# Curriculum Vitae — *Wei-Fan Hu*

*Department of Mathematics*
*National Central University*
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## Appointments

**Professor** — 2023/08 - present
Department of Mathematics, National Central University, Taiwan

**Associate Professor** — 2020/08 - 2023/07
Department of Mathematics, National Central University, Taiwan

**Associate Professor** — 2019/08 - 2020/07
Department of Applied Mathematics, National Chung Hsing University, Taiwan

**Assistant Professor** — 2016/02 - 2019/07
Department of Applied Mathematics, National Chung Hsing University, Taiwan

**Postdoctoral Research Fellowship** — 2014/08 - 2016/01
Department of Applied Mathematics, National Chiao Tung University, Taiwan

## Education

Ph.D. Applied Mathematics, National Chiao Tung University, Taiwan — 2014/06
    Dissertation: Immersed Boundary Methods for Simulating Vesicle Dynamics
    Advisor: Dr. Ming-Chih Lai

M.S. Applied Mathematics, National Chiao Tung University, Taiwan — 2008/07

B.S. Applied Mathematics, National Chung Hsing University, Taiwan — 2006/06

## Research Interests

Numerical methods for PDEs

Computational fluid dynamics

Scientific and mathematical machine learning

## Awards and Honors

**Luo Jialun Outstanding Young Researcher Award** — 2023
National Central University, Taiwan

**Young Mathematicians Prize** — 2021
The Mathematical Society, Taiwan

**Ta-You Wu Memorial Award** — 2021
Ministry of Science and Technology, Taiwan

**NCTS Young Theoretical Scientists Award** — 2019
National Center for Theoretical Sciences Mathematics Division, Taiwan

**Outstanding Ph.D. Dissertation Gold Medal Award** — 2014
The Mathematical Society, Taiwan

## Scientific Committees

Taiwan Society for Industrial and Applied Mathematics (TWSIAM), Executive Member    2022 - present

National Center for Theoretical Sciences, Math Division, Center Scientist    2022-2024

## Grants

Learning to solve partial differential equations    2022/08 - 2025/07
MOST 111-2115-M-008-009-MY3 (PI)

Mathematical modeling and numerical methods for Quincke rotation    2020/08 - 2022/07
MOST 109-2115-M-005-004-MY2 (PI)

An immersed interface method on a moving irregular domain and its applications    2018/08 - 2020/07
MOST 107-2115-M-005-004-MY2 (PI)

Numerical methods for complex fluid dynamics problems with electric fields    2016/06 - 2018/05
MOST 105-2115-M-005-008-MY2 (PI)

Participation of NSC-FIT Orchid Program    2014/01 - 2015/12

## Publication List

[1] **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 static and evolving surfaces, *Computer Methods in Applied Mechanics and Engineering*, Vol 418, 116486 (2024).

[2] A. Farutin, M. S. Rizvi, **W.-F. Hu**, T.-S. Lin, S. Rafai, and C. Misbah, Motility and swimming: Universal description and generic trajectories, *The European Physical Journal E*, Vol 46, 135, (2023).

[3] Y.-H. Tseng, T.-S. Lin, **W.-F. Hu**, and M.-C. Lai, A cusp-capturing PINN for elliptic interface problems, *Journal of Computational Physics*, Vol 491, 112359 (2023).

[4] **W.-F. Hu**, T.-S. Lin, Y.-H. Tseng, and M.-C. Lai, An efficient neural-network and finite-difference hybrid method for elliptic interface problems with applications, *Communications in Computational Physics*, Vol 33, pp. 1090-1105 (2023).

[5] A. Farutin, M. S. Rizvi, **W.-F. Hu**, T.-S. Lin, S. Rafai, and C. Misbah, A reduced model for a phoretic swimmer, *Journal of Fluid Mechanics*, Vol 952, A6 (2022).

[6] **W.-F. Hu**, T.-S. Lin, and M.-C. Lai, A discontinuity capturing shallow neural network for elliptic interface problems, *Journal of Computational Physics*, Vol 469, 111576 (2022).

[7] 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, *Journal of Computational Physics*, Vol 469, 111547 (2022).

[8] **W.-F. Hu**, T.-S. Lin, S. Rafai, and C. Misbah, Spontaneous locomotion of phoretic particles in three dimensions, *Physical Review Fluids*, Vol 7, 034003 (2022).

[9] H. Nganguia, **W.-F. Hu**, M.-C. Lai and Y.-N. Young, Effects of surfactant solubility on the hydrodynamics of a viscous drop in a DC electric field, *Physical Review Fluids*, Vol 6, 064004 (2021).

[10] T.-S. Lin, **W.-F. Hu**, and C. Misbah, A direct Poisson solver in spherical geometry with an application to diffusiophoretic problems, *Journal of Computational Physics*, Vol 409, 109362 (2020).

[11] T.-S. Lin, C.-Y. He, and **W.-F. Hu**, Fast spectral solver for Poisson equation in an annular domain, *Annals of Mathematical Sciences and Applications*, Vol 5, pp. 65-74 (2020).

[12] J.-J. Xu, W. Shi, **W.-F. Hu**, and J.-J. Huang, A level-set immersed interface method for simulating the electrohydrodynamics, *Journal of Computational Physics*, Vol 400, 108956 (2020).

[13] **W.-F. Hu**, T.-S. Lin, S. Rafai, and C. Misbah, Chaotic swimming of phoretic particles, *Physical Review Letters*, Vol 123, 238004 (2019).

[14] A. Farutin, H. Wu, **W.-F. Hu**, S. Rafai, P. Peyla, M.-C. Lai and C. Misbah, Analytical study for swimmers in a channel, *Journal of Fluid Mechanics*, Vol 881, pp. 365-383 (2019).

[15] S.-H. Shu, **W.-F. Hu**, and M.-C. Lai, A coupled immersed interface and grid based particle method for three-dimensional electrohydrodynamic simulations, *Journal of Computational Physics*, Vol 398, 108903 (2019).

[16] **W.-F. Hu**, M.-C. Lai, and C. Misbah, A coupled immersed boundary and immersed interface method for interfacial flows with soluble surfactant, *Computers & Fluids*, Vol 168, pp. 201-215 (2018).

[17] H. Wu, A. Farutin, **W.-F. Hu**, M. Thiebaud, S. Rafai, P. Peyla, M.-C. Lai, and C. Misbah, Amoeboid swimming in a channel, *Soft Matter*, 12, pp. 7470-7484 (2016).

[18] Y. Seol, **W.-F. Hu**, Y. Kim and M.-C. Lai, An immersed boundary method for simulating vesicle dynamics in three dimensions, *Journal of Computational Physics*, Vol 322, pp. 125-141 (2016).

[19] H. Nganguia, Y.-N. Young, A. T. Layton, M.-C. Lai, and **W.-F. Hu**, Electrohydrodynamics of a viscous drop with inertia, *Physical Review E*, Vol 93, 053114 (2016).

[20] **W.-F. Hu**, M.-C. Lai, Y. Seol, and Y.-N. Young, Vesicle electrohydrodynamic simulations by coupling immersed boundary and immersed interface method, *Journal of Computational Physics*, Vol 317, pp. 66-81 (2016).

[21] H. Wu, M. Thiebaud, **W.-F. Hu**, A. Farutin, S. Rafai, M.-C. Lai, P. Peyla, C. Misbah, Amoeboid motion in confined geometry, *Physical Review E Rapid Communications*, Vol 92, 050701(R) (2015).

[22] H. Nganguia, Y.-N. Young, A. T. Layton, **W.-F. Hu**, M.-C. Lai, An immersed interface method for electrohydrodynamics simulations, *Communications in Computational Physics*, Vol 18, issue 02, pp. 429-449 (2015).

[23] **W.-F. Hu**, M.-C. Lai, and Y.-N. Young, A hybrid immersed boundary and immersed interface method for electrohydrodynamic simulations, *Journal of Computational Physics*, Vol 282, pp. 47-61 (2015).

[24] **W.-F. Hu**, Y. Kim, M.-C. Lai, An immersed boundary method for simulating the dynamics of three-dimensional axisymmetric vesicles in Navier-Stokes flows, *Journal of Computational Physics*, Vol 257, pp. 670-686 (2014).

[25] **W.-F. Hu** and M.-C. Lai, Unconditionally energy stable immersed boundary method with application to vesicle dynamics, *East Asian Journal on Applied Mathematics*, Vol 3, pp. 247-262 (2013).

[26] M.-C. Lai, **W.-F. Hu**, and W.-W. Lin, A fractional step immersed boundary method for Stokes flow with an inextensible interface enclosing a solid particle, *SIAM Journal on Scientific Computing*, Vol 34, No 5, pp. B692-B710 (2012).