SHINGYU LEUNG

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The Hong Kong University of Science and Technology,
Clear Water Bay, Hong Kong
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EMPLOYMENT

Professor (2020-Now)
Associate Dean (2016-2023)
School of Science
The Hong Kong University of Science and Technology, Hong Kong
Associate Professor (2014-2020)
Assistant Professor (2009-2014)
Department of Mathematics
The Hong Kong University of Science and Technology, Hong Kong
Postdoc Researcher and Instructor (2006-2009)
Department of Mathematics
University of California, Irvine

EDUCATION

PhD in Mathematics (2006)
University of California, Los Angeles
Supervised by Prof. Stanley Osher, UCLA
MA in Mathematics (2003)
University of California, Los Angeles
MPhil in Mathematics (2001)
The Hong Kong University of Science and Technology, Hong Kong
Supervised by Prof. Grafton W.H. Hui, HKUST
BSc in Mathematics (1999)
The Hong Kong University of Science and Technology, Hong Kong

RESEARCH INTERESTS

- Eulerian techniques for high frequency asymptotic solutions to wave phenomena and their related inverse problems
- Numerical methods for interfacial motions
- Variational and statistical methods for image processing
- Visualization methods for nonlinear dynamical systems

AWARDS

- **Winner, School Teaching Award 2013**. School of Science, HKUST.
- **Winner, Best Ten Lecturers Election 2011**. VERTEX, House II Students' Association, HKUST.

GRANTS

1. Numerical Methods for Hyperbolic Partial Differential Equations on Surfaces, **GRF 2019-2022**. Principal Investigator. Funding amount HKD 502,444.
2. Numerical Approaches for Dynamic Interface Problems and Their Applications, **GRF 2016-2019**. Principal Investigator. Funding amount HKD 488,501.
3. Efficient Numerical Representations of Manifolds and Computations of Differential Operators on Surfaces, **GRF 2014-2017**. Principal Investigator. Funding amount HKD 614,810.
4. Eulerian Methods for Lagrangian Coherent Structure (LCS) based on the Finite Time Lyapunov Exponent (FTLE), **ECS 2012-2015**. Principal Investigator. Funding amount HKD 750,000.
5. Eulerian Approaches to High Frequency Wave Phenomena and Their Inverse Problems, **GRF 2011-2014**. Principal Investigator. Funding amount HKD 747,500.
6. Efficient Numerical Methods for Total Variation (TV) Regularization and Their Applications to Inverse Problems, **Research Project Competition (RPC)**, HKUST, 2011. Principal Investigator. Funding amount HKD 380,000.
7. The Making of a Digital World, **Special Research Fund Initiative (SRFI)**, HKUST, 2011. Co-Investigator. Funding amount HKD 972,000.

8. Efficient Numerical Methods for Interface Problems, **GRF 2010-2013**. Principal Investigator. Funding amount HKD 1,003,084.
9. An Efficient Numerical Method for High Frequency Asymptotic Solutions to Wave Phenomena with Diffraction, **DAG 2009-2012**. Principal Investigator. Funding amount HKD 106,800.

PUBLICATIONS

(*: Corresponding author)

Published or Accepted Papers in Refereed Journals or Proceedings

1. Yu-Keung Ng, Guoqiao You* and **Shingyu Leung**. Sparse Subsampling of Flow Measurements for Finite-Time Lyapunov Exponent in Domains with Obstacles. *Journal of Computational and Applied Mathematics*, 431 (2023) 115255.
2. Wai Ming Chau and **Shingyu Leung***. Within-Cluster Variability Exponent for Identifying Coherent Structures in Dynamical Systems. *Commun. Comput. Phys.*, 33(3), 824-848, 2023.
3. Ki Wai Fong and **Shingyu Leung***. Spherical Essentially Non-Oscillatory (SENO) Interpolation. *J. Sci. Comput.,* (2023) 94:28.

4. **Shingyu Leung***. Some Applications of the Adjoint State Method to Inverse Problems from Seismology and Tomography. Accepted by *Proceedings of the Eighth International Congress of Chinese Mathematicians*.
5. Hao Liu, **Shingyu Leung***, and Jianliang Qian. An Efficient Operator–Splitting Method for the Eigenvalue Problem of the Monge-Ampere Equation. *Commun. Optim. Theory*, 2022 (2022) 7.
6. **Shingyu Leung**, Jiangtao Hu, Jianliang Qian*. Liouville partial-differential-equation methods for computing 2D complex multivalued eikonals in attenuating media. Geophysics 87(2), T71-84, 2022.

7. Guoqiao You* and **Shingyu Leung**. Eulerian algorithms for computing some Lagrangian flow network quantities. *J. Comput. Phys.,* 445, 110620, 2021.
8. Siyang Wei and **Shingyu Leung***. An Adjoint State Method for an Inverse Problem for the Schrodinger Equation. In *Mathematical Methods in Image Processing and Inverse Problems*, Editors: Tai, Xue-Cheng, Wei, Suhua, Liu, Haiguang (Eds.), 2021.
9. Jiangtao Hu*, Jianliang Qian, Junxing Cao, Xingjian Wang, Huazhong Wang and **Shingyu Leung.** Ray Illumination Compensation for Adjoint-State First-Arrival Traveltime Tomography, *Geophysics*, 86(5), 2021.
10. Kaho Ho, **Shingyu Leung***, and Jianliang Qian. Fast Huygens Sweeping Methods for a Class of Nonlocal Schrodinger Equations. *J. Sci. Comput*. 88:54, 2021.
11. **Shingyu Leung**, Jianliang Qian*, and Jiangtao Hu. A Level-Set Adjoint-State Method for Transmission Traveltime Tomography in Irregular Domains. *SIAM J. Sci. Comput.*43(3), A2352-A2380, 2021.
12. Jiangtao Hu*, Jianliang Qian, Jian Song, Min Ouyang, Junxing Cao, and **Shingyu Leung**. Eulerian partial-differential-equation methods for complex-valued eikonals in attenuating media. *Geophysics*, 86(4):T179-T192, July-August 2021.
13. Kwanlun Chu and **Shingyu Leung***. A Level Set Method for Dirichlet k-Partition Problem. *J. Sci. Comput*. 86:11, 2021.
14. Guoqiao You* and **Shingyu Leung**. Computing the Finite Time Lyapunov Exponent for Flows with Uncertainties. *J. Comput. Phys.,* 425, 109905, 2021.

15. Roland Glowinski, **Shingyu Leung**, Hao Liu*, and Jianliang Qian. On the Numerical Solution of Nonlinear Eigenvalue Problems for the Monge-Ampere Operator. *ESAIM: Control, Optimization and Calculus of Variations*, 26 (2020) 118. https://arxiv.org/abs/2008.08103
16. Boxi Xu*, Jin Cheng, **Shingyu Leung** and Jianliang Qian. Efficient algorithms for computing multi-dimensional fractional Laplacians via spherical means. *SIAM J. Sci. Comput., 42-5 (2020), pp. A2910-A2942.*
17. Hao Liu* and **Shingyu Leung**. A Simple Semi-Implicit Scheme for Partial Differential Equations with Obstacle Constraints. *Numer. Math. Theor. Meth. Appl.*, 13(3), 620-643, 2020.
18. Guoqiao You* and **Shingyu Leung**. Fast Construction of Forward Flow Maps using Eulerian Based Interpolation Schemes. *J. Sci. Comput.,* 82:32, 2020.
19. Ke Wei*, Jian-Feng Cai, T.F. Chan and **Shingyu Leung**. Guarantees of Riemannian Optimization for Low Rank Matrix Completion. *Inverse Problems and Imaging*, 14(2), 233-265, 2020.

20. Yee Fai Ng, Kwan Kit Chan, Huey Lei*, Phoebe Mok and **Shingyu Leung**. Pedagogy and innovation in science education: A case study of an experiential learning science undergraduate course. *The European Journal of Social & Behavioral Sciences* 25(2), 156-173.

21. Hao Liu and **Shingyu Leung***. An Alternating Direction Explicit Method for Time Evolution Equations with Applications to Fractional Differential Equations. *Methods and Applications of Analysis*, 26(3), 249-268, 2019.
22. Hao Liu*, Roland Glowinski, **Shingyu Leung** and Jianliang Qian. A Finite Element/Operator-Splitting Method for the Numerical Solution of the Three dimensional Monge-Ampere Equation. *J. Sci. Comput.*, 81(3), 2271-2302, 2019.
23. Yu-Keung Ng and **Shingyu Leung***. Estimating the Finite Time Lyapunov Exponent from Sparse Lagrangian Trajectories. *Commun. Comput. Phys.*, 26(4), 1143-1177, 2019.
24. **Shingyu Leung***, Guoqiao You, Tony Wong and Yu Keung Ng. Recent Developments in Eulerian Approaches for Visualizing Continuous Dynamical System. *Proceedings of the Seventh International Congress of Chinese Mathematicians*, 2, 579-622, 2019.
25. Roland Glowinski, Hao Liu*, **Shingyu Leung** and Jianliang Qian. A Finite Element/Operator-Splitting Method for the Numerical Solution of the Two Dimensional Elliptic Monge-Ampère Equation. *J. Sci. Comput.*, 79(1), 1-47, 2019.

26. Ningchen Ying*, Songming Hou, **Shingyu Leung** and Hongkai Zhao. A Weak Formulation for the Multiphase Stokes Flow Problem without Body Fitting Grids. *Pure and Applied Mathematics Quarterly*, 14(1), 131-159, 2018.
27. Guoqiao You* and **Shingyu Leung**. An Improved Eulerian Approach for the Finite Time Lyapunov Exponent. *J. Sci. Comput.,* 76(3), 1407-1435, 2018.
28. Roland Glowinski, **Shingyu Leung** and Jianliang Qian*. A Simple Explicit Operator-Splitting Method for Effective Hamiltonians. *SIAM J. Sci. Comput.,* 40(1), A484–A503, 2018.
29. Meng Wang, **Shingyu Leung*** and Hongkai Zhao. Modified Virtual Grid Difference (MVGD) for Discretizing the Laplace-Beltrami Operator on Point Clouds. *SIAM J. Sci. Comp*., 40(1), A1-A21, 2018.
30. Guoqiao You and **Shingyu Leung***. Eulerian Based Interpolation Schemes for Flow Map Construction and Line Integral Computation with Applications to Coherent Structures Extraction. *J. Sci. Comput.,* 74(1), pp. 70-96, 2018.

31. Hao Liu, Zhigang Yao, **Shingyu Leung*** and Tony F. Chan. A Level Set Based Variational Principal Flow Method for Nonparametric Dimension Reduction on Riemannian Manifolds. *SIAM J. Sci. Comp*., 39(4), A1616-A1646, 2017.
32. Wing-Fai Kwan, **Shingyu Leung***, Xiaoping Wang and Jianliang Qian. Fast Huygen Sweeping Methods for Paraxial Multi-Color Optical Self-Focusing in a Nematic Liquid Crystal. *Journal of Computational Physics,* Volume 348, November 2017, Pages 108-138.
33. Guoqiao You, Tony Wong and **Shingyu Leung***. Eulerian Methods for Visualizing Continuous Dynamical Systems using Lyapunov Exponents. *SIAM J. Sci. Comp*., 39(2), A415-A437, 2017.

34. Ke Wei*, Jian-Feng Cai, T.F. Chan and **Shingyu Leung**. Guarantees of Riemannian Optimization for Low Rank Matrix Recovery. *SIAM J. Matrix Anal. & Appl*., 37(3), 2016, pp.1198-1222.
35. Tony Wong and **Shingyu Leung***. A Fast Sweeping Method for Eikonal Equations on Implicit Surfaces. *J. Sci. Comput.*, 67(3), pp.837-859, 2016.
36. Roland Glowinski, **Shingyu Leung** and Jianliang Qian*. Operator-Splitting Based Fast Sweeping Methods for Isotropic Wave Propagation in a Moving Fluid. *SIAM J. Sci. Comp*., 38(2), A1195-A1223, 2016.

37. Ke Wei*, X.C. Tai, T.F. Chan and **Shingyu Leung**. Primal-Dual Method for Continuous Max-Flow Approaches. Proceedings of the 5th Eccomas Thematic Conference on Computational Vision and Medical Image Processing (VipIMAGE 2015), 2015.
38. Guoqiao You and **Shingyu Leung***. A Fast Semi-Implicit Level Set Method for Curvature Dependent Flows with an Application to Limit Cycles Extraction in Dynamical Systems. *Commmun. Comput. Phys*., Vol. 8, No. 1, 2015, pp. 203-229.
39. Roland Glowinski, **Shingyu Leung**, Jianliang Qian*. A Penalization-Regularization-Operator Splitting Method for Eikonal-based Traveltime Tomography. *SIAM J. on Imaging Sciences*, Vol. 8, No. 2, 2015, pp. 1263-1292.
40. Wangtao Lu, **Shingyu Leung** and Jianliang Qian*. An Improved Fast Local Level Set Method for Three-Dimensional Inverse Gravimetry. *Inverse Problems and Imaging*, 9(2), 2015, Pages 479-509.

41. Wenbin Li, **Shingyu Leung*** and Jianliang Qian. A Level-Set Adjoint-State Method for Crosswell Transmission-Reflection Traveltime. *Geophysical J. Int.*, 199(1), 2014, Pages 348-367.
42. Jun Liu*, Xue-Cheng Tai, **Shingyu Leung** and Haiyang Huang, A New Continuous Max-Flow Algorithm for Multi-phase Image Segmentation using Binary Super-Level Set Representation.

Journal of Visual Communication and Image Representation, Volume 25, Issue 6, 2014, Pages 1472-1488.

43. Sean Y. Hon, **Shingyu Leung*** and Hongkai Zhao. A Cell Based Particle Method for Modeling Dynamic Interfaces. *Journal of Computational Physics*, Volume 272, 2014, Pages 279-306.
44. Guoqiao You and **Shingyu Leung***. VIALS: An Eulerian Tool Based on Total Variation and the Level Set Method for Studying Dynamical Systems. *Journal of Computational Physics*, Volume 266, 2014, Pages 139-160.
45. **Shingyu Leung**, Jianliang Qian* and Susana Serna. Fast Huygens Sweeping Methods for Schrodinger Equations in the Semi-Classical Regime. *Methods and Applications of Analysis,* 21(1), 2014, Pages 31-66.
46. Guoqiao You and **Shingyu Leung***. An Eulerian Method for Computing the Coherent Ergodic Partition of Continuous Dynamical Systems. *Journal of Computational Physics*, Volume 264, 2014, Pages 112-132.

47. **Shingyu Leung***. The Backward Phase Flow Method for the Finite Time Lyapunov Exponent. *Chaos*, 23(043132), 2013.
48. Wenbin Li and **Shingyu Leung***. A Fast Local Level Set Based Adjoint State Method for First Arrival Transmission Traveltime Tomography with Discontinuous Slowness. *Geophysical J. Int.*, 195(1), 2013, Pages 582-596.
49. Jun Liu*, Xue-Cheng Tai, **Shingyu Leung**. A Generic Convexification and Graph Cut Method for Multiphase Image Segmentation. *EMMCVPR Lecture Notes in Computer Science Volume 8081,* 2013, pp 251-265.
50. Victor Isakov, **Shingyu Leung** and Jianliang Qian*. A Three Dimensional Inverse Gravimetry Problem for Ice with Snow Caps. *Inverse Problems and Imaging*, Volume 7, No.2, May 2013, Pages 523-544.
51. Jun Liu and **Shingyu Leung***, A Splitting Algorithm for Image Segmentation on Manifolds Represented by the Grid Based Particle Method. *J. Sci. Comput.*, Volume 56, 2013, Pages 243-266.

52. Jun Liu, Yin Bon Ku and **Shingyu Leung***, Expectation-Maximization Algorithm with Total Variation Regularization for Vector-Valued Image Segmentation. *Journal of Visual Communication and Image Representation*, Volume 23, No. 8, November 2012, Pages 1234-1244.
53. Songting Luo, **Shingyu Leung** and Jianliang Qian*, An Adjoint State Method for Numerical Approximation of Continuous Traffic Congestion Equilibria. *Commun. Comput. Phys.*, Volume 10, Number 5, 2011, Pages 1113-1131.
54. Victor Isakov, **Shingyu Leung** and Jianliang Qian*, A Fast Local Level Set Method for Inverse Gravimetry. *Commmun. Comput. Phys.*, Volume 10, No. 4, October 2011, Pages 1044-1070.
55. **Shingyu Leung***, An Eulerian Approach for Computing the Finite Time Lyapunov Exponent. *Journal of Computational Physics*, Volume 230, Issue 29, May 1 2011, Pages 3500-3524.
56. **Shingyu Leung***, John Lowengrub and Hongkai Zhao, A grid based particle method for solving partial differential equations on evolving surfaces and modeling high order geometrical motion. *Journal of Computational Physics*, Volume 230, Issue 7, April 1 2011, Pages 2540-2561.
57. J.H. Ha*, A. Hokugo, C.M. Mengatto, **Shingyu Leung**, S. Osher, I. Nishimura, Mathematical Restoration Techniques to Improve Micro-CT Images of Implant Osseointegration. In: IADR/AADR/CADR 89th General Session, 2011, San Diego, Calif. Journal of Dental Research - Spec Issue A. US: JDR, 2011. v.90.
58. **Shingyu Leung** and Jianliang Qian*, The Backward Phase Flow and FBI-Transform-Based Eulerian Gaussian Beams for the Schrodinger Equation. *Journal of Computational Physics*, Volume 229, Issue 23, November 20 2010, Pages 8888-8917.
59. **Shingyu Leung*** and Hongkai Zhao, Gaussian Beam Summation for Diffraction in Inhomogeneous Media Based on the Grid Based Particle Method. *Commmun. Comput. Phys.*, Volume 8, Number 4, May 17 2010, Pages 758-796.
60. **Shingyu Leung*** and Hongkai Zhao, A Grid Based Particle Method for Evolution of Open Curves and Surfaces. *Journal of Computational Physics*, Volume 228, Issue 20, November 1 2009, Pages 7706-7728.
61. **Shingyu Leung** and Jianliang Qian*, Eulerian Gaussian Beams for Semi-Classical Solutions of Schrodinger Equations. *Journal of Computational Physics*, Volume 228, Issue 8, May 1 2009, Pages 2951-2977.
62. **Shingyu Leung***, Gang Liang, Knut Solna and Hongkai Zhao, Expectation-Maximization Algorithm with Local Adaptivity. *SIAM J. Imaging Sci.*, Volume 2, Issue 3, Pages 834-857, 2009.
63. **Shingyu Leung*** and Hongkai Zhao, A Grid Based Particle Method for Moving Interface Problems. UCLA-CAM 08-08. *Journal of Computational Physics*, Volume 228, Issue 8, May 1 2009, Pages 2993-3024.

64. **Shingyu Leung**, Jianliang Qian* and Robert Burridge, Eulerian Gaussian Beams for High Frequency Wave Propagation. *Geophysics*, Volume 72, Issue 5, September-October 2007, Pages SM61-SM76.
65. **Shingyu Leung** and Jianliang Qian*, An Adjoint State Method for 3D Transmission Traveltime Tomography Using First Arrival. *Commun. Math. Sci.*, Volume 4, Number 1, March 2006, Pages 249-266. UCLA CAM 06-06.
66. **Shingyu Leung** and Jianliang Qian*, Transmission Traveltime Tomography Based on Paraxial Liouville Equations and Level Set Formulations. *Inverse Problems* 23 (2007) 799-821.
67. **Shingyu Leung** and Jianliang Qian*, A Transmission Tomography Problem Based on Multiple Arrivals from Paraxial Liouville Equations, In *Expanded Abstract for the SEG 75th Annual Meeting*, Houston, USA, 2005.
68. **Shingyu Leung*** and Stanley Osher, Fast Global Minimization of the Active Contour Model with TV-Inpainting and Two-phase Denoising. *Proceeding of the 3rd IEEE Workshop on Variational, Geometric and Level Set Methods in Computer Vision*, 2005, Pages 149-160.
69. **Shingyu Leung**, Jianliang Qian* and Stanley Osher, A Level Set Method for Three-dimensional Paraxial Geometrical Optics with Multiple Sources. *Commun. Math. Sci.,* Volume 2, Issue 4, Pages 643-672, 2004.
70. Jianliang Qian* and **Shingyu Leung**, A Local Level Set Method for Paraxial Geometrical Optics. *SIAM J. Sci. Comp*., Volume 28, Issue 1, Pages 206-223.
71. Jianliang Qian* and **Shingyu Leung**, A Level Set Based Eulerian Method for Paraxial Multivalued Traveltimes. *Journal of Computational Physics*, Volume 197, Issue 2, Pages 711-736, 2004.

Popular Science Article

- 梁承裕, 數學在電腦動畫中的應用. *http://utalks.etvonline.hk/article124.php*

SUPERVISING

Postdoc Research

- Boxi Xu (July-Dec 2014, July 2015-July 2017). Current: Shanghai University of Finance and Economics.
- Jun Liu (2011-2012). Current: Beijing Normal University.

Graduate Research (Academic Year 2023-2024)

Current (3 PhD and 1 MPhil)

- Wai Ming Chau. **MPhil Program** Year 1
- Kin Ting Ken Hung. **PhD Program** Year 1
- Young Kyu Lee. **PhD Program** Year 2
- Chun-Kit Hung. **PhD Program** Year 3

Graduated (6 PhD's and 9 MPhil's)

- Kin Ting Ken Hung. MPhil 2023, Department of Mathematics, HKUST.
    - Thesis:
    - Current: PhD, HKUST.
- Young Kyu Lee. **MPhil 2022**, Department of Mathematics, HKUST.
    - Thesis: A Simple Converging Embedding Method for the Laplace-Beltrami Operator on Implicit Surfaces.
    - Current: PhD, HKUST.
- Ki-Wai Fong. **MPhil 2022**, Department of Mathematics, HKUST.
    - Thesis: Spherical Essentially Non-Oscillatory (SENO) Interpolation
    - Current: KGI Asia.
- Chun-Kit Hung. **MPhil 2021**, Department of Mathematics, HKUST
    - Thesis: Embedding Methods for Hyperbolic Conservation Laws on Implicit Surfaces.
    - Current: PhD, HKUST.
- Kwun-Lun Alan Chu. **PhD 2020**, Department of Mathematics, HKUST.
    - Thesis: Numerical Methods for Partial Differential Equations on Meshless Domains and the Dirichlet k-Partition Problem.
    - Current: Instructor, The Hang Seng University of Hong Kong.
- Haiyi Helen Tan. **MPhil 2019**, Department of Mathematics, HKUST.
    - Thesis: An Operator-Splitting Fast Huygens Sweeping Method for Schrodinger Equations with Electromagnetic Fields
- Siyang Wei. **MPhil 2019**, Department of Mathematics, HKUST.
    - Thesis: An Adjoint State Method for an Inverse Problem for the Schrödinger Equation
    - Current: PhD students, UC Irvine, USA

- Yu-Keung Ng. **MPhil 2018**, Department of Mathematics, HKUST.
    - Thesis: Finite Time Lyapunov Exponent Estimation from Sparse Lagrangian Trajectories Data Using Radial Basis Functions
    - Current: Engineer – Software Development, ASTRI
- Hao Liu. **PhD 2018**, Department of Mathematics, HKUST.
    - Thesis: Numerical PDE Methods for Geometry Related Problems
    - Current: Assistant Professor, HKBU.
- Andy Wing-Fai Kwan. **MPhil 2017**, Department of Mathematics, HKUST.
    - Thesis: Applications and Modifications of Fast Huygens Sweeping Methods
    - Current: Computational scientist, ClusterTech Limited, Hong Kong.
- Ningchen Ying. **PhD 2017**, Department of Mathematics, HKUST.
    - Thesis: Numerical Methods for Partial Differential Equations from Interface Problems
- Tony Ka-Wah Wong. **MPhil 2016**, Department of Mathematics, HKUST.
    - Thesis: A Fast Sweeping Method for Eikonal Equations on Implicit Surfaces
    - Current: PhD student, UBC, Canada.
- Meng Wang. **PhD 2015**, Department of Mathematics, HKUST.
    - Thesis: Numerical Methods For Elliptic Interface Problems.
    - Current: Citibank, Hong Kong.
- Wenbin Li. **PhD 2014**, Department of Mathematics, HKUST.
    - Thesis: Eulerian Methods for Computing High Frequency Wave Propagation and Solving Related Nonlinear Inverse Problems.
    - Current: Harbin Institute of Technology, ShenZhen, China.
- Sean Y. Hon. **MPhil 2014**, Department of Mathematics, HKUST.
    - Thesis: A Cell Based Particle Method for Modeling Dynamic Interfaces.
    - Current: Assistant Professor, HKBU.
- Guoqiao You. **PhD 2014**, Department of Mathematics, HKUST.
    - Thesis: Eulerian Approaches for Computational Dynamical Systems Based on the Level Set Method.
    - Current: Nanjing Audit University, China.

PRESENTATIONS

2023

- *Spherical Essentially Non-Oscillatory (SENO) Interpolation,* 14 August 2023, International Conference on Spectral and High Order Methods (ICOSAHOM2023), Seoul, Korea.
- *Eulerian Approaches for Computing Lagrangian Quantities in Dynamical Systems,* 15 May 2023, SIAM Conference on Applications of Dynamical Systems, Portland, Oregon, US.
- *Spherical Essentially Non-Oscillatory (SENO) Interpolation,* 27 April 2023, HKUST-KAIST-NUS Joint Workshop in Applied and Computational Mathematics, HKUST, Hong Kong.

2022

- *Fast Huygens Sweeping Methods for Schrodinger Equations*, 24 March 2022, (Online) HIT-SZ, China.

2021

- *Numerical Methods for Partial Differential Equations on Surfaces*, 21 April 2021, (Online) SUSTech, China.

2020

- *Fast Huygens Sweeping Methods for Schrodinger Equations*, Efficient Algorithms in Data Science, Learning and Computational Physics, Jan 12-16, 2020, Tsinghua Santa International Mathematics Forum, Sanya, China.

2019

- *Numerical Methods for Partial Differential Equations on Manifolds and Point Clouds*, DEA19, 16-20 September 2019, AGH University of Science and Technology, Krakow, Poland.
- *A Regularized Least Squares Radial Basis Function Method for Partial Differential Equations*, ICIAM2019, 16 July 2019, Valencia, Spain.
- *A Numerical Method for an Inverse BVP for the Schrodinger Equation with Finite Number of Measurements*, ICIAM2019, 15 July 2019, Valencia, Spain.
- *An Adjoint State Method for an Inverse Problem for the Schrodinger Equation*, Applied Inverse Problems, 12 July 2019, Grenoble, France.
- *Adjoint State Methods for Some Tomography Problems*, Applied Inverse Problems, 11 July 2019, Grenoble, France.

- *Adjoint State Methods for Solving Inverse Problems of Partial Differential Equations*, 8th International Congress of Chinese Mathematicians, June 9-14 2019, Tsinghua University, Beijing, China. 45mins invited lecture.
- *Eulerian Approaches based on the Level Set Method for Visualizing Continuous Dynamical Systems*, Claremont Center for the Mathematical Sciences, Feb 28 2019, Claremont McKenna College, Claremont, California, US.
- *Fast Huygens Sweeping Methods for Highly Oscillatory Phenomena*, SIAM Conference on Computational Science and Engineering (CSE19), Feb 25- Mar 1 2019, Spokane, Washington, US.
- *Operator-Splitting Based Methods for Hamilton-Jacobi Type Equations,* Efficient Operator Splitting Techniques for Complex System and Large Scale Data Analysis, Jan 15 2019, Tsinghua Santa International Mathematics Forum, Sanya, China.

2018

- *A Level Set Based Variational Principal Flow Method for Nonparametric Dimension Reduction on Riemannian Manifolds*, Challenges for Predictive Modeling of Complex Systems, Nov 26 2018, University of Hong Kong.
- *Numerical Methods for Partial Differential Equations on Manifolds and Point Clouds*, The 16th Annual Meeting of CSIAM, Chengdu, Sep 13-17, 2018.
- *Some Numerical Methods for Inverse Problems from Traveltime Tomography and Gravimetry*, Workshop on Mathematical and Computational Challenges of Medical Imaging and Inverse Problems, Shanghai University of Finance and Economics in Shanghai, China, August 13-17, 2018.
- *Numerical Methods for First Arrivals Traveltime Tomography*, The Joint International Meeting of the American Mathematical Society and the Chinese Mathematical Society, June 11-14 2018, Fudan University, Shanghai, China.
- *Numerical Methods for Partial Differential Equations on Manifolds and Point Clouds*, The Fifth International Workshop on Modeling, Analysis, Simulations, and Applications of Inter-Facial Dynamics and FSI Problems, June 4-8, 2018, Sanya, China.
- *Adjoint State Methods for Inverse Problems from Seismology*, 10th annual meeting on inverse problems, May 28-31, 2018, Jilin University, Changchun, China.
- *Adjoint State Methods for Inverse Problems from Traveltime Tomography*, International workshop on inverse problems and image processing, 21-23 April 2018, Beijing Computational Science Research Center, Beijing, China.
- *A Level Set Based Variational Principal Flow Method for Nonparametric Dimension Reduction on Riemannian Manifolds*, Inverse Problems, Imaging and Partial Differential Equations, 12-16 Mar 2018, IAS, HKUST.
- *A Level Set Based Variational Principal Flow Method for Nonparametric Dimension Reduction on Riemannian Manifolds.* Meeting the Statistical Challenges in High Dimensional Data and Complex Networks, 5-16 February 2018, Singapore.

2017

- *Numerical Methods for Partial Differential Equations on Manifolds and Point Clouds*. International Congress of Chinese Mathematicians 2017 (ICCM2017), 27-29 December 2017, Guangzhou, China. 45mins invited lecture.
- *Numerical Methods for Partial Differential Equations on Manifolds and Point Clouds*. The Sixth CAM-ICCM Workshop: Geometry and Imaging, in honor of Prof. David Mumford's 80th Birthday, 15-17 December 2017, Tsinghua University, Beijing.
- *A Level Set Based Variational Principal Flow Method for Nonparametric Dimension Reduction on Riemannian Manifolds*, Optimization in Scientific Computing, 21-23 June 2017, CUHK.
- *Some Applications of Operator Splitting in Scientific Computing*, The Sixth International Conference on Scientific Computing and Partial Different Equations, 5-8 June 2017, (SCPDE17) – On the Occasion of Roland Glowinski 80th Birthday, HKBU, Hong Kong.
- *A Fast Local Level Set Method for Inverse Gravimetry*, Applied Inverse Problem, 29 May- 2 June 2017, Hangzhou, China.
- *Asymptotic Methods for Highly Oscillatory Phenomena,* Applied Inverse Problem, 29 May- 2 June 2017, Hangzhou, China.

2016

- *Eulerian Approaches based on the Level Set Method for Visualizing Continuous Dynamical Systems*, International Congress of Chinese Mathematicians 2016 (ICCM2016), 6-11 August 2016, Beijing, China. 45mins invited lecture.
- *Eulerian Approaches based on the Level Set Method for Visualizing Continuous Dynamical Systems*, International Conference on Applied Mathematics 2016, 30 May - 2 June 2016, City University of Hong Kong, Hong Kong.

- *Eulerian Methods for Schrodinger Equations in the Semi-Classical Regime*, Computational Seismology, 4-8 January 2016, Tsinghua Sanya International Mathematics Forum, Sanya, China.

2015

- *Eulerian Methods for Schrodinger Equations in the Semi-Classical Regime,* First Asia-Pacific Workshop on Image Processing and Applications, 14-16 December 2015, Sydney, Australia.
- *Eulerian Methods for Schrodinger Equations in the Semi-Classical Regime*, 15 Oct 2015, BME, Hungary.
- *A Fast Local Level Set Method for Inverse Gravimetry*, 14 Oct 2015, BME, Hungary.
- *Numerical Approaches for Eikonal-based Traveltime Tomography Problem*, Inverse Problems, Imaging and PDE, 28 Sep - 2 Oct 2015, HKUST, Hong Kong.
- *Fast Huygens sweeping methods for Schrodinger equations in the semi-classical regime,* 13 August 2015, ICIAM 2015, Beijing, China.
- *Numerical approaches for eikonal-based traveltime tomography problem*, 23 May 2015, HKMS Annual Meeting 2015, CUHK, Hong Kong.

2014

- *A level set-adjoint state method for the joint transmission-reflection first arrival traveltime tomography*, 8-12 December 2014, The 5th International Conference on Scientific Computing and Partial Differential Equations (SCPDE14) – On the Occasion of Eitan Tadmor's 60th Birthday, HKBU, Hong Kong.
- *Crosswell transmission-reflection traveltime tomography using first arrivals*, 20-23 November 2014, KSIAM Annual Meeting 2014, Jeju, Korea.
- *A cell based particle method for modeling dynamic interfaces*, 20-25 July 2014, WCCM, Barcelona, Spain.
- *A level-set adjoint-state method for the joint transmission-reflection traveltime tomography*, SIAM AN14, July 9 2014, Chicago, US.
- *Fast Eulerian techniques for Schrodinger equations in the semi-classical regime*, ICOSAHOM'14, June 23-27 2014, Salt Lake City, Utah.
- *Joint Transmission and Reflection Traveltime Tomography for Reflector in Inhomogeneous Media Using First Arrivals*, SIAM IS14, May 12-14 2014, Hong Kong.
- *Eulerian Methods for Schrodinger Equations in the Semi-Classical Regime*, SIAM IS14, May 12-14 2014, Hong Kong.

2013

- *Some recent process in the grid based particle method (GBPM) for interface representation*, Workshop on Fluid Structure Interaction Problems, 27 July to 30 July 2013, Shanghai Jiao Tong University, China.
- *A splitting algorithm for image segmentation on manifolds represented by the grid based particle method*. The 1st Chongqing Workshop on Computational and Applied Mathematics, 30 May to 2 June 2013, Chongqing University, Sichuan Province, China.

Before 2013

- *A Grid Based Particle Method for Solving Variational Problems on Manifolds*, CAM-ICCM Imaging Science: a workshop in honor of Stanley Osher, Mathematical Science Center of Tsinghua University, 15 December 2012, Beijing, China
- *FBI-Transform-Based Eulerian Gaussian Beams for the Schrodinger Equation*, SIAM Annual Meeting, 13 July 2012, Minneapolis, Minnesota, USA.
- *FBI-transform-based Eulerian Gaussian Beams for the Schrodinger Equation*, International Conference on Applied Mathematics 2012, 28 May to 1 June 2012, City University of Hong Kong
- *A grid based particle method for solving partial differential equations on evolving surfaces and modeling high order geometrical motion*, Frontiers in Applied and Computational Mathematics, 18-20 May 2012, New Jersey Institute of Technology, New Jersey, USA
- *A Fast Local Level Set Method for Inverse Gravimetry*, 24 Jan 2012, University of California at Irvine, USA
- *A Fast Local Level Set Method for Inverse Gravimetry*, International Conference on Scientific Computing, 6 Jan 2012, CUHK, Hong Kong
- *An Eulerian Approach for Computing the Finite Time Lyapunov Exponent*, 22 May 2011, SIAM Conference on Dynamical Systems 2011, Snowbird, UT, USA
- *An Eulerian Approach for Computing the Finite Time Lyapunov Exponent*, 14 May 2011, Hong Kong Mathematics Society Annual Meeting 2011, HKUST
- *A Grid Based Particle Method for Dynamic Interfaces with Application to Image Segmentation*, 30 April 2011, Workshop on Imaging Sciences, HKBU

- *The backward phase flow and FBI-transform-based Eulerian Gaussian beams*, MCIAM workshop on Computational Wave Propagation, 16 April 2011, Michigan State University, East Lansing, MI, USA
- *An Eulerian Approach for Computing the Finite Time Lyapunov Exponent*, 21 Jan 2011, University of California at Irvine, USA
- Invited Speaker of the summer program titled "Computational Wave Propagation", June 6-26 2010, Michigan State University, East Lansing, MI, USA
- *A Grid Based Particle Method for Moving Interface Problems*, 25 May 2010, SIAM Conference on Mathematical Aspects of Materials Science (MS10), Pennsylvania, USA
- *Transmission Traveltime tomography Based on Paraxial Liouville Equations and Level Set Formulations*, 23 April 2010, International Workshop on Inverse Problems, Chinese University of Hong Kong
- *Eulerian Approaches for High Frequency Asymptotic Solutions to Wave Phenomena,* 24 February 2010, Eighty-First School Colloquium, HKUST
- *A Grid Based Particle Method for Moving Interface Problems*, 19 January 2010, Michigan State University, USA

Other talks

- **知識增益：數學的應用－數學及娛樂, 18 May 2017, 教育局課程發展處.** (https://tcs.edb.gov.hk/tcs/admin/courses/previewCourse/forPortal.htm?courseId=CDI020170290&lang=zh)
- *Mathematics in the Entertainment Industries,* 5 July 2016, Carmel Secondary School, Hong Kong.
- *Mathematics in the Entertainment Industries,* 24 May 2016, Yan Chai Hospital Law Chan Chor Si College, Hong Kong.
- *Mathematics in the Entertainment Industries,* 23 May 2016, Aberdeen Baptist Lui Ming Choi Secondary School, Hong Kong.
- *What's Math Got To Do With It?,* 18 March 2015, Baptist Lui Ming Choi Secondary School, Hong Kong.
- *What's Math Got To Do With It?,* 12 March 2015, TWGHS Li Ka Shing College, Hong Kong.
- *What's Math Got To Do With It?,* 23 October 2014, HKSKH Bishop Hall Secondary School, Hong Kong.
- *What's Math Got To Do With It?,* 23 May 2014 Good Hope, Hong Kong.
- *What's Math Got To Do With It?,* 3 April 2014, Elegantia College, Hong Kong.
- *Motivating our students*, 18 October 2013, OBE Team, HKUST.
- *What's Math Got To Do With It?,* 3 June 2013, South Tuen Mun Government Secondary School, Hong Kong
- *My ε-Teaching Experience on Mathematics*, 27 March 2013, South Tuen Mun Government Secondary School, Hong Kong.
- Recruitment talk, 3 Feb 2012, Chinese International School, Hong Kong.
- *Research with Undergraduates: Why and How?* 9 November 2011, Center for Enhanced Learning and Teaching (CELT), HKUST
- *Numerical Methods for Dynamical Interface Problems*, 23 September 2011, Student-Faculty seminar, Department of Mathematics, HKUST.

PROFESSIONAL SERVICE

Reviewer

- J. Sci. Comput.
- Nonlinear Dynamics
- Journal of Computational Mathematics
- Journal of Modern Optics
- SIAM Journal on Scientific Computing
- Chaos
- IEEE Transections on Cybernetics
- The Proceedings of the National Academy of Sciences of the United States of America (PNAS)
- Wave Motion
- Commun. Comput. Phys.
- Journal of Computational Physics
- Applied Numerical Mathematics
- Journal of Computational and Applied Mathematics
- CMS

Mini-symposium Organizer

- Recent developments for high-frequency waves and tomography, ICIAM2023, Tokyo, Japan.
- Recent algorithmic advances for tomography and gravity inversion – Part I and II, Applied Inverse Problems 2019, Grenoble, France.
- Recent algorithmic developments for seismic imaging and tomography – Part I and II, Applied Inverse Problems 2017, Hangzhou, China.
- Waves and tomography in geosciences and medical imaging – ICIAM 2015, Beijing, China.
- High frequency wave propagation and related imaging problems – Part I, II and III, SIAM Conference on Imaging Science 2014.
- Algorithms for high frequency waves and related inverse problems - Part I, II and III, SIAM Annual Meeting 2012.
- Recent techniques and developments on inverse problems – Part I and II, ICIAM 2011.

Conference Organizer

- Organizing Committee, Applied Inverse Problems, 2021, IAS HKUST, Hong Kong.
- Organizing Committee, Inverse Problems, Imaging and Partial Differential Equation, 12-16 March 2018, IAS HKUST, Hong Kong.
- Organizing Committee, Inverse Problems, Imaging and Partial Differential Equation, 5-9 December 2016, IAS HKUST, Hong Kong.
- Organizing Committee, First Asia-Pacific Workshop on Image Processing and Applications, 14-16 December 2015, Sydney, Australia.
- Organizing Committee, 10th Intl. Conf. on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR), Jan 13-16 2015.
- Organizing Committee, Multiscale Modeling and Simulation of Defect Problems in Materials Science, Dec 15-19 2014.
- Local Organizing Committee, SIAM Conference on Imaging Science 2014 (SIAM-IS14), May 12-14 2014.
- Organizing Committee, the International Workshop on Imaging Science 2012 (in honor of Prof. Stanley Osher at his 70th birthday for his contributions to imaging sciences), December 3-6 2012.
- Organizing Committee, the International Conference on Scientific Computing (in honor of Prof. Tony F. Chan at his 60th birthday for his contributions to scientific computing), January 4-7 2012.

Program Organizer

- Summer Research Program in Industrial and Applied Mathematics (SPIA) 2019.
- Summer Research Program in Industrial and Applied Mathematics (SPIA) 2018.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2018.
- Summer Research Program in Industrial and Applied Mathematics (SPIA) 2017.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2017.
- Industrial Projects in Mathematics (IPM) 2017.
- Summer Research Program in Industrial and Applied Mathematics (SPIA) 2016.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2016.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2015.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2014.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2013.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2012.
- Research in Industrial Projects for Students – Hong Kong (RIPS-HK) 2011.

DEPARTMENTAL SERVICE

- Member, Merit Salary Review Committee, Department of Mathematics, HKUST (Sep 2022- Now)
- Chair, Executive Committee, Hang Lung Mathematics Awards (2021-Now).
- Member, Steering Committee, Hang Lung Mathematics Awards (2021-Now).
- Member, Search Committee of the Head of Mathematics, 2021.
- Member, Substantiation and Promotion Committee, Department of Mathematics, HKUST (Sep 2020- Now)
- AM track coordinator, UG Committee, Department of Mathematics, HKUST (Sep 2018- Now)
- Member, Search Committee, Department of Mathematics, HKUST (Aug 2018-Aug 2020)
- Member, Coordinator for the Applied Math Group for RAE2020.
- Member, Search Committee of the Head of Mathematics, 2016.
- Member, Search and Appointment Committee, Department of Mathematics. (Aug 2015-Aug 2016)

- Member, UG Studies 4Y program (operational) subcommittee – Applied Mathematics, Department of Mathematics. (Sep 2013-Aug 2015)
- Member, Teaching Faculty Subcommittee, Department of Mathematics. (July 2013-Aug 2015)
- Member, Student Liaison Subcommittee, Department of Mathematics. (July 2012-Now)
- Member, Executive Committee, Department of Mathematics. (July 2012-June 2014)
- Member, Colloquium Committee, Department of Mathematics. (2011-June 2013)
- Member, Mathematics Minor Program Management committee, Department of Mathematics. (2011-June 2012)
- Member, Student Recruitment Subcommittee, Department of Mathematics. (2011-)
- Career Liaison Officer, Department of Mathematics. (Feb 2011-)
- Member, UG Studies (operational) subcommittee, Department of Mathematics. (2010-June 2012)

UNIVERSITY SERVICE

- Chair, Search Committee of the Head of Chemistry, 2022.
- School representative, Undergraduate Admission Subcommittee, HKUST (June 2016-May 2023).
- Associate Dean (Undergraduate Studies), School of Science, HKUST (June 2016-May 2023).
- Member, Working Group for Mid-term Review of the Four-year Degree (WGR4Y), HKUST.
- Member, Local UG Admission Committee, School of Science, HKUST (Jan 2015-Aug 2016).
- School representative, Senate Scholarship Committee, HKUST (Jan 2015-Now).
- School representative, Senate Committee on Student Affairs, HKUST (Jan 2014-Dec 2017).
- Scientific Advisor, /Science Focus/ Magazine, HKUST (Sep 2013-Now).
- Member, Undergraduate pre-major advisor, School of Science, HKUST (May 2012-Now).
- Chair, Selection Committee, 2013 President's Cup, HKUST, 2013.
- Member, JEE Interview in Shanghai and Guangzhou, School of Science, HKUST, 2012.
- Member, Selection Committee, 2012 President's Cup, HKUST, 2012.
- Course review panel, University Common Core – Quantitative Reasoning, HKUST UG Core Education.
- HKSAR Administrative Service Summer Internship Programme 2010 – HKUST Internal Selection Interview Panel
- Inspiring Science Talk, School of Science, HKUST.
    - 13 May 2015
- Promotion Talk, School of Science, HKUST.
    - 18 March 2015, Baptist Lui Ming Choi Secondary School
    - 12 March 2015, TWGHs Li Ka Shing College
    - 23 October 2014, HKSKH Bishop Hall Secondary School
- Discovering Science Talk, School of Science, HKUST.
    - 29 November 2014
    - 15-16 May 2014

SOCIETY SERVICE

- Member, Curriculum Development Council (CDC) Committee on Mathematics Education, Education Bureau, Hong Kong (2019-2021).
- External Academic Advisor for the Associate of Science (Sep 2017- Aug 2020), Community College of City University, Hong Kong.
- Member, Validation panel for associate of Science programme 2017, Community College of City University, Hong Kong.
- Final Judge, Fun Science Competition 2015, co-organized by the society of Hong Kong Scholars, Hong Kong Association of the Heads of Secondary Schools, Hong Kong Association for Science & Mathematics Education, Hong Kong Federation of Education Workers, and Hong Kong Science Museum.
- Final Judge, Fun Science Competition 2014, co-organized by the society of Hong Kong Scholars, Hong Kong Association of the Heads of Secondary Schools, Hong Kong Association for Science & Mathematics Education, Hong Kong Federation of Education Workers, and Hong Kong Science Museum.
- Final Judge, Mathematics Resources Contest 2013, co-organized by the Mathematical Database (http://eng.mathdb.org/) and the Hong Kong Academy of Gifted Education (http://ge.hkage.org.hk/).
- Final Judge, Fun Science Competition 2013, co-organized by the society of Hong Kong Scholars, Hong Kong Association of the Heads of Secondary Schools, Hong Kong Association for Science & Mathematics Education, Hong Kong Federation of Education Workers, and Hong Kong Science Museum.

- Member, School Management Committee, South Tuen Mun Government Secondary School, Hong Kong. (Oct 2012-Sep 2014)
- Final Judge, Mathematics Resources Contest 2012, co-organized by the Mathematical Database (http://eng.mathdb.org/) and the Hong Kong Academy of Gifted Education (http://ge.hkage.org.hk/).
- Final Judge, Online Mathematics Resources Contest 2011, organized by the Mathematical Database (http://eng.mathdb.org/).

OTHER STATISTICS (as of 31 May 2023)

- http://scholar.google.com/citations?user=rXnFQQQAAAAJ
  - Citation: 1586
  - Documents: 77
  - H-index: 22
  - I-10 index: 38
- http://www.scopus.com/authid/detail.url?authorId=7202044873
  - Citations: 1007
  - Documents: 64
  - H-index: 18
- **60** documents are found in Web of Science. They are cited **885** times by documents in Web of Science. The h-index is **18**.