

LOK MING LUI

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EDUCATION

University of California at Los Angeles Ph. D. in Applied Mathematics	Los Angeles, CA <i>2003-2008</i>
University of California at Los Angeles Master of Arts in Mathematics	Los Angeles, CA <i>June 2005</i>
Hong Kong University of Science and Technology B. Sc. in Pure Mathematics	Hong Kong, China <i>June 2003</i>

WORK EXPERIENCE

- **Assistant Professor**, Department of Mathematics, The Chinese University of Hong Kong, Aug. 2010 - Now
- **Postdoctoral Scholar in Mathematics** Aug. 2008 - Aug. 2010
- Jointly appointed by Harvard University and University of California, Los Angeles
- Hosted by: Prof. Shing-Tung Yau, Harvard and Prof. Tony F. Chan, UCLA
- **Visting Researcher, Microsoft Research Asia, Beijing** June 2007 - Sept. 2007.
Research Mentor for the RIPS@Beijing Program. Mentoring two research projects:
1. Hyperbolic Desktop; 2. Link Analysis of Google Page Rank.
- **Research Assistant, UCLA**, Jan. 2005 - June 2008. Jointly working with Prof. Tony Chan, Prof. Paul M. Thomspon on:
Brain Conformal Parametrization, Automatics sulcal landmarks tracking, PDEs/Variational Problem solving on Brain surfaces, Shape based Landmark matching diffeomorphism, Landmark matching diffeomorphism with the algebraic functions, Computational Differential Geometry.
- **Teaching Assistant, UCLA**, Sep. 2003 - Dec. 2004. Taught: Multivariable Calculus, Linear Algebra, Complex Analysis and Differential Geometry.
- **President and Cofounder, UCLA Student Chapter of Society of Industrial and Applied Mathematics (SIAM)**, Sept. 2006 - Sept. 2007.

RESEARCH INTERESTS

Computational Conformal Geometry, Quasiconformal Geometry, Human Brain Mapping, Variational problems on manifolds and Surface Registration.

Thesis

- Title: "Computational Conformal Geometry and its Applications to Human Brain Mapping"
- Advisor: Prof. Tony F. Chan

My thesis develops mathematical algorithms and models to study human brain diseases, using conformal geometry as a tool. Effective methods have been developed to solve equations and variational problems on general manifolds using their Riemannian structures.

Publications

Published

- **M. Zhang, F. Li, Y. He, L. Shi, D. Wang and L.M. Lui**, Registration of Brainstem Surfaces in Adolescent Idiopathic Scoliosis Using Discrete Ricci Flow, *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, Part II, LNCS 7511, 146-154 (2012)
- **T.W. Wong, L.M. Lui, P.M. Thompson, T.F. Chan and S.T. Yau**, Intrinsic Feature Extraction on Hippocampal Surfaces and Its Applications, *SIAM Journal of Imaging Sciences*, Volume 5, Issue 2, 746-768 (2012)
- **W. Zeng, L.M. Lui, F. Lou, X.F. Gu, T.F. Chan and S.T. Yau**, Computing Quasiconformal Maps using an Auxiliary Metric and Discrete Curvature Flow, *Numerische Mathematik*, Volume 121, 671-703 (2012)
- **L.M. Lui, T.W. Wong, W. Zeng, X.F. Gu, P.M. Thompson, T.F. Chan and S.T. Yau** Optimization of Surface Registrations using Beltrami Holomorphic Flow, *Journal of Scientific Computing*, Volume 50, Issue 3, 557-585 (2012)
- **L.M. Lui, T.W. Wong, W. Zeng, P.M. Thompson, T.F. Chan, S.T. Yau**, A Survey on Recent Development in Computational Quasi-conformal Geometry and its Applications, *AMS/IP Studies in Advanced Mathematics*, Volume 51, 697-717 (2012)
- **X.F. Gu, W. Zeng, L.M. Lui, F. Luo, S.T. Yau**, Recent Development of Computational Conformal Geometry, *AMS/IP Studies in Advanced Mathematics*, Volume 51, 515-560 (2012)
- **T.W. Wong, X.F. Gu, T.F. Chan, L.M. Lui**, Parallelizable Inpainting and Refinement of Diffeomorphisms using Beltrami Holomorphic Flow, *Proceedings of the International Conference of Computer Visions (ICCV)* (2011)
- **S. Xin, Y. He, P. Fu, L. Shi, D. Wang, W.C.W. Chu, J.C.K. Cheng, X.F. Gu, L.M. Lui**, Euclidean Geodesic Loops on High-genus Surfaces Applied to the Morphometry of Vestibular Systems, *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 384-392 (2011)
- **W. Yang, L.M. Lui, J.H. Gao, T.F. Chan, S.T. Yau, R.A. Sperlinge and X. Huang**, Independent component analysis-based classification of Alzheimers MRI data, *Journal of Alzheimer's Disease (JAD)*, Volume 24, Number 4, 615-637(2011)
- **L.M. Lui, W. Zeng, X.F. Gu, T.F. Chan and S.T. Yau**, Shape Analysis of Planar Objects with Arbitrary Topologies using Conformal Geometry, *Proceedings of the 11th European conference on Computer vision*, 672-686 (2010)
- **L.M. Lui, T.W. Wong, X.F. Gu, P.M. Thompson, T.F. Chan and S.T. Yau**, Hippocampal Shape Registration using Beltrami Holomorphic flow, *Medical Image Computing and Computer Assisted Intervention(MICCAI)*, Part II, LNCS 6362, 323-330 (2010)
- **W. Zeng, L.M. Lui, L. Shi, D. Wang, W.C.W. Chu, J.C.K. Cheng, X.F. Gu, S.T. Yau**, Shape Analysis of Vestibular Systems in Adolescent Idiopathic Scoliosis Using Geodesic Spectra, *Medical Image Computing and Computer Assisted Intervention(MICCAI)*, Part III, LNCS 6363, 538-546 (2010)
- **L.M. Lui, T.W. Wong, X.F. Gu, T.F. Chan and S.T. Yau**, Compression of Surface Diffeomorphism using Beltrami coefficient, *IEEE Computer Vision and Pattern Recognition(CVPR)*, 2839-2846 (2010)
- **L.M. Lui, T.W. Wong, W. Zeng, X.F. Gu, P.M. Thompson, T.F. Chan and S.T. Yau**, Detecting Shape Deformations using Yamabe Flow and Beltrami Coefficients, *Journal of Inverse Problem and Imaging (IPI)*, Volume 4, Number 2, 311-333 (2010)
- **L.M. Lui, S. Thiruvankadam, Y. Wang, P.M. Thompson and T.F. Chan**, Optimized Conformal Surface Registration with Shape-based Landmark Matching, *SIAM Journal of Imaging Sciences*, Volume 3, Issue 1, pp. 52-78 (2010).
- **L.M. Lui, X. Gu, T.F. Chan and S.T. Yau**, Variational Method on Riemann Surfaces using Conformal Parameterization and its Applications to Image Processing, *Journal of Methods and Applications of Analysis*, Volume 15, Number 4, 513-538 (2008)
- **W. Zeng, L.M. Lui, X. Gu, S.-T. Yau**, Shape Analysis by Conformal Modules, *Journal of Methods and Applications of Analysis*, Volume 15, Number 4, 539-556 (2008)
- **L.M. Lui, Y. Wang, J. Kwan, and S. T. Yau**, Computation of Curvatures using Conformal Parameterization, *Communications in Information and Systems*, Volume 8, Number 1, 1-16 (2008)

- **L.M. Lui, S. Thiruvankadam, Y. Wang, T.F. Chan, P.M. Thompson**, Optimized Conformal Parameterization of Cortical Surfaces Using Shape Based Matching of Landmark Curves, *Medical Image Computing and Computer Assisted Intervention(MICCAI)*, LNCS 5241, 494-502 (2008)
- **L.M. Lui, Y. Wang, T.F. Chan, and P.M. Thompson**, Brain Anatomical Feature Detection by Solving Partial Differential Equations on General Manifolds, *Discrete and Continuous Dynamical Systems B*, 7(3), pp. 605-618 (2007)
- **Y. Wang, L. M. Lui, X. Gu, K.M. Hayashi, T.F. Chan, P.M. Thompson and S.T. Yau**, Brain Surface Conformal Parameterization using Riemann Surface Structure, *IEEE Transaction of Medical Imaging*, 26(6), pp. 853-865 (2007)
- **L.M. Lui, Y. Wang, T.F. Chan and P.M. Thompson**, Landmark Constrained Genus Zero Surface Conformal Mapping and Its Application to Brain Mapping Research”, *Applied Numerical Mathematics* 57, pp. 847-858 (2007)
- **B. Gutman, Y. Wang, L.M. Lui, T.F. Chan, P.M. Thompson**, Hippocampal Surface Discrimination via Invariant Descriptors of Spherical Conformal Maps, *IEEE International Symposium on Biomedical Imaging - From Nano to Macro (ISBI)*, Washington D.C., USA, 1316-1319 (2007)
- **L. M. Lui, Y. Wang, T.F. Chan and P.M. Thompson**, Automatic Landmark Tracking and Its Application to the Optimization of Brain Conformal Mapping, *IEEE Computer Vision and Pattern Recognition(CVPR)*, Vol. 2, 1784-1792 (2006)
- **B. Gutman, Y. Wang, L. M. Lui, T. F. Chan, and P.M. Thompson**, Hippocampal Surface Analysis Using Spherical Harmonic Function Applied to Surface Conformal Mapping, *Proceeding of 8th International Conference on Pattern Recognition (ICPR)*, Hong Kong, China, Vol. 3, 964-967 (2006)
- **L.M. Lui, Y. Wang, T.F. Chan**, PDE on manifold using global conformal parametrization, *Variational, Geometric, and Level Set Methods in Computer Vision: Third International Workshop, VLSM 2005*, Beijing, China, 307-319 (2005)
- **Y. Wang, L.M. Lui, T.F. Chan and P.M. Thompson**, Optimization of Brain Conformal Mapping with Landmarks, *Medical Image Computing and Computer Assisted Intervention(MICCAI)*, Part II, 675-683 (2005)

Submitted papers/Preprint

- **L.M. Lui, K.C. Lam, T.W. Wong, X.F. Gu**, Beltrami representation and its applications to texture and video compression, submitted
- **L.M. Lui, K.C. Lam, S.T. Yau, X.F. Gu**, Teichmuller mapping (T-Map) and its applications to landmark matching registrations, submitted
- **L.M. Lui, C.F. Wen, X.F. Gu**, A conformal approach for surface inpainting, submitted
- **L.M. Lui, W. Zeng, S.T. Yau, X.F. Gu**, Shape analysis of planar multiply-connected objects using conformal welding, submitted
- **R. Lai, Z. Wen, W. Yin, X.F. Gu, L.M. Lui**, Fast and Accurate Algorithms for Harmonic Energy Minimization on Genus-0 Surfaces, submitted

Presentation

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- International Congress of Chinese Mathematician 2010, Beijing, December, 45-minute talk.
 - SIAM Conference on Imaging Science 2008 (IS10), Chicago, April 12-14
 - Southwest Conference on Integrated Mathematical Methods in Medical Imaging 2010, Arizona, Feb 6-7
 - SIAM Conference on Imaging Science 2008 (IS08), San Diego, July 7-9
 - International Conference on Medical Image Computing and Computer Assisted Intervention 2006, 9th International Conference, Copenhagen, Denmark, Oct. 1-6
 - IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR), New York, NY, Jun. 2006
 - IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI), Arlington, VA, Apr. 2006
 - International Conference on Medical Image Computing and Computer Assisted Intervention 2006 2005: 8th International Conference, Palm Springs, CA USA, Oct. 26-29, 2005

- The Eighth IASTED International Conference on Computer Graphics and Imaging (CGIM), Honolulu, HI, USA, Aug. 2005
- 11th Annual Meeting of the Organization for Human Brain Mapping (OHBM), Toronto, Canada, Jun. 12-16, 2005

Honors and Awards

- New World Mathematics Award (Silver award for PhD thesis) 2010
- Phi Tau Phi Scholarship 2007
- Charles E. and Sue K. Young Outstanding Graduate Student Award, UCLA College Award 2007
- Outstanding Leadership Award by Society of Industrial and Applied Mathematics 2007
- Research Assistantship, UCLA, Jan 2005 to Now
- Teaching Assistantship, UCLA, Sept 2003 to Dec 2004
- California Non-resident tuition Fellowship, UCLA, Sept 2003 to Now
- Academic Achievement Medal, Hong Kong University of Science and Technology 2003
- Deans list Award, Hong Kong University of Science and Technology (all semesters during the 3 years undergraduate study)
- Sir Edward Youde Scholarship 2002
- Heng Seng Bank Scholarship 2002
- Heung Tao Summer Research Scholarship 2002
- Heung Tao Student Exchange Program Scholarship 2002 (Exchanged to: University of California, Berkeley)

TEACHING EXPERIENCE

- **Teaching Assistant.** Advanced Calculus, Fall 2003, Winter 2004, Spring 2004, Winter 2008, UCLA.
- **Teaching Assistant.** Linear Algebra, Winter 2004, UCLA.
- **Teaching Assistant.** Complex Analysis, Spring 2004, UCLA.
- **Teaching Assistant.** Differential Geometry, Fall 2007, UCLA.