

Te-Sheng Lin (林得勝)

Department of Applied Mathematics

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Appointments

Associate Professor , Department of Applied Mathematics, National Yang Ming Chiao Tung University, Taiwan.	Feb. 2021 - present
Associate Professor , Department of Applied Mathematics, National Chiao Tung University, Taiwan.	Aug. 2020 - Jan. 2021
Assistant Professor , Department of Applied Mathematics, National Chiao Tung University, Taiwan.	Aug. 2014 - Jul. 2020
Research Associate , Department of Mathematical Sciences, Loughborough University, UK.	Dec. 2012 - Jul. 2014
Marie Curie Experienced Researcher , Department of Mathematical Sciences, Loughborough University, UK.	Jun. 2012 - Dec. 2012

Education

New Jersey Institute of Technology, USA Ph.D. in Applied Mathematics <u>Dissertation</u> : “Instabilities in Newtonian films and nematic liquid crystal droplets.” <u>Advisors</u> : Dr. Lou Kondic and Dr. Linda J. Cummings	Sep. 2007 - May. 2012
National Chung-Cheng University, Taiwan M.S. in Applied Mathematics <u>Thesis</u> : “Numerical methods for the nonlinear Schrödinger equation.” <u>Advisor</u> : Dr. Ming-Chih Lai	Sep. 2002 - Jun. 2004
B.S. in Mathematics	Sep. 1998 - Jun. 2002

Research Interests

Modeling and scientific computation of thin films of simple or complex fluid.
Machine learning approaches for solving partial differential equations.

Prizes and Awards:

3. 國立陽明交通大學 109 學年度優良教學獎	2021
2. 國立交通大學 108 學年度優良教學獎	2020
1. 國立交通大學理學院年輕學者研究獎	2019

Grants

10. MOST 111-2628-M-A49-008-MY4, (PI) Aug. 2022 - Jul. 2026
Data-driven mathematical modeling
9. MOST 109-2115-M-075-001, (Co-PI) Aug. 2020 - Jul. 2021
Integrating Time-Frequency Information with Pulse Waveform Manifold Learning via Optimal Transportation for Cardiovascular Signal Analysis
8. MOST 109-2115-M-009-006-MY2, (PI) Aug. 2020 - Jul. 2022
Liquid films on curved substrates
7. MOST 108-2115-M-075-001, (Co-PI) Aug. 2019 - Jul. 2020
Building knowledge base for manifold learning in medical diagnosis in clinical anesthesiology
6. MOST 107-2115-M-075-001, (Co-PI) Aug. 2018 - Jul. 2019
Manifold learning for human circulation system modeling in clinical anesthesiology and critical care
5. MOST 107-2115-M-009-008-MY2, (PI) Aug. 2018 - Jul. 2020
Bifurcation analysis of electrified falling liquid films
4. MOST 106-2115-M-075-001, (Co-PI) Aug. 2017 - Jul. 2018
Momentary pulse waveform analysis and human cardiovascular system modeling for clinical anesthesiology
3. MOST 105-2115-M-009-008-MY2, (PI) Aug. 2016 - Jul. 2018
Modeling thin nematic films: Weak anchoring model
2. MOST 105-2115-M-341-001-MY2, (Co-PI) Feb. 2016 - Jul. 2017
Human cardiovascular system modeling for beat-to-beat pulse waveform analysis in clinical anesthesia
1. MOST 103-2115-M-009-015-MY2, (PI) Oct. 2014 - Jul. 2016
Interaction theory for solitary pulses arising in falling film flows

Refereed Publications

27. Y.-H. Tseng, T.-S. Lin, W.-F. Hu and M.-C. Lai, A cusp-capturing PINN for elliptic interface problems, submitted (2022).
26. W.-F. Hu, T.-S. Lin, Y.-H. Tseng and M.-C. Lai, A hybrid neural-network and finite-difference method for solving Poisson equation with jump discontinuities on interfaces, submitted (2022).
25. W.-F. Hu, Y.-J. Shih, T.-S. Lin and M.-C. Lai, A shallow physics-informed neural network for solving partial differential equations on surfaces, submitted (2022).
24. M. G. Blyth, T.-S. Lin and D. Tseluiko, On the transition to dripping of an inverted liquid film, submitted (2022).
23. A. Farutin, S. M. Rizvi, W.-F. Hu, T.-S. Lin, S. Rafai and C. Misbah, A reduced model for a phoretic swimmer, *J. Fluid Mech.* (2022).
22. W.-F. Hu, T.-S. Lin, and M.-C. Lai, A discontinuity capturing shallow neural network for elliptic interface problems, *J. Comput. Phys.*, **469**, 111576 (2022).
21. M.-C. Lai, C.-C. Chang, W.-S. Lin, W.-F. Hu and T.-S. Lin, A shallow Ritz method for elliptic problems with singular sources, *J. Comput. Phys.*, **469**, 111547 (2022).
20. W.-F. Hu, T.-S. Lin, S. Rafai and C. Misbah, Spontaneous locomotion of phoretic particles in three dimensions, *Phys. Rev. Fluids*, **7**, 034003 (2022).

19. T.-S. Lin, J.A. Dijksman and L. Kondic, Thin liquid films in a funnel, *J. Fluid Mech.*, **924**, A26 (2021).
18. D. Tseluiko, M. Alesemi, T.-S. Lin, and U. Thiele, Effect of driving on coarsening dynamics in phase-separating systems, *Non.*, **33**, 4449-4483 (2020).
17. T.-S. Lin, W.-F. Hu, and C. Misbah, A direct Poisson solver in spherical geometry with an application to diffusiophoretic problems, *J. Comput. Phys.*, **409**, 109362 (2020).
16. T.-S. Lin, C.-Y. He and W.-F. Hu, Fast spectral solver for Poisson equation on an annular domain, *Ann. Math. Sci. App.*, **5(1)**, 65-74 (2020).
15. W.-F. Hu, T.-S. Lin, S. Rafai and C. Misbah, Chaotic swimming of phoretic particles, *Phys. Rev. Lett.*, **123**, 238004 (2019).
14. M. G. Blyth, D. Tseluiko, T.-S. Lin and S. Kalliadasis, Two-dimensional pulse dynamics and the formation of bound states on electrified falling films, *J. Fluid Mech.*, **855**, 210-235 (2018).
13. T.-S. Lin, D. Tseluiko, M. G. Blyth and S. Kalliadasis, Continuation methods for time-periodic travelling-wave solutions to evolution equations, *Appl. Math. Lett.*, **86**, 291-297 (2018).
12. T.-S. Lin, S. Rogers, D. Tseluiko and U. Thiele, Bifurcation analysis of the behavior of partially wetting liquids on a rotating cylinder, *Phys. Fluids*, **28**, 082102 (2016).
11. C. Honisch, T.-S. Lin, A. Heuer, U. Thiele and S. Gurevich, Instabilities of layers of deposited molecules on chemically stripe patterned substrates: Ridges vs. drops, *Langmuir*, **31**, 10618-10631 (2015).
10. M. A. Lam, L. J. Cummings, T.-S. Lin and L. Kondic, Three-dimensional coating flow of nematic liquid crystal on an inclined substrate, *Euro. J. Appl. Math.*, **26**, 647-669 (2015).
9. T.-S. Lin, M. Pradas, S. Kalliadasis, D. T. Papageorgiou and D. Tseluiko, Coherent structures in non-local dispersive active-dissipative systems, *SIAM J. Appl. Math.*, **75**, 538-563 (2015).
8. M. A. Lam, L. J. Cummings, T.-S. Lin and L. Kondic, Modeling flow of nematic liquid crystal down an incline, *J. Eng. Math.*, **94**, 97-113 (2015).
7. T.-S. Lin, L. J. Cummings, A. J. Archer, L. Kondic and U. Thiele, Note on the hydrodynamic description of thin nematic films: strong anchoring model, *Phys. Fluids*, **25**, 082102 (2013).
6. T.-S. Lin, L. Kondic, U. Thiele and L. J. Cummings, Modelling spreading dynamics of nematic liquid crystals in three spatial dimensions, *J. Fluid Mech.*, **729**, 214-230 (2013).
5. T.-S. Lin, L. Kondic and A. Filippov, Thin films flowing down inverted substrates: three dimensional flow, *Phys. Fluids*, **24**, 022105 (2012).
4. T.-S. Lin, L. Kondic and L. J. Cummings, Defect modelling in spreading nematic droplets, *Phys. Rev. E*, **85**, 012702 (2012).
3. L. J. Cummings, T.-S. Lin and L. Kondic, Modelling and simulations of the spreading and destabilization of nematic droplets, *Phys. Fluids*, **23**, 043102 (2011).
2. T.-S. Lin and L. Kondic, Thin films flowing down inverted substrates: two dimensional flow, *Phys. Fluids*, **22**, 052105 (2010).
1. M.-C. Lai, C.-Y. Huang and T.-S. Lin, A simple Dufort-Frankel type scheme for the Gross-Pitaevskii equation of Bose-Einstein condensates on different geometries, *Numer. Methods for Partial Diff. Eqs.*, **20**, 624-638 (2004).

Conference papers

1. T.-S. Lin, D. Tseluiko and S. Kalliadasis, Numerical study of a non-local weakly nonlinear model for a liquid film sheared by a turbulent gas, *Procedia IUTAM*, **11**, 98 (2014).

Presentations

- Bifurcation analysis using scientific computing, May 2022
2022 NCTS Workshop on Dynamical Systems
NCTS, Taipei, Taiwan.
- Machine Learning to solve elliptic interface problems, Mar. 2022
2022 NCTS Math-Phys Joint workshop on machine learning
NCTS, Taipei, Taiwan.
- Machine Learning to solve elliptic interface problem, Jan. 2022
2021 TMS annual meeting
Institute of Mathematics, Academia Sinica, Taipei, Taiwan.
- Machine learning approach for elliptic interface problem, Nov. 2021
Workshop: Perspectives in exploring complicated data
National Sun Yat-sen University, Kaohsiung, Taiwan.
- An introduction to ultraspherical spectral method, Feb. 2020
2020 Workshop on Applied Mathematics and Scientific Computing
National University of Kaohsiung, Kaohsiung, Taiwan.
- Autophoretic motion of an isotropic particle, Dec. 2019
2019 28th Annual Workshop on Differential Equations
Institute of Mathematics, Academia Sinica, Taiwan.
- Two dimensional pulse dynamics and on electrified falling films, Apr. 2019
Modelling of Thin Liquid Films-Asymptotic Approach vs. Gradient Dynamics
BIRS, Canada.
- Autophoretic motion of an isotropic particle, Mar. 2019
2019 Spring Progress in Mathematical and Computational Studies on Science and Engineering Problems
Taiwan-India Joint Conference - Recent Progress on Flow Simulation and Stability Analysis
CASTS, National Taiwan University, Taiwan.
- Continuation methods and numerical bifurcation analysis, Dec. 2018
2018 TMS annual meeting,
National Taiwan Normal University, Taiwan.
- Two dimensional pulse dynamics and on electrified falling films, Nov. 2018
Taiwan-Japan Joint Workshop on Scientific Computing and Related Topics, Taipei, Taiwan.
- Continuation method for time-periodic traveling-wave solutions to evolution equations, May 2018
6th TWSIAM Annual Meeting, National Taiwan University of Science and Technology, Taipei, Taiwan.
- Numerical continuation of solutions of evolution equations, Dec. 2017
2017 TMS annual meeting
National Chiayi University, Taiwan.
- Bifurcation analysis of the behavior of partially wetting liquids on a rotating cylinder, Mar. 2017
2017 Spring Special Program in Applied Mathematics and Applied Mechanics.
Taida Institute for Mathematical Sciences(TIMs), Taiwan.

- Bifurcation analysis of the behavior of partially wetting liquids on a rotating cylinder, Mar. 2017
2017 Conference on Advanced Topics and Auto Tuning in High-Performance Scientific Computing, Taiwan.
- Bifurcation analysis of the behavior of partially wetting liquids on a rotating cylinder, Dec. 2016
2016 NCTS Workshop on Complex and Biological Fluid Dynamics with Applications, Taiwan.
- Bifurcation analysis of the behavior of thin liquid films, Jan. 2016
2016 One-day workshop on numerical PDEs, National Chung Hsing University, Taiwan.
- The behavior of partially wetting liquids on a rotating cylinder, Dec. 2015
2015 TMS annual meeting
National University of Kaohsiung, Taiwan.
- Coherent-structure theory and bound-state formation in electrified falling films, Nov. 2015
APS Division of Fluid Mechanics Annual Meeting, Boston, USA.
Bull. Amer. Phys. Soc., **60**, 440, Boston, MA, November 2015.
- Interfacial phenomena in thin liquid films: mathematical modeling and scientific computation, July 2015
Center for Nonlinear Science, University of Münster, Münster, Germany.
- Interfacial phenomena in thin liquid films: A computational investigation, May 2015
2015 NCTS 計算數學薪傳及新苗研討會
NCTU, Hsinchu, Taiwan.
- Pulse interaction and bound state formation in falling liquid films, Dec. 2014
AMMS 2014, National Cheng Kung University, Taiwan.
- Pulse interaction and bound state formation in non-local dispersive active-dissipative systems, Apr. 2014
British Applied Mathematics Colloquium, Cardiff, UK.
- Coherent structures in non-local active-dissipative equations, Nov. 2013
APS Division of Fluid Mechanics Annual Meeting, Pittsburgh, USA.
Bull. Amer. Phys. Soc., **58**, 45, Pittsburgh, PA, November 2013.
- Hydrodynamic description of thin nematic films, May 2013
The Mathematics of Liquid Crystals - Young Researchers Meeting,
Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
- Instabilities in thin hanging films, Oct. 2012
International focus workshop in Multiscale Complex Fluid Flows and Interfacial Phenomena,
Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany.
- Contact line induced instabilities for thin fluid films, Nov. 2011
APS Division of Fluid Mechanics Annual Meeting, Baltimore, USA.
Bull. Amer. Phys. Soc., **56**, 56, Baltimore, MD, November 2011.
- Contact line induced instability in hanging fluid film, Jul. 2011
ICIAM 2011, Vancouver, BC, Canada.
- Modeling spreading of nematic liquid crystal droplets, Apr. 2011
AMS 2011 Spring Eastern Sectional Meeting, Worcester, USA.
Proceedings of the 1070th AMS Meeting, 103, Worcester, MA, April 2011.
- Instabilities in Newtonian films and nematic liquid crystal droplets, Feb. 2011
Liquid Crystal Institute, Kent State University, USA.
- Thin films: instabilities, waves, and dewetting, Nov. 2010
APS Division of Fluid Mechanics Annual Meeting, Long Beach, USA.
Bull. Amer. Phys. Soc., **55**, 139, Long Beach, CA, November 2010.

On contact line induced instability in flow of hanging fluid films,
APS Division of Fluid Mechanics Annual Meeting, Minneapolis, USA.
Bull. Amer. Phys. Soc., **53**, 48, Minneapolis, MN, November 2009.

Nov. 2009

Services

International and Domestic Committees:

Taiwan Society for Industrial and Applied Mathematics (TWSIAM)

Executive member of the council

Aug. 2022 - present

National Center for Theoretical Sciences (NCTS) - Mathematics Division

Program Committee - Interdisciplinary Studies

Jan. 2021 - present

Taiwan Society for Industrial and Applied Mathematics (TWSIAM)

Deputy secretary general

June 2018 - May. 2020

Referee: Applied Mathematics and Computation; AIP Advances; European Journal of Applied Mathematics; European Journal of Mechanics B/Fluids; IMA Journal of Applied Mathematics; Journal of Colloid and Interface Science; Journal of Computational Physics; Journal of Engineering Mathematics; Journal of Fluid Mechanics; Physics of Fluids; Proceedings A; Taiwanese Journal of Mathematics; Zeitschrift für Angewandte Mathematik und Mechanik.