A. Markowich), *J. Comput. Phys.*, Vol. **175** (2002), pp. 487-524.
- [22] The random projection method for stiff detonation waves (with S. Jin), *SIAM J. Sci. Comput.*, Vol. **23** (2001), pp. 1000-1026.
- [21] Error estimates for the finite element approximation of linear elastic equations in an unbounded domain (with H. Han), *Math. Comp.*, Vol. **70** (2001), pp. 1437-1459.
- [20] On inf-sup conditions of mixed finite element formulations for acoustic fluids (with X. Wang and K.J. Bathe), *Math. Models Methods Appl. Sci.*, Vol. **11** (2001), pp. 883-901.
- [19] Numerical simulations of fracture problems by coupling the FEM and the direct method of lines (with H. Han and Z. Huang), *Comput. Methods Appl. Mech. Engrg.*, Vol. **190** (2001), pp. 4831-4846.
- [18] Weakly compressible high-order I-stable central difference schemes for incompressible viscous flows (with S. Jin), *Comput. Methods Appl. Mech. Engrg.*, Vol. **190** (2001), pp. 5009-5026.
- [17] The random projection method for hyperbolic conservation laws with stiff reaction terms (with S. Jin), *J. Comput. Phys.*, Vol. **163** (2000), pp. 216-248.
- [16] Artificial boundary conditions for incompressible Navier-Stokes equations: A well-posed result, *Comput. Methods Appl. Mech. Engrg.*, Vol. **188** (2000), pp. 595-611.
- [15] The artificial boundary conditions for computing the flow around a submerged body (with. Wen X.), *Comput. Methods Appl. Mech. Engrg.*, Vol. **188** (2000), pp. 473-482.
- [14] High-order local artificial boundary conditions for problems in unbounded domains (with H. Han), *Comput. Methods Appl. Mech. Engrg.*, Vol. **188** (2000), pp. 455-471.
- [13] Error estimates for the finite element approximation of problems in unbounded domains (with H. Han), *SIAM J. Numer. Anal.*, Vol. **37** (2000), pp. 1101-1119.
- [12] The discrete artificial boundary condition on a polygonal artificial boundary for the exterior problem of Poisson equation by using the direct method of lines (with H. Han), *Comput. Methods Appl. Mech. Engrg.*, Vol. **179** (1999), pp. 345-360.
- [11] The direct method of lines for the problem of infinite elastic foundation (with H. Han), *Comput. Methods Appl. Mech. Engrg.*, Vol. **175** (1999), pp. 157-173.
- [10] A priori and posteriori error bounds for nonconforming linear finite element approximation of a non-Newtonian flow (with J. W. Barrett), *M²AN Math. Model. Numer. Anal.*, Vol. **32** (1998), pp. 843-858.

- [9] The approximations of the exact boundary condition at an artificial boundary for linearized incompressible viscous flows, *J. Comput. Math.*, Vol. **16** (1998), pp. 239-256.
- [8] The artificial boundary conditions for incompressible materials on an unbounded domain (with H. Han), *Numer. Math.*, Vol. **77** (1997), pp. 347-363.
- [7] Numerical simulation for the problem of infinite elastic foundation (with H. Han and T. Wang), *Comput. Methods Appl. Mech. Engrg.*, Vol. **147** (1997), pp. 369-385.
- [6] Artificial boundary conditions for two-dimensional incompressible viscous flows around an obstacle, *Comput. Methods Appl. Mech. Engrg.*, Vol. **147** (1997), pp. 263-273.
- [5] Local artificial boundary conditions for the incompressible viscous flow in a slip channel (with H. Han), *J. Comput. Math.*, Vol. **15** (1997), pp. 335-344.
- [4] Nonlocal artificial boundary conditions for the incompressible viscous flow in a channel using spectral techniques (with H. Han), *J. Comput. Phys.*, Vol. **126** (1996), pp. 52-63.
- [3] An artificial boundary condition for the incompressible viscous flows using the method of lines (with H. Han), *Int. J. Numer. Methods Fluids*, Vol. **22** (1996), pp. 483-493.
- [2] An artificial boundary condition for the incompressible viscous flows in a no-slip channel (with H. Han), *J. Comput. Math.*, Vol. **13** (1995), pp. 51-65.
- [1] A discrete artificial boundary condition for steady incompressible viscous flows in a no-slip channel using a fast iterative method (with H. Han and J. Lu), *J. Comput. Phys.*, Vol. **114** (1994), pp. 201-208.

c). Submitted:

- [109] Single-polymer ‘flyfishing’ effect for nanoscale motors and machines: an exact worm-like-chain model study (with N. Wang, R. Hou and Z. Wang).
- [110] Dimension reduction for dipolar Bose-Einstein condensates in the strong interaction regime (with L. Le Treust and F. Mehats), arXiv: 1501.02177 (math.AP).
- [111] Numerical methods and comparison for the Dirac equation in the nonrelativistic limit regime (with Y. Cai, X. Jia and Q. Tang), arXiv: 1504.02881 (math.NA).
- [112] A regularized Newton method for computing ground states of Bose-Einstein condensates (with X. Wu and Z. Wen), arXiv: 1504.02891 (math.NA).
- [113] A uniformly accurate (UA) multiscale time integrator Fourier pseudospectral method for the Klein-Gordon-Schrodinger equations in the nonrelativistic limit regime (with X. Zhao), arXiv: 1505.00083.
- [114] Hubbard model for atomic impurities bound by the vortex lattice of a rotating BEC (with T. H. Johnson, Y. Yuan, S. R. Clark, C. Foot and D. Jaksch), arXiv: 1512.09334.
- [115] Fundamental gaps and energy asymptotics of the Gross-Pitaevskii/nonlinear Schrodinger equation with repulsive interaction (with X. Ruan), arXiv: 1512.07123.
- [116] A uniformly accurate multiscale time integrator pseudospectral method for the Klein-Gordon-Zakharov system in the high-plasma-frequency limit regime (with X. Zhao), preprint.

- [117] A parametric finite element method for solid-state dewetting problems with anisotropic surface energies (with W. Jiang, Y. Wang and Q. Zhao), arXiv: 1601.05877.

REFEREED CONFERENCE PROCEEDINGS AND CHAPTERS IN BOOKS:

- [7] Analysis and computation for the semiclassical limits of the ground and excited states of the Gross-Pitaevskii equation (with Fong Yin Lim), Proc. Sympos. Appl. Math., Amer. Math. Soc., Vol. **67** (2009), pp. 195–215.
- [6] Analysis and Efficient Computation for the Dynamics of Two-Component Bose-Einstein Condensates, Contemporary Mathematics, American Mathematical Society, Vol. **473** (2008), pp. 1-26.
- [5] The Nonlinear Schrödinger Equation and Applications in Bose-Einstein Condensation and Plasma Physics, Chapter 3 in Dynamics in Models of Coarsening, Coagulation, Condensation and Quantization (IMS Lecture Notes Series Volume 9), World Scientific (2007), pp. 141-240.
- [4] Ground States and Dynamics of Rotating Bose-Einstein Condensates, Chapter 10, Transport Phenomena and Kinetic Theory, Series: Modeling and Simulation in Science, Engineering and Technology, Birkhauser (2006), pp. 216-255.
- [3] Quantum kinetic theory: modeling and numerics for Bose-Einstein condensation (with P.A. Markowich and L. Pareschi), Chapter 10, Modeling and Computational Methods for Kinetic Equations, Series: Modeling and Simulation in Science, Engineering and Technology, Birkhauser (2004), pp. 287-321.
- [2] The random projection method for stiff multi-species detonation computation (with S. Jin), Proceedings of Hyperbolic Problems: Theory, Numerics, Applications, Birkhauser-Verlag, Berlin (2001), pp 139-148.
- [1] The random projection method (with S. Jin), Advances in Scientific Computing (Proceeding of the Workshop on Scientific Computing 99 in Hong Kong), Science Press, Beijing/New York (2001), pp.1-11.

BOOKS EDITED OR PUBLISHED:

- [2] Multiscale Modeling and Analysis for Materials Simulation, IMS Lecture Notes Series Volume 22 (edited with Q. Du), World Scientific, 2011.
- [1] Dynamics in Models of Coarsening, Coagulation, Condensation and Quantization, IMS Lecture Notes Series Volume 9 (edited with J.-G. Liu), World Scientific, 2007.

AWARD:

- 45-minute Invited Speaker, International Congress of Mathematicians (ICM2014), 2014.

- Feng Kang Prize, Chinese Society of Computational Mathematics, 2013.
- Outstanding Scientist Award, Faculty of Science, National University of Singapore, 2012.
- Young Scientist Award, Faculty of Science, National University of Singapore, 2008.
- Young Researchers' Grant, ORGANIZING COMMITTEE OF HYP2004: Tenth International Conference on Hyperbolic Problems Theory, Numerics, Applications, 2004 (AWARDED TO VERY ACTIVE YOUNG RESEARCHERS WITH FINANCIAL SUPPORT UP TO 100,000JPY TO GO HYP2004 IN JAPAN).
- Beijing Science and Technology Award, 2003 (AWARDED TO RESEARCHER FOR SIGNIFICANT ACHIEVEMENT IN SCIENCE AND TECHNOLOGY PROGRESS IN BEIJING).
- The Young Researcher Fellowship Award, 2001, The First M.I.T. Conference on Computational Fluid and Solid Mechanics, Massachusetts Institute of Technology, USA.
- Tsinghua Alumni Award, Tsinghua University, 1995, 1997
- Luokeng Hua Scholarship, Tsinghua University, 1994 (AWARDED ANNUALLY TO THE TOP RESEARCH STUDENT IN APPLIED MATHEMATICS IN School of Science at Tsinghua)
- C. C. Lin Scholarship, Tsinghua University, 1995 (AWARDED ANNUALLY TO THE TOP RESEARCH STUDENT IN APPLIED MATHEMATICS IN TSINGHUA UNIVERSITY)

GRANT SUPPORT:

- Principal Investigator, Ministry of Education, 2016-2019, S\$434,075 for “Multiscale Analysis and Methods for Oscillatory Partial Differential Equations”.
- Principal Investigator, Ministry of Education, 2014-2017, S\$136,000 for “Theoretical Study of Dipolar Bose-Einstein Condensation”.
- Principal Investigator, Singapore A*STAR SERC, 2013-2016, S\$295,200 for “Modeling and Simulation for Solid-State Dewetting Problems”.
- Co-Principal Investigator, Singapore A*STAR SERC, 2012-2015, S\$3,729,800 for “Complex Systems” Research Programme.
- Principal Investigator, Ministry of Education, 2009-2012, S\$823,300 for “Analysis & Simulation for Quantized Vortices in Superfluidity & Superconductivity”.
- Principal Investigator, Ministry of Education, 2007-2009, S\$137,200 for “Theoretical Study of Bose-Einstein Condensates” (with B. Li).
- Principal Investigator, Ministry of Education, 2006-2008, S\$93,300 for “Efficient and Stable Numerical Methods for Coupled Systems in Quantum and Plasma Physics”.
- Principal Investigator, Ministry of Education, 2005-2007, S\$70,000 for “Modelling and Simulation of Trapped Bose Gases at Finite Temperature by Quantum Kinetic Theory”.

- Principal Investigator, Ministry of Education, 2003-2005, S\$33,800 for “Quantized Vortex States and Dynamics in Bose-Einstein Condensate”.
- Principal Investigator, Ministry of Education, 2002-2004, S\$83,000 for “Numerical Simulation for Bose-Einstein Condensation (BEC)”.
- Principal Investigator, Ministry of Education, 2001-2003, S\$55,500 for “Numerical Methods for Problems with Multiscale Phenomena”.
- Principal Investigator, Climbing Program of National Key Project of foundation in China, 1997-1999, 60,000 yuan for “Finite Element Methods for Non-Newtonian/Viscoelastic flows”
- Principal Investigator, Cao Guang-Biao’s Higher Science and Technology Grant at Tsinghua University, 1998-1999, 50,000 yuan for “High-order Local Artificial Boundary Conditions for Partial Differential Equations in Unbounded Domains”.
- Co-Principal Investigator (with H. Han and J. Lu), National Natural Science Foundation in China, 1998-2000, 75,000 yuan for “Artificial Boundary Conditions for Incompressible Viscous Flows”
- Principal Investigator, The Scientific Research Foundation for the Returned Oversea’s Chinese Scholars, 1997-1999, 25,000 yuan for “Numerical Simulations of Non-Newtonian/Viscoelastic flows”.

COLLOQUIA AND SEMINARS (selected):

• Department of Physics, University of Oxford, UK (2015), Wolfgang Pauli Institute (WPI), University of Vienna, Austria (2015), Department of Mathematics, HKUST (2015), National Taiwan University, Taiwan (2014), School of Mathematics, Fudan University, China (2014), Department of Mathematics, Tsinghua University, China (2014), School of Mathematics, University of New South Wales, Australia (2014); Mathematics Sciences Institute, Australian National University, Australia (2013); School of Mathematical Sciences, Fudan University, China (2012); IWR, University of Heidelberg, Germany (May); ZIST, University Erlangen-Nuremberg, Germany (2012); Institute of Physics, Chinese Academy of Sciences, China (2011); Department of Mathematics, Hong Kong University of Science and Technology (2011); Department of Mathematics, National Taiwan University, Taiwan (2010); Department of Mathematical Sciences, Tsinghua University, China (2010); School of Mathematical Sciences, Peking University, China (2009); Department of Mathematics, University of California Santa Barbara, USA (2008); Institute for Pure and Applied Mathematics (IPAM), University of California Los Angeles (UCLA), USA (2008); Department of Mathematics, Stanford University, USA (2008); Institute for Mathematics, University of Vienna, Austria (2007); Department of Mathematics, University of Wisconsin-Madison, USA (2007); Department of Physics, Oxford University, UK (2007); Institute of Mathematics, University Paul Sabatier, France (2007). Johann Radon Institute for Computational and Applied Mathematics (RICAM), University of Linz, Austria (2006); Chinese University of Hong Kong, Hong Kong (2006); MIP, University of Paul Sabatier, France (2005). Department of Mathematics, University of Maryland, USA (2004); Department of Mathematics, University of Ferrara, Italy (2004); Department of Mathematics, Indiana University, USA (2003); Department of Mathematics, Purdue University, USA (2003); Institute of Mathematical Sciences, Chinese University of Hong Kong, Hong Kong (2003); Wolfgang Pauli

Institute, Vienna, Austria (2002); Tamesek laboratory, National University of Singapore, Singapore (2001); Department of Mathematics, Emory University, USA (2000). School of Mathematics, Georgia Institute of Technology, USA (1998); Department of Mathematics, Peking University, Beijing, China (1997); Department of Applied Mathematics, Tsinghua University, Beijing, China (1995).

MEETINGS AND SYMPOSIA:

a). Invited (selected)

- Invited Speaker, 9th Pan African Congress of Mathematicians (PACOM 2017), July 3 – 7, 2017, Faculty of Sciences, University Mohammed V, Rabat, Morocco.
- Invited Speaker, The Asian Mathematical Conference (AMC) 2016, July 25 – 29, 2016, Bali, Indonesia.
- Plenary Speaker, The 5th International Conference on Scientific Computing and Partial Differential Equations (SCPDE14), December 8–12, 2014, Hong Kong Baptist University, Hong Kong.
- Invited Speaker, International Congress of Mathematicians (ICM2014), August 13–21, 2014, Coex, Seoul, Korea.
- Invited Speaker, The 7th CAS Cross-Trait and International Conference on Quantum Manipulation, June 28 – 30, 2013, Institute of Physics, Chinese Academy of Sciences, Beijing, China.
- Invited Speaker, Quantum Systems: A Mathematical Journey from Few to Many Particles, May 13 – 16, 2013, CSCAMM, University of Maryland, Maryland, USA.
- Invited Speaker, Materials Defects: Mathematics, Computation, and Engineering, September 10 – December 14, 2012, Institute for Pure & Applied Mathematics (IPAM), UCLA, USA.
- Plenary Speaker, ESF Research Conferences on “Applied Partial Differential Equations in Physics, Biology and Social Sciences: Classical and Modern Perspectives”, 2-7 September 2012, Centre de Recerca Matemàtica, Bellaterra, Spain.
- Invited Speaker, The International Congress of Chinese Mathematicians (ICCM2010), December 17 – 22, 2010, Tsinghua University, Beijing, China.
- Invited Speaker, Long program on “Partial Differential Equations in Kinetic Theories”, August 16 – December 22, 2010, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK
- Invited Speaker, Nonlinear phenomena in quantum degenerate gases, April 12-16, 2010, Universidade de Vigo, Ourense, Spain.
- Tutorial Speaker (6 hours), Workshop on “Numerical Methods for the Nonlinear Schrödinger equations”, September 22 - 23, 2008, Wolfgang Pauli Institute (WPI), Vienna, Austria.
- Invited Speaker, 12th International Conference on “Hyperbolic Problems: Theory, Numerics and Applications (HYP2008)”, June 9 - 13, 2008, University of Maryland, USA.

- Tutorial Speaker (4 hours), Summer School on “Gross-Pitaevskii equations for superfluids and Bose-Einstein condensates”, Wolfgang Pauli Institute (WPI), Vienna, Austria, 18 - 22 September 2006.
- Tutorial Speaker (20 hours), Shanghai Summer School on “Analysis and Numerics in Modern Sciences”, Fudan University, China, May – June 2004.
- For more details, please refer to: <http://www.math.nus.edu.sg/~bao/past-conf.html>

b). Organized (selected)

- Member of the Scientific Committee, 9th Pan African Congress of Mathematicians (PACOM 2017), July 3 – 7, 2017, Faculty of Sciences, University Mohammed V, Rabat, Morocco.
- Member of the Scientific and Organizing Committee, Workshop on New Challenges in Mathematical Modeling and Numerical Simulation of Superfluids, June 27 – July 1, 2016, CIRM, Marseille, France.
- Member of the Organizing Committee, Thematic Program on Multiscale Scientific Computing: From Quantum Physics and Chemistry to Material Science and Fluid Mechanics, January – April, 2016, The Fields Institute for Research in Mathematical Sciences, Toronto, Canada.
- Co-chair of the Organizing Committee, The three-month program on “High Performance and Parallel Computing for Materials Defects and Multiphase Flows”, January 1 – March 31, 2015, Institute for Mathematical Sciences, National University of Singapore, Singapore.
- Co-chair of the Organizing Committee, The 9th International Conference on Computational Physics, January 7 – 11, 2015, National University of Singapore, Singapore.
- Member of the Organizing Committee, Thematic Program on “Confined Quantum Systems”, July 2012 – July 2013, Wolfgang Pauli Institute (WPI), Vienna, Austria.
- Member of the Organizing Committee, Multiscale Materials Modeling (MMM) 2012, October 15 – 19, 2012, Biopolis, Singapore.
- Co-chair of the Organizing Committee, The three-month program on “Multiscale Modeling, Simulation, Analysis and Applications”, November 1, 2011 – January 20, 2012, Institute for Mathematical Sciences, National University of Singapore, Singapore.
- Member of the Organizing Committee, SIAM Conference on Computational Science and Engineering (CSE11), February 28–March 4 2011, Grand Sierra Resort and Casino, Reno, Nevada, USA.
- Co-chair of the Organizing Committee, The two-month program on “Mathematical Theory and Numerical Methods for Computational Materials Simulation and Design”, July 1 – August 31, 2009, Institute for Mathematical Sciences, National University of Singapore, Singapore.
- Co-chair of the Organizing Committee, The two-month program “Bose-Einstein condensation and quantized vortex in superconductivity and superfluidity”, The Institute of Mathematical Sciences, National University of Singapore, 1 November - 31 December 2007.

- Member of the Organizing Committee, The three-month program on “Moving Interface Problems and Applications in Fluid Dynamics”, Institute for Mathematical Sciences, National University of Singapore, Singapore, 8 January – 31 March 2007. .
- Co-chair of the Organizing Committee, The two-month program “Nanoscale Material Interfaces: Experiment, Theory and Simulation”, The Institute of Mathematical Sciences, National University of Singapore, 24 Nov 2004 - 23 Jan 2005.
- For more details, please refer to: <http://www.math.nus.edu.sg/~bao/past-conf.html>

PROFESSIONAL SERVICES:

- At NUS: Assistant Head (2014–2017), Member of Search Committee (2008–2011), Deputy Director of the Graduate Programme Committee (2010–2011), Member of Curriculum Committee (2008–2009), Coordinator of Applied and Computational Mathematics (ACM) seminar (2006–07, 2010–2011), Member of Graduate Programme Committee (GPC) (2006–07, 2011–2014), Department of Mathematics; Department Colloquium Coordinator (2001–04), UROPS Coordinator (2001 – 06); Honours Coordinator (2003–06), Department of Computational Science, Member of International Collaboration Committee (2006–07), Member of the 75th Faculty Anniversary Committee (March–November, 2004).
- *Member of Editorial Board*: Asian Journal of Mathematics, International Press (2015–), Computational Astrophysics and Cosmology, Springer (2014–), Applied Mathematics and Mechanics, Springer (2014–), Journal of Mathematical Study, Global Science Press (2013–), SIAM Journal on Scientific Computing, SIAM (2009–2014), Advances in Numerical Analysis (2008–), East Asia Journal on Applied Mathematics, Global Science Press (2010–), Chinese Journal of Numerical Methods and Applications (2000–2010).

Research Students Supervised:

At National University of Singapore (NUS):

- *PhD thesis*: Zhang Teng (2015–), Yin Jia (2015–), Liu Zhaoqiang (2013– & co-supervised with Tan V.), Zhao Quan (2013– & co-supervised with Ren W.), Ruan Xinran (2012–), Wang Yan (2011–2016), Jia Xiaowei (2010–2015), Zhao Xiaofei (2010–2014), Wang Nan (2009–2014), Huang Mengmin (2009–2014), Tang Qinglin (2008–2013), Dong Xuanchun (2007–2012), Cai Yongyong (2007–2012), Lim Fong Yin (2005–2009), Zhang Yanzhi (2003–2006), Wang Hanquan (2002–2006).
- *Msc thesis*: Hong Mei (2013–2015), Cao Xiaomeng (2011–2012), Xu Weibiao (2008–2011), Sit Wing Yee (2007–2009), Chai Ming Huang (2004–2007), Yang Li (2004–2006), Ge Yunyi (2002–2004), Sun Fangfang (2001–2003).
- For more details, please refer to: <http://www.math.nus.edu.sg/~bao/graduate.html>

At Other Universities:

- *Tsinghua University*: Yong Zhang (PhD, 2008–2012 & co-supervised with H. Jian), Chijie Zhuang (PhD, 2006–2011 & co-supervised with R. Zeng), Wenjun Ying (MSc, 1997–2000 & co-supervised with H. Han).

REFEREEING SERVICES:

SIAM Journal on Scientific Computing; SIAM Journal on Numerical Analysis; SIAM Journal on Applied Mathematics; Journal of Computational Physics; SIAM Review; Physical Review A; Physical Review E; SIAM Journal on Mathematical Analysis; Mathematics of Computation; Inverse Problems; Foundation of Computational Mathematics; Discrete and Continuous Dynamical System – Series B; Physics Letters A; Computers & Mathematics in Simulation; Applied Numerical Mathematics; Zentralblatt MATH; Bulletin of the Belgian Mathematical Society; Journal of Physics A: Mathematics and General; Multiscale Modelling and Simulation; Applied Mathematics and Modelling; Journal of Hyperbolic Differential Equations; Transport Theory and Statistics Physics; Journal of Computational and Applied Mathematics; Communications in Computational Physics; Science in China; Computing in Science & Engineering; International Journal of Heat and Mass Transfer; Nonlinearity; Computational Materials Science; Numerical Methods for Partial Differential Equations; Communications in Mathematical Sciences; IMA Journal on Numerical Analysis; Mathematical Models and Methods in Applied Sciences; Applied Mathematics Letters; Advances in Computational Mathematics; Journal of Computational Mathematics; Chinese Journal of Computational Physics; International Journal of Numerical Methods in Fluids; Journal of Scientific Computing; Journal of Physics B: Atomic and Molecular Physics;

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