

# Hongyu Liu

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## EDUCATION

- PhD in Mathematics June 2007  
**Chinese University of Hong Kong, Hong Kong SAR**
- M.Sc in Mathematics April 2004  
**Institute of Mathematics, Chinese Academy of Sciences (09/2002–04/2004)**  
**Harbin University of Science & Technology, China (09/2001–08/2002)**
- B.Sc in Mathematics July 2001  
**Harbin University of Science & Technology**

## PROFESSIONAL EXPERIENCE

- **University of Washington, Seattle, USA**  
Acting Assistant Professor 09/2007–09/2010
- **Chinese University of Hong Kong**  
Teaching Assistant 08/2004–09/2007
- **Chinese University of Hong Kong**  
Research Assistant 05/2003–08/2004

## RESEARCH INTERESTS

- Inverse Problems for Partial Differential Equations
  - Inverse acoustic and electromagnetic scattering
  - Electrical Impedance Tomography and Calderón problem
- Invisibility and Cloaking
- Applied and Numerical Analysis, Computational Mathematics
  - Acoustic and electromagnetic scattering theory and numerics
  - Qualitative numerical reconstruction algorithms for inverse problems
  - Geometric numerical integration for dynamical systems

## AWARDS AND FELLOWSHIPS

- **Pacific Institute for the Mathematical Sciences, Canada**  
PIMS Postdoctoral Fellowship 2008–2010
- **Chinese University of Hong Kong**  
Award for Best Research Output of 2007 2008
- **Harbin University of Science & Technology**  
Best Thesis Award and Outstanding Student Prize 2001

## PUBLICATIONS AND PREPRINTS

1. U. Hetmaniuk, H. Y. Liu and G. Uhlmann, On three dimensional active acoustic cloaking devices and their simulation, submitted to *SIAM J. Appl. Math.*, 2009.
2. U. Hetmaniuk, H. Y. Liu and G. Uhlmann, Two dimensional active acoustic cloaking devices, submitted to *J. Comput. Phys.*, 2009.
3. H. Y. Liu, Virtual reshaping and invisibility in obstacle scattering, *Inverse Problems*, **25**(2009).
4. H. Y. Liu, H. Zhang and J. Zou, Recovery of polyhedral scatterers by a single electromagnetic far-field measurement, accepted for publication in *J. Math. Phys.*, 2009.
5. J. Li, H. Y. Liu and J. Zou, Strengthened linear sampling method with a reference ball, *SIAM J. Sci. Comput.*, **31** (2009), no. 6, 4013–4040.
6. H. Y. Liu, Recovery of inhomogeneities and buried obstacles, submitted to *Comm. Part. Diff. Eqn.*, 2008, arXiv: 0804.0938
7. H. Y. Liu, On recovering polyhedral scatterers with acoustic far-field measurements, *IMA J. Appl. Math*, **74** (2009), 264–272.
8. H. Y. Liu, and J. Zou, Uniqueness in determining multiple polygonal scatterers of mixed type, *Discrete Contin. Dyn. Syst, Ser. B*, **9** (2008), no. 2, 375-396
9. H. Y. Liu, A global uniqueness for formally determined inverse electromagnetic obstacle scattering, *Inverse Problems*, **24** (2008), 035018. **(Editorial highlights of the journal for year 2008)**
10. H. Y. Liu, M. Yamamoto and J. Zou, New reflection principles for Maxwell equations and their applications, *Numer. Math.: TMA*, **2** (2009), 1–17.
11. J. Li, H. Y. Liu and J. Zou, Multilevel linear sampling method for inverse scattering problems, *SIAM J. Sci. comput.*, **30** (2008), 1228-1250.

12. H. Y. Liu, M. Yamamoto and J. Zou, Reflection principle for Maxwell's equations and its application to inverse electromagnetic scattering problem, *Inverse Problems* **23** (2007), 2357–2366. **(Editorial highlights of the journal for year 2008)**
13. H. Y. Liu and J. Zou, On unique determination of partially coated polyhedral scatterers with far-field measurements, *Inverse Problems*, **23** (2007), 297–308.
14. H. Y. Liu and J. Zou, Zeros of Bessel and spherical Bessel functions and their applications for uniqueness in inverse acoustic obstacle scattering problems, *IMA J. Appl. Math.* **72** (2007), 817–831. **(Top 5 downloaded for year 2008)**
15. J. Hong, S. Jiang, C. Li and H. Y. Liu, Explicit multi-symplectic methods for Hamiltonian wave equations, *Commun. Comput. Phys.*, **2** (2007), no. 4, 662–683.
16. H. Y. Liu and J. Zou, Uniqueness in an inverse acoustic obstacle scattering problem for both sound-hard and sound-soft polyhedral scatterers, *Inverse Problems*, **22** (2006), 515–524. **(Featured article of the journal for year 2006)**
17. H. Y. Liu and J. Zou, Some new additive Runge-Kutta methods and their applications, *J. Comput. Appl. Math.* **190** (2006), 74–98.
18. H. Y. Liu and K. Zhang, Multi-symplectic Runge-Kutta-type methods for Hamiltonian wave equations, *IMA J. Numer. Anal.* **26** (2006), 252–271.
19. J. Hong, H. Y. Liu and G. Sun, The multi-symplecticity of partitioned Runge-Kutta methods for Hamiltonian PDEs, *Math. Comp.* **75** (2006), no. 253, 167–181.
20. R. P. K. Chan, H. Y. Liu and G. Sun, Efficient symplectic Runge-Kutta methods, *Appl. Math. Comput.*, **172** (2006), 908–924.
21. H. Y. Liu and G. Sun, Symplectic RK and symplectic PRK methods with real eigenvalues, *J. Comput. Math.* **22** (2004), 769–776.

#### CONFERENCE PROCEEDING PUBLICATIONS

1. H. Y. Liu and J. Zou, On Uniqueness in Inverse Acoustic and Electromagnetic Obstacle Scattering Problems, *Journal of Physics: Conference Series, Applied Inverse Problems*, Vancouver, Canada, 2007
2. H. Y. Liu and J. Zou, On Uniqueness in Inverse Obstacle Scatterings, in: *Proceedings of The 2nd International Conference on Scientific Computing and Partial Differential Equations and The First East Asia SIAM Symposium*, Hong Kong., 2006
3. H. Y. Liu and J. Zou, Inverse Obstacle Scattering: Some Theory and Numerics, *Oberwolfach Reports*, Vol 4, Issue 1, 2007, 331–333

#### BOOK CHAPTER

1. J. Li, H. Y. Liu and J. Zou, An Efficient Multilevel Algorithm for Inverse Scattering Problem, *Advances in Computation and Intelligence*, Lecture Notes in Computer Science, Springer-Berlin, 2007.

#### CONFERENCES ORGANIZED

- Special session organizer, *Inverse Problems: Analysis and Computations*, AMS & MAA joint annual meeting, San Francisco, USA, 2010.
- Symposium organizer, *Multisymplectic Integrators*, International Conference on Scientific Computation and Differential Equations, SciCADE09, Beijing, China, 2009.

#### INVITED LECTURES

- Invited mini-symposium speaker, SIAM Conference on Mathematical Aspects of Materials Science, May 23-26, 2010, Philadelphia, Pennsylvania, USA.
- Invited speaker, Applied Math Seminar, Department of Mathematics, Michigan State University, USA, 2009.
- Invited mini-symposium speaker, SIAM conference on Analysis of Partial Differential Equations, 2009, Miami, Florida, USA.
- Invited speaker, AMS Mathematics Research Community (MRC) conference on Inverse Problems, Snowbird, Utah, USA, 2009.
- Invited mini-symposium speaker, *Cloaking and Invisibility*, SIAM Annual Meeting, Denver, Colorado, USA, 2009.
- Invited mini-course speaker, Morningside Center of Mathematics, Chinese Academy of Sciences, Beijing, China, 2009.
- Invited colloquium speaker, Department of Mathematics, Shanghai Jiaotong University, Shanghai, China, 2009.
- Invited colloquium speaker, Institute of Applied Mathematics, Chinese Academy of Sciences, Beijing, China, 2009.
- Invited speaker, Inverse Problems Seminar, University of Washington, Oct. 2008.
- Invited speaker, Multiscale Modeling, Analysis, and Simulations, March 27 & 28, 2008, Michigan Center for Industrial and Applied Mathematics, Michigan State University.
- Invited speaker, Inverse Problems Seminar, University of Washington, Nov. 2007.
- Invited colloquium speaker, Institute of Mathematics, Chinese Academy of Sciences, May, 2007.
- Invited colloquium speaker, Institute of Computational Mathematics, Chinese Academy of Sciences, May, 2007.

- Invited speaker, Computational Electromagnetism and Acoustics, Feb. 4–10, 2007, Oberwolfach, Germany.
- Invited speaker, RGC Postgraduate Student Conference on Computer Image & Vision, June 12–15, 2007, Hong Kong.
- Contributed speaker, The 2nd International Conference on Scientific Computing and Partial Differential Equations & The First East Asia SIAM Symposium, Dec. 2006, Hong Kong.

#### REFEREE FOR JOURNALS

- Inverse Problems, SIAM J. Math. Anal., Commu. Pure Appl. Math.
- Commun. Comp. Phys., Sciences in China, Appl. Math. Comp.
- J. Comp. Math., Acta Math. Sinica, Int. J. Comput. Math.
- Acta Math. Appl. Sinica, J. Math. Anal. Appl.

#### COURSES TAUGHT

- **Teaching at University of Washington, Seattle**
  - Math 307: Introduction to Differential Equations
  - Math 308: Matrix Algebra with Applications
  - Math 309: Linear Analysis
- **TA at Chinese University of Hong Kong**
  - Numerical Analysis
  - Numerical Methods for Differential Equations

#### REFERENCES

- Prof. Gang Bao  
Department of Mathematics, Michigan State University, East Lansing, MI 48824, USA  
Email: [bao@math.msu.edu](mailto:bao@math.msu.edu)
- Prof. Hart Smith  
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Email: [hart@math.washington.edu](mailto:hart@math.washington.edu)
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- Prof. Masahiro Yamamoto  
Department of Mathematical Sciences, The University of Tokyo, Komaba, Meguro,  
Tokyo, 153-8914 Japan  
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- Prof. Jun Zou  
Department of Mathematics, Chinese University of Hong Kong, Shatin, N.T., Hong  
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