

## Zhongming Wang

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### Professional Preparation

Postdoc Mathematics, University of California, San Diego, 2008–present  
Mentors: Prof. Li-Tien Cheng and Prof. Bo Li

Ph.D. Applied Mathematics, Iowa State University, 2003–2008  
Advisor: Prof. Hailiang Liu

B.Sc. (First Honor), Computing Mathematics, City University of Hong Kong, 2000–2003  
Advisor: Prof. Felipe Cucker

Undergraduate Study, Mathematics Department, Fudan University, China, 1999–2000

### Research Interests

- The level set method
- Numerical analysis and scientific computation
- Applied mathematics and mathematical biology

### Past and current Research Projects

- Electrostatics, Coulomb and Yukawa-field, and the Poisson–Boltzmann equation
- Monte Carlo simulation
- Variational implicit solvent model in biochemistry
- The Poisson–Nernst–Planck model
- Particle trajectory crossing in two-phase flows
- Computation of semi-classical approximation of the Schrödinger equation, multi-valued solutions to the Euler–Poisson equation and high frequency wave Propagation

### Awards and Honors

- Wolfe Fellowship, Iowa State University, 2007
- Robert J. Lambert Applied Mathematics Award, Iowa State University, 2006
- Chinese Undergraduates Modeling Contest, Second Prize, 2002
- Hong Kong Jockey Club Charity Trust Scholarship for Outstanding Mainland Students, 2000–2003

### Publications

#### Preprints and in-preparations

1. Level set variational implicit solvation with the Coulomb-field approximation, preprint.

#### Journal articles

1. Mean-field description of ionic size effects with nonuniform ionic sizes: A numerical approach, *Phys. Rev. E* 84, 021901 (2011)
2. H. Liu, Z. Wang and R. Fox, A level set approach for dilute non-collisional fluid-particle flows, *J. Comput. Phys.* 230 (2011), no. 4, 920936

3. L.-T. Cheng, B. Li and Z. Wang, Level-set minimization of potential controlled Hadwiger valuations for molecular solvation, *J. Comput. Phys.*, 229 (2010), 8497–8510.
4. B. Li, B. Lu, Z. Wang and A. McCammon, Solutions to a model Poisson–Nernst–Planck system and the determination of reaction rates, *Physica A*, 389 (2010), 1329–1345.
5. P. Setny, Z. Wang, L.-T. Cheng, B. Li, J.A. McCammon and J. Dzubiella, Dewetting-controlled binding of ligands to hydrophobic pockets, *Physical Review Letters*, 103 (2009), no.18, 187801.  
Note: This article was also selected for republication in the Nov 1, 2009 issue of *Virtual J. of Biological Physics Research*.
6. L.-T. Cheng, Z. Wang, P. Setny, J. Dzubiella, B. Li and A. McCammon, Interfaces and hydrophobic interactions in receptor-ligand systems: A level-set variational implicit solvent approach, *J. Chem. Phys.*, 131 (2009), no.14, 144102.  
Note: This article was also selected for republication in the Oct. 15, 2009 issue of *Virtual J. of Biological Physics Research*.
7. H. Liu and Z. Wang, A Bloch band based level set method for computing the semiclassical limit in Schrödinger equations, *J. Comput. Phys.*, 228 (2009), no.9, 3326–3344.
8. H. Liu and Z. Wang, Superposition of multi-valued solutions in high frequency wave dynamics, *J. Sci. Comput.*, 35 (2008), no.2–3, 192–218.
9. H. Liu and Z. Wang, A field space-based Level set method for computing multi-valued solutions to 1D Euler–Poisson equations, *J. Comput. Phys.*, 225 (2007), no.1, 591–614.
10. H. Liu and Z. Wang, Computing multi-valued velocity and electrical fields for 1d Euler–Poisson equations. *Appl. Numer. Math.*, 57 (2007), no.5–7, 821–836.

### Presentations and Posters

- A Level Set Approach for Dilute Non-Collisional Fluid-Particle flows, 2011 Spring AMS Central Section Meeting, Iowa City, IA, March 18-20, 2011
- A Level-Set Variational Implicit-Solvent Approach to Biomolecular Solvation, International Research Workshop, Zhejiang University, Hangzhou, China, Sept. 11, 2009
- A Bloch Band Based Level Set Method for Computing the Semiclassical Limit of Schrödinger, Kinetic FRG Young Researchers Workshop, March 5, 2009
- A Level-Set Variational Implicit-Solvent Approach to Hydrophobic Interactions, Informal Seminars on Mathematics and Biochemistry-Biophysics, Department of Mathematics, UCSD, Jan 27, 2009
- Solutions to a Model Poisson–Nernst–Planck System and the Determination of Reaction Rates, Informal Seminars on Mathematics and Biochemistry-Biophysics, Department of Mathematics, UCSD, Nov, 2008
- A Field Space-Based Level Set Method for Computing Multi-Valued Solutions to 1D Euler–Poisson Equations, Conference on Analysis of Partial Differential Equations (PD07), Mesa, Az., December 10-12, 2007
- Superposition of Multi-valued Solutions in High Frequency Wave Dynamics, CAM seminar, Department of Mathematics, Iowa State University, Ames, IA. October 8, 2007
- Application of Level Set Method to 1D Euler-Poisson Equations, CAM seminar, Department of Mathematics, Iowa State University, Ames, IA. October 30, 2006
- Level Set Formulation and Computation of Multivalued Solutions to 1D Euler-Poisson Equations. Iowa Section MAA Meeting, Iowa State University, Ames, IA. April 7, 2006
- Computation of Multi-Valued Solutions in High Frequency Wave Dynamics (*Poster*), Computational and Mathematical Aspects of Materials and Fluids, Iowa State University, April 13, 2007
- Computing Multi-valued Velocity and Electrical Fields in Euler-Poisson Equations (*Poster*), Workshop on Computational Methods and Applied PDEs(CMAPDE05), Mathematics Department, Iowa State University, Ames, IA, November 5, 2005

## Teaching Experience

- **University of California, San Diego, Mathematics**
  - Instructor: Vector Calculus, Winter Quarter 2011
- **Iowa State University, Mathematics**
  - Instructor: Survey of Calculus, Spring 2008, Fall 2007; Calculus I, Spring 2006
  - Teaching Assistant: Master of School Mathematics, Summer 2007; Discrete Mathematics for Business and Social Sciences (*Web-based*), Fall 2005; Calculus I, II or III, Fall 2003–Spring 2005, Fall 2006;
  - Group Leader: Numerical Analysis Qualifying Exam Study Group , Summer 2006

## References

- **Professor Bo Li**  
Professor, Department of Mathematics, University of California, San Diego  
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- **Professor Li-Tien Cheng**  
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- **Professor Hailiang Liu**  
Professor, Department of Mathematics, Iowa State University  
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- **Professor J. Andrew McCammon**  
The Joseph E. Mayer Chair Professor of Theoretical Chemistry and Distinguished Professor of Pharmacology, University of California, San Diego; Investigator, the Howard Hughes Medical Institute  
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- **Professor Paul Sacks (teaching)**  
Professor, Department of Mathematics, Iowa State University  
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