

# Curriculum Vitae

## ZHONGYI HUANG

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### PERSONAL INFORMATION:

Born on Nov. 1, 1975 in Hunan Province, P.R. China.  
Married, one child.  
Nationality: P.R. China.

### EDUCATION:

**Ph.D. & M.S., Tsinghua University, 1999**

*Dissertation:* The discrete method of separation of variables for solving the composite materials problems

*Advisor:* Professor Houde Han

**B.S., Tsinghua University, 1994**

### ACADEMIC EXPERIENCES:

#### Regular positions:

*Professor*, Tsinghua University, 12/2008 - date

*Associate Professor*, Tsinghua University, 12/2002 - 12/2008

*Assistant Professor*, Tsinghua University, 03/1999 - 12/2002

*Teaching Assistant*, Tsinghua University, 09/1995 - 03/1999

#### Visiting positions:

*Visiting Fellow*, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, 8/2010 - 9/2010

*Visiting Professor*, University of Cambridge, 1/2009 - 2/2009

*Visiting Professor*, University of Cambridge, 2/2008

*Visiting Scholar*, University of Wisconsin–Madison, 9/2007–2/2008

*Visiting Professor*, University of Vienna, 2/2007

*Visiting Professor*, University of Vienna, 2/2006

*Visiting Scholar*, University of Wisconsin–Madison, 9/2003–12/2003

*Post Doc*, Princeton University, 9/2000–1/2002

## **RESEARCH INTERESTS:**

Computational methods for high frequency waves; Artificial boundary conditions for time dependent problems and nonlinear problems; Numerical methods for quantum mechanics in semiclassical regime; Numerical methods for elasticity with singularities; Computational methods for problems with multi-scale phenomena; Computational fluid mechanics.

## **AWARDS:**

Hemker Prize, (With Houde Han, R. Bruce Kellogg), 2008.

Beijing Science and Technology Awards, (with Houde Han, Weizhu Bao, Xiaonan Wu, Chunxiong Zheng and Xin Wen), 2002.

Teaching Awards of Tsinghua University, (with Tiecheng Li and Xiaofeng Wang), 2000.

“Chia-chiao Lin” Applied Mathematics scholarship, Tsinghua University, 1999.

## **GRANTS:**

Principal Investigator, NSFC - Project 11071139, for “Coupling methods for multi-scale problems based on eigenfunction expansion”, 2011-2013.

Co-Principal Investigator, NSFC - Project 10971116, for “Tailored finite point method and singular perturbation problems”, 2010-2012.

Principal Investigator, NSAF - Project 10676017, for “Study of the Euler Numerical Methods for Large deformation Multi-phase flow with high temperature and high density”, 2007-2009.

National Basic Research Program of China - Grant 2005CB321701, for “High Performance Scientific Computation Research”, 2005-2010.

Principal Investigator, NSFC - Project 10301017, for “Coupled Numerical Methods for Multi-scale Phenomena”, 2004-2006.

Principal Investigator, Scientific Foundation for Returned Overseas Chinese Scholars, Ministry of Education of China, 2004-2006.

Co-Principal Investigator, Basic Research Foundation of Tsinghua University- Project JC2003005, for Three Dimensional Finite Element Numerical Analysis for Geotectonic Structure, 2003-2006.

## **CONFERENCE SPEECHES:**

### **Invited:**

“International Congress of Chinese Mathematicians (ICCM2010)”, December 17-22, 2010, Mathematical Sciences Center, Tsinghua University, Beijing, China.

“PDE Models for Quantum Fluids”, December 13-17, 2010, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK.

“PDEs in kinetic theories: kinetic description of biological models”, November 8-12, 2010, International Centre for Mathematical Sciences (ICMS), Edinburgh, UK.

“The Second International Conference: Nonlinear Waves—Theory and Applications”, June 26-29, 2010, Beijing, China.

“7th China-Norway-Sweden Workshop on Computational Mathematics”, June 8-10, 2010, Bergen, Norway.

Workshop on “Frontiers in Computational and Applied Mathematics”, August 9-10, 2009, Tsinghua University, Beijing, China.

“Mathematical Theory and Numerical Methods for Computational Materials Simulation and Design”, July 1 — August 31, 2009, IMS, National University of Singapore, Singapore.

Enumath 2009: The eighth European Conference on Numerical Mathematics and Advanced Applications, Uppsala University, Uppsala, Sweden, June 29 - July 3, 2009.

ICOSAHOM 09: International Conference on Spectral and High Order Methods, June 22-26, 2009, Trondheim, Norway.

2009 Annual Conference of Chinese Mathematical Society, April 21-24, 2009, Xiamen, China.

Conference On “Modern Topics in Nonlinear Kinetic Equations”, University of Cambridge, UK, April 20-22, 2009.

Workshop on Computational Methods for Quantum, High Frequency and Seismic Waves, Tsinghua University, December 20-22, 2008.

International Workshop on The Gross-Pitaevskii equation and its application for BEC in optical lattices, Wolfgang Pauli Institute, Vienna, Austria, Sep. 24-27, 2008.

The first French-Chinese summer Institute, Fudan University, Shanghai, China, Sep. 1-21, 2008.

2008 Frontiers of computational and applied mathematics, University of Science and Technology of China, July 19-22, 2008.

The International Conference: Nonlinear Waves – Theory and Applications, Beijing, June 9-12, 2008.

Workshop on Frontiers in Computational and Applied Mathematics, Peking University, Beijing, China, Aug.4-5, 2007.

International Conference On Spectral and High Order Methods (ICOSAHOM07), Institute of Computational Mathematics Chinese Academy of Sciences, Beijing, China, June 18-22, 2007.

Workshop on High Frequency Wave Computation, Wolfgang Pauli Institute, Vienna, Austria, February 26-March 2, 2007.

Workshop on Scientific Computing, Tsinghua University, Beijing, China, July 13-14, 2006.

The Second Workshop on Multi-scale Modelling and Computation, Peking University, P. R. China, Aug.15 - 16, 2003.

International Conference on Scientific Computing and Partial Differential Equations, On the Occasion of Stanley Osher’s 60th birthday. Hong Kong Baptist University, Hong Kong, December 12-15, 2002.

The First Workshop on Multi-scale Modelling and Computation, Peking University, P. R. China, Aug.3 - 4, 2002.

12th International Conference on Domain Decomposition Methods, Chiba University, Chiba, Japan, October 25-29, 1999.

## Organized:

Workshop on “Frontiers in Computational and Applied Mathematics”, August 9-10, 2009, Tsinghua University, Beijing, China.

Workshop on Computational Methods for Quantum, High Frequency and Seismic Waves, Tsinghua University, December 20-22, 2008.

Workshop on Scientific Computing, Tsinghua University, Beijing, China, July 13-14, 2006.

International Workshop on Wave Propagations -On the occasion of George Papanicolaou’s 60th Birthday, Tsinghua University, Beijing, China, June 7-10, 2004.

## INVITED COLLOQUIA AND SEMINAR TALKS:

Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, Dec. 2008

University of Wisconsin-Madison, Sep. 2007.

University of Science and Technology of China, Apr. 2007.

Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, Dec. 2006

BICMR, Peking University, Oct. 2006

RICAM, Austrian Academy of Sciences, Feb. 2006

Peking University, Sep. 2005

Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, Dec. 2002

## EDITORSHIP:

Associate Editor of *Numerical Mathematics: A Journal of Chinese Universities*, 2007–

## PUBLICATIONS:

- [29] *Tailored finite point method for steady-state reaction-diffusion equation*, (with H. Han), *Comm. Math. Sci.*, 8 (4): 887-899, 2010.
- [28] *Bloch Decomposition-Based Gaussian Beam Method for the Schrödinger equation with Periodic Potentials*, (with S. Jin, H. Wu and X. Yang), *J. Comput. Phys.*, 229 (13): 4869-4883, 2010.
- [27] *Numerical simulation of trapped dipolar quantum gases: Collapse studies and vortex dynamics*, (with P. Markowich, and C. Sparber), *Kinetic and Related Models*, 3 (1):181-194, 2010.
- [26] *Tailored finite point method for a singular perturbation problem with variable coefficients in two dimensions*, (with H. Han), *J Sci. Comp.*, 41 (2): 200-220, 2009.
- [25] *Tailored finite point method for the interface problem*, *Networks and Heterogeneous Media*, 4 (1): 91-106, 2009.
- [24] *On the Bloch decomposition based spectral method for wave propagation in periodic media*, (with S. Jin, P. Markowich, and C. Sparber), *Wave Motion*, 46 (1): 15-28, 2009.

- [23] *A Hybrid Phase-Flow Method for Hamiltonian Systems with Discontinuous Hamiltonians*, (with S. Jin, H. Wu), SIAM J Scientific Computing, 31(2):1303-1321, 2008.
- [22] *A Tailored finite point method for the Helmholtz equation with high wave numbers in heterogeneous medium*, (with H. Han), J Comput. Math., 26 (5):728-739, 2008.
- [21] *A Tailored finite point method for a singular perturbation problem on an unbounded domain*, (with H. Han and B. Kellogg), J Sci. Comp., 36 (2): 243-261, 2008.
- [20] *Numerical simulation of the nonlinear Schroedinger equation with multi-dimensional periodic potentials*, (with S. Jin, P. Markowich, and C. Sparber), MMS, 7 (2): 539-564, 2008.
- [19] *Exact artificial boundary conditions for quasilinear elliptic equation in unbounded domains*, (with H. Han and D. Yin), Comm. Math. Sci., 6 (1): 71-82, 2008.
- [18] *Numerical solutions of Schrodinger equations in  $R^3$* , (with H. Han and D. Yin), Numer. Meth. For Diff. Eqns, 23 (3): 511-533, 2007.
- [17] *A Bloch decomposition based split-step pseudo spectral method for quantum dynamics with periodic potentials*, (with S. Jin, P. Markowich, and C. Sparber), SIAM J Scientific Computing, 29 (2): 515-538, 2007.
- [16] *Numerical Simulation for Crack Propagation in Two-Dimensional*, (in Chinese) (with Q. Liu), J. Tsinghua University, 46 (9): 1604-1607, 2006.
- [15] *Wavelet-Galerkin method for reaction-diffusion equation*, (in Chinese) (with X. Yang and L. Zhu), J. Tsinghua University, 46 (3): 392-395, 2006.
- [14] *Numerical Study of a Domain Decomposition Method For a Two-Scale Linear Transport Equation*, (with X. Yang, F. Golse, S. Jin), Networks and Heterogeneous Media, 1(1):143-166, 2006.
- [13] *A time-splitting spectral method for Maxwell-Dirac system*, (with S. Jin, P. Markowich, C. Sparber, C. Zheng), J. Comput. Phys., 208 (2): 761-789, 2005.
- [12] *Exact artificial boundary conditions for Schrodinger equation in  $R^2$* , (with H. Han) Comm. Math. Sci., 2 (1): 79-94, 2004.
- [11] *Heterogeneous multi-scale method: A general methodology for multi-scale modeling*, (with W. E and B. Engquist) Phys. Rev. B, 67 (9): Art. No. 092101, 2003.
- [10] *High accuracy numerical method of thin-film problems in micromagnetics*, J Comput. Math. 21 (1): 33-40, 2003.
- [9] *A dynamic atomistic-continuum method for the simulation of crystalline materials*, (with W. E), J Comput. Phys. 182 (1): 234-261, 2002.
- [8] *Exact and Approximating Boundary Conditions for the Parabolic Problems on Unbounded Domains*, (with H. Han), Comput. Math. Appl., 44 (5-6): 655-666, 2002.
- [7] *A Class of Artificial Boundary Conditions for Heat Equation in Unbounded Domains*, (with H. Han), Comput. Math. Appl., 43 (6-7): 889-900, 2002.

- [6] *The discrete method of separation of variables for composite material problems*, (with H. Han), Int. J Fracture 112 (4): 379-402, 2001.
- [5] *Matching conditions in atomistic-continuum modeling of materials*, (with W. E), Phys. Rev. Lett., 87 (13): 5501-5504, 2001.
- [4] *Numerical simulations of fracture problems by coupling the FEM and the direct method of lines*, (with W.Z. Bao and H. Han), Comput. Method Appl. Mech. Eng., 190 (37-38): 4831-4846, 2001.
- [3] *Wavelet-Galerkin method for the singular perturbation problem with boundary layers*, Tsinghua Science & Technology, 5(4): 365-369, 2000.
- [2] *The discrete method of separation of variables for computation of stress intensity factors*, (with H. Han and W.Z. Bao), Chinese J Comp. Phys., 17(5): 483-496, 2000.
- [1] *The direct method of lines for the numerical solutions of interface problem*, (with H. Han), Comput. Method Appl. Mech. Eng., 171(1): 61-75, 1999.

**REFEREEING SERVICES:**

BIT Numerical Mathematics  
 Chinese Journal of Computational Physics  
 Communications in Computational Physics  
 CMES: Computer Modeling in Engineering & Sciences.  
 Computers and Mathematics with Applications  
 IMA Journal of Numerical Analysis  
 Journal of Computational Mathematics  
 Journal of Computational Physics  
 Journal of Jilin University  
 Journal of Scientific Computing  
 Numerical Mathematics: A Journal of Chinese Universities  
 etc.