

# CURRICULUM VITAE

## CHIU-YEN KAO

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**Institute for Mathematics and its Applications (IMA)**  
**University of Minnesota**  
400 Lind Hall, 207 Church Street S.E.  
Minneapolis, MN 55455-0436

Email: [kao@ima.umn.edu](mailto:kao@ima.umn.edu)  
Phone: (310) 383-5773  
Fax: (612) 626-7370

### EDUCATION

- Ph.D., *Mathematics*, University of California, Los Angeles June 2004  
*Dissertation: Fast Sweeping Methods for Static Hamilton-Jacobi Equations*  
Advisor: Stanley Osher
- M.S., *Applied Mechanics*, National Taiwan University June 1999
- B.S., *Mathematics with a minor in Physics*, National Taiwan University June 1997

### RESEARCH EXPERIENCE

- *IMA Industrial Postdoc* (IMA, UMN) Sept. 2004 ~ now  
Pursue interdisciplinary mathematical research at the IMA, especially in the areas of inverse problems and computational anatomy.
- *Faculty Mentor* (IPAM, UCLA) Jun. 2004 ~ Aug. 2004  
Advise students to do a summer research project in image processing for Areté Associates which is an advanced science and engineering company that provides innovative solutions to the most challenging technical problems faced by the United States (IPAM Research in Industrial Projects for Students (RIPS))
- *Research Assistant / Associate* (UCLA) Apr. 2002 ~ Jun. 2004  
Research on the numerical methods for Hamilton-Jacobi equations and Level Set applications on optimization problems
- *Research Assistant* (National Taiwan University) Sept. 1997 ~ Jun. 1999  
Research on Percolation theory and its application to random resistor network

### TEACHING EXPERIENCE

- *Teaching Assistant / Associate* (UCLA) Apr. 2000 ~ Mar. 2002  
Math 31B Calculus and Analytic Geometry  
Math 32A & 32B Calculus of Several Variables  
Math 61 Introduction to Discrete Structures  
Math 135A & 135B Ordinary Differential Equations  
Math 151B Applied Numerical Methods  
Math 266A Applied Ordinary Differential Equations  
Math 269A Advanced Numerical Analysis
- *Teaching Assistant* (National Taiwan University) Sept. 1998 ~ Jun. 1999  
Course: Applied Partial Differential Equations
- *Teacher* of Li-Wei Liu Math Center Nov. 1993 ~ Jun. 1998  
Teach high school students mathematics to prepare for University Entrance Exam

## **RESEARCH INTERESTS**

- Inverse Problems
- Numerical Methods for Hamilton-Jacobi Equations and Conservation laws
- Level Set Methods and its Applications
- Computational Anatomy and Image Processing
- Numerical Analysis and Scientific Computing

## **PUBLICATIONS**

- Maximizing Band Gaps in Two Dimensional Photonic Crystals by Using Level Set Methods by Chiu-Yen Kao, Stanley Osher, and Eli Yablonovitch *UCLA Math CAM Reports 05-05 (Applied Physics B: Lasers and Optics, 81, Pages 235-244,2005)*
- White Matter Tractography by Anisotropic Wavefront Evolution and Diffusion Tensor Imaging by Marcel Jackowski, Chiu Yen Kao, Maolin Qiu, R. Todd Constable, and Lawrence H. Staib *UCLA Math CAM Reports 05-03 (Medical Image Analysis,9, Pages 427-440,2005)*
- The Lax-Friedrichs Sweeping Method for Optimal Control Problems in Continuous and Hybrid Dynamics by Chiu Yen Kao, Carmeliza Navasca, and Stanley Osher, *UCLA Math CAM Reports 04-24 (Journal of Nonlinear Analysis, in press)*
- Estimation of Anatomical Connectivity by Anisotropic Front Propagation and Diffusion Tensor imaging by Marcel Jackowski, Chiu Yen Kao, Maolin Qiu, R. Todd Constable, and Lawrence H. Staib, *UCLA Math CAM Reports 04-08 (MICCAI (2) 2004: Pages 663-670)*
- Lax-Friedrichs Sweeping Scheme for Static Hamilton-Jacobi Equations by Chiu Yen Kao, Stanley Osher and Jianliang Qian, *UCLA Math CAM Report 03-38, (Journal of Computational Physics,196(1), Pages 367-391,2004)*
- Fast Sweeping Methods for Hamilton-Jacobi Equations by Chiu Yen Kao, Stanley Osher and Yen-His Tsai, *UCLA Math CAM Reports 02-66 (SIAM Numerical Analysis, 42, Pages 2612-2632,2005)*
- Recognizing Sand Ripple Patterns from Side-scan Sonar Images by John David, Gunay Dogan, Yevgeny Goncharov, Chiu Yen Kao, and Pakinee Suwannajan, *NCSU Reports, July 2002*
- A Geometric Method for Automatic Extraction of Sulcal Fundi by Chiu-Yen Kao, Michael Hofer, Guillermo Sapiro, Josh Stern, and David Rottenberg, *submitted to ISBI, Nov 2005*
- Optimization of the Quality Factor of an Acoustic Resonator by Chiu-Yen Kao and Fadil Santosa, *In preparation (2005)*
- Numerical Solutions to a Class of Hamilton-Jacobi-Bellman Equations and its Application to the Visibility Problem by Chiu-Yen Kao, Yen-His Tsai and Stanley Osher, *In preparation (2005)*

## **PRESENTATIONS**

- SIAM Annual Meeting: New Orleans Jul. 2005  
*Maximizing Band Gaps in Two Dimensional Photonic Crystals by Using Level Set Methods*
- Applied Mathematics and Numerical Analysis Seminar, UMN Math Department Oct. 2004  
*Fast Sweeping Methods for Static Hamilton-Jacobi Equations*
- SIAM Annual Meeting: Portland Jul. 2004  
*Fast Sweeping Methods for Static Hamilton-Jacobi Equations*
- MURI On-Site Meeting at Stanford University Feb. 2004  
*Lax-Friedrich Sweeping Methods for Static Hamilton-Jacobi Equations*
- NCTS Dynamical Systems Seminar, Taiwan Dec. 2003  
*Lax-Friedrich Sweeping Methods for Static Hamilton-Jacobi Equations*
- MURI On-Site Meeting at Stanford University Jan. 2003

- Sweeping Methods for Static Hamilton-Jacobi Equations*
- Geometrically Based Motions Reunion Conference at Lake Arrowhead Sept. 2002  
*Sweeping Methods for Static Hamilton-Jacobi Equations*
  - Industrial Mathematics Modeling Workshop at NCSU Jul. 2002  
*Recognizing Sand Ripple Patterns from Side-scan Sonar Images*

### **PROFESSIONAL EXPERIENCE**

- Reviewer for Journal of Computational Physics
- Reviewer for IEEE Transaction on Pattern Analysis and Machine Intelligence
- Reviewer for Physics Letters A
- Reviewer for Kang-Ting Publishing Company, Taiwan (Mar. 1998 ~ Jun. 1998)  
*Review mathematics textbooks for high school education*

### **TECHNICAL SKILLS**

- Computer Languages: C++, Fortran, Matlab, Maple, Mathematica
- Platforms: Windows, Unix, and Linux

### **HONORS**

- Medical Image Analysis second Best MICCAI Paper Award 2005
- Teaching and Research Assistantships (UCLA) Sept. 1999 ~ Jun. 2004
- Teaching and Research Assistantships (National Taiwan University) Sept. 1997 ~ Jun. 1999
- The Ministry of Education Graduate Scholarship (Taiwan) Sept. 1997 ~ Jun. 1999
- Scholarship for Gifted Senior High School Students Studying Mathematics and Natural Science (Taiwan) Sept. 1993 ~ Jun. 1997
- The Presidential Award (Taiwan) Jun. 1996

### **MEMBERSHIPS**

- American Mathematical Society
- Society for Industrial and Applied Mathematics

### **REFERENCES**

- Professor Stanley Osher, Department of Mathematics, UCLA  
E-mail: [sjo@math.ucla.edu](mailto:sjo@math.ucla.edu) (thesis advisor)
- Professor Fadil Santosa, Department of Mathematics, UMN  
E-mail: [santosa@ima.umn.edu](mailto:santosa@ima.umn.edu) (current mentor in IMA)
- Professor Guillermo Sapiro, Department of Electrical and Computer Engineering, UMN  
E-mail: [guille@ece.umn.edu](mailto:guille@ece.umn.edu)
- Professor Eli Yablonovitch, Department of Electrical Engineering, UCLA  
E-mail: [eliy@ee.ucla.edu](mailto:eliy@ee.ucla.edu)

### **TEACHING REFERENCE**

- Professor Hailiang Liu, Department of Mathematics, Iowa State University  
E-mail: [hliu@iastate.edu](mailto:hliu@iastate.edu)