Kawa **Manmi**

Research Fellow · MATHEMATICS INSTITUTE (UNIVERSITY OF WARWICK)

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Profile

Applied mathematician with expertise in physics-based battery modeling and fluid dynamics, combining 10+ years of research experience with extensive teaching of mathematics and computing across multiple institutions. My research demonstrates ability to tackle complex problems using computational techniques, while making mathematical concepts accessible through technology-enhanced teaching for diverse student backgrounds. I continuously expand my technical skills across disciplines, approaching challenges with analytical rigor and dedication to excellence.

Employment History

Mathematics Institute, University of Warwick
Coventry, UK

Research Fellow — *2023 - 2025*

- Conducted research on physics-based Li-ion battery modeling as part of the Multiscale Modelling team at Faraday Institution.
- Contributed to the PyBaMM (Python Battery Mathematical Modelling) open-source software package.
- Provided teaching support and marking for undergraduate courses, including MA3D1 Fluid Dynamics, MA133 Differential Equations, and MA265 Mathematical Modelling.

A-Team Academy
UK

Mathematics Tutor — *2024 - 2026*

- Provided one-to-one and small group tutoring for A-Level Mathematics students. (2-4 h/wk)

Pearson - A Level Further Mathematics (9FM0)
UK

Assessment Associate — *2022 - 2025*

- Assessed A Level Further Mathematics examinations during summer exam periods.

De Montfort University International College (DMUIC)
Leicester, UK

Computing Tutor — *2023*

- Taught and assessed Visual Web Development courses covering C#, HTML, and JavaScript.

Mathematics Department, College of Science, Salahaddin University-Erbil
Erbil, Iraq

Assistant Professor — *2019 - 2020*

- Taught courses in Multivariable Calculus, Introduction to Probability, Discrete Mathematics, and Numerical Methods.
- Served as a member of the scientific committee for undergraduate and postgraduate studies.
- Supervised postgraduate students' research projects.
- Concurrently served as a part-time Lecturer in the IT Department, Tishk International University.

School of Mathematics, University of Birmingham
Birmingham, UK

Research Fellow — *2018 - 2019*

- Developed numerical models for cavitation and single bubble dynamics using Finite Volume Method (FVM) and Finite Element Method (FEM) for an EPSRC-funded project "Maximizing cavitation to clean dental implants".

Mathematics Department, College of Science, Salahaddin University-Erbil
Erbil, Iraq

Lecturer — *2015 - 2018*

- Taught courses in Calculus I and II, and Computational Mathematics using Matlab.
- Led administrative duties as head of department and member of exam board.
- Concurrently served as a part-time Lecturer in the IT Department, Lebanese French University.

Mathematics Department, College of Science, Salahaddin University-Erbil
Erbil, Iraq

Lecturer (MSc) — *2007 - 2011*

- Taught courses in Introduction to Numerical Analysis, Introduction to Visual Basic, and Linear Programming.
- Coordinated departmental affairs including lecture timetables and examination board duties.

Education

University of Birmingham — *Birmingham, UK*

Ph.D. in Applied Mathematics — *2011 - 2015*

- Thesis: "Three Dimensional Acoustic Microbubble Dynamics Near Rigid Boundary"
- Developed novel numerical methods and implemented algorithms for complex simulations

Salahaddin University-Erbil — *Erbil, Iraq*

M.Sc. in Numerical Analysis — *2005 - 2007*

Salahaddin University-Erbil — *Erbil, Iraq*

B.Sc. in Mathematics — *1999 - 2003*

Training Courses

University of Cambridge — *Cambridge, UK*

Cambridge Ellis Unit Summer School on Probabilistic Machine Learning — *July 2024*

Genoa, Italy

Summer School: Machine Learning Crash Course 2024 - An Introduction to Machine Learning — *June 2024*

University of Warwick — *Coventry, UK*

Warwick Battery Days — *June 2024*

Academic and Professional Development — *2023 - 2024*

- Becoming a Peer Reviewer: Everything You Need to Know, AIP Publishing, June 2024
- VisualPDE: Using Interactive Web-Based Simulations to Explore Partial Differential Equations, TALMO, June 2024
- Enhancing University Mathematics With Python, TALMO, May 2024
- Early Career Mathematicians and Statisticians Teaching in Higher Education Ideas Exchange, IMA, May 2024
- Design of Experiments, WMG, University of Warwick, February 2024
- APP PGR Academic and Professional Pathway for Postgraduate Researchers who Teach, University of Warwick, November 2023 - February 2024
- Faraday THRIVE Program, "Skill 4 Thrive Program", October 2023 - February 2024
- CISM Advanced Course: Batteries - Basic Principles, Experimental Investigations, and Modeling Across Scales, September 2023
- Introduction Course for New Lecturers in the Mathematical Sciences, IMA Isaac Newton Institute, September 2023
- PyBaMM Workshop, University of Warwick, September 2023
- Midlands Fluid Mechanics Meeting, Aston University, September 2023

Software Development — *2022 - 2023*

- Software Development Course, Code Your Future, June 2022 - March 2023
- Web Development Bootcamp, Bath Spa University, June - August 2022
- Data Science Bootcamp, TechTalent Academy, February - June 2022
- Analysing Data Bootcamp, Babington, December 2021 - February 2022
- Fundamentals in Software Development, Code Your Future, May 2022

Professional Development — *2018 - 2022*

- Action Tutor Online Training Session, Action Tutor, March 2022
- Academic Consultancy Workshop, University of Birmingham Enterprise Limited, May 2019
- Deep Learning, NVIDIA Deep Learning Institute and Advanced Research Computing, University of Birmingham, January 2019
- Software Carpentry - Python, University of Birmingham, December 2018

Publications

1. Abdolrahman Dadvand, Ebrahim Kadivar, Saman A. Bapir, Kawa **Manmi**, and Ould el Moctar. Experimental and numerical study of the dynamics of a laser-induced cavitation bubble between two parallel walls: Effect of confinement and viscosity. *Experimental and Computational Multiphase Flow*, 2025. (accepted)
2. Alireza Esfandiari Khosroshahi, Abdolrahman Dadvand, and Kawa **Manmi**. A collapsing bubble-based micropump for viscous liquids. *Experimental and Computational Multiphase Flow*, 2025. (accepted)
3. Kawa **Manmi**, Marcus Tuchel, Emma Kendrick, and Ferran Brosa Planella. A comparison of standard sei growth models in the context of battery formation. *Journal of The Electrochemical Society*, 171(10):100530, 2024

4. Jegyr Anwar Agha, Kawa **Manmi**, and Abdolrahman Dadvand. Dynamics of a bubble-pair between two parallel rigid walls. *Ocean Engineering*, 301:117401, 2024
5. Asaad A Jund, Abdolrahman Dadvand, Imad A Aziz, and Kawa **Manmi**. An extended laplacian smoothing for boundary element analysis of 3d bubble dynamics. *Engineering Analysis with Boundary Elements*, 160:76–88, 2024
6. Saman A Bapir, Kawa **Manmi**, Rostam K Saeed, and Abdolrahman Dadvand. Oscillation of an ultrasonically driven gas bubble in an asymmetric confined domain. *International Journal of Mechanical Sciences*, 265:108861, 2024
7. Abdolrahman Dadvand, Kawa **Manmi**, and Imad A Aziz. Three-dimensional bubble jetting inside a corner formed by rigid curved plates: Boundary integral analysis. *International Journal of Multiphase Flow*, 158:104308, 2023
8. Kawa **Manmi**, Imad A Aziz, Arun Arjunan, Rostam K Saeed, and Abdolrahman Dadvand. Three-dimensional oscillation of an acoustic microbubble between two rigid curved plates. *Journal of Hydrodynamics*, 33(5):1019–1034, 2021
9. Kawa **Manmi**, WB Wu, Nina Vyas, WR Smith, QX Wang, and AD Walmsley. Numerical investigation of cavitation generated by an ultrasonic dental scaler tip vibrating in a compressible liquid. *Ultrasonics Sonochemistry*, 63:104963, 2020
10. N Vyas, QX Wang, Kawa **Manmi**, RL Sammons, SA Kuehne, and AD Walmsley. How does ultrasonic cavitation remove dental bacterial biofilm? *Ultrasonics Sonochemistry*, 67:105112, 2020
11. Imad A Aziz, Kawa **Manmi**, Rostam K Saeed, and Abdolrahman Dadvand. Modeling three dimensional gas bubble dynamics between two curved rigid plates using boundary integral method. *Engineering Analysis with Boundary Elements*, 109:19–31, 2019
12. Nina Vyas, Kawa **Manmi**, Qianxi Wang, Ananda J Jadhav, Mostafa Barigou, Rachel L Sammons, Sarah A Kuehne, and A Damien Walmsley. Which parameters affect biofilm removal with acoustic cavitation? a review. *Ultrasound in Medicine & Biology*, 45(5):1044–1055, 2019
13. Kawa **Manmi** and Qianxi Wang. Acoustic microbubble dynamics with viscous effects. *Ultrasonics Sonochemistry*, 36:427–436, 2017
14. Qianxi Wang, Kawa **Manmi**, and Michael L Calvisi. Numerical modeling of the 3d dynamics of ultrasound contrast agent microbubbles using the boundary integral method. *Physics of Fluids*, 27(2), 2015
15. Qian Wang and Kawa **Manmi**. Microbubble dynamics near a wall subjected to a travelling acoustic wave. *Physics of Fluids*, 26:032104, 2014
16. Qianxi Wang, Kawa **Manmi**, and Kuo-Kang Liu. Cell mechanics in biomedical cavitation. *Interface Focus*, 5(5):20150018, 2015
17. Rostam K Saeed and **Kawa** M Aziz. An iterative method with quartic convergence for solving nonlinear equations. *Applied Mathematics and Computation*, 202(2):435–440, 2008

Conferences & Talks

ModVal2025, Karlsruhe, Germany *2025-POSTER*

21st Symposium on Modeling and Validation of Electrochemical Energy Technologies

PyBaMM Conference, London, UK *2025-PRESENT*

Python Battery Mathematical Modelling Annual Conference

University of Warwick, UK *2025-PRESENT*

Applied Mathematics Research Seminar

KMS Seminar, Online *2024-PRESENT*

Kurdish Mathematical Society Annual Seminar

Faraday Conference, Newcastle University, UK *2024*

Faraday Institution Annual Conference

OBMS, Oxford, UK *2024-POSTER*

Oxford Battery Modelling Symposium

ModVal2024, Baden, Switzerland *2024-POSTER*

20th Symposium on Modeling and Validation of Electrochemical Energy Technologies

ECR Conference, University of Warwick, UK *2024-PRESENT*

Early Career Researcher Conference and Training Event

Salahaddin University-Erbil, Iraq *2024-PRESENT*

Mathematical Physics-Based Modeling Seminar

Faraday Conference, University of Birmingham, UK *2023*

Faraday Institution Annual Conference

Cavitation Workshop, Ljubljana, Slovenia *2018-PRESENT*

Workshop on Cavitation Exploitation

PERCAT Conference, University of Birmingham, UK *2019-POSTER*

Postdoctoral Researcher Conference in Engineering and Physical Sciences

WAMS, Salahaddin University-Erbil, Iraq *2017-ORGANISER*

West Asia Mathematical Schools by CIMPA

ICoIT17, Erbil, Iraq *2017-PRESENT*

1st International Conference on Information Technology

SKWAIM, University of Zakho, Iraq *2015-PRESENT*

Swedish-Kurdish Workshop on Applied and Industrial Mathematics

Kavli Royal Society Centre, UK *2014-PRESENT*

Murphy International Scientific Meeting on Cavitation Bubbles

Funding, Prizes and Awards

2025	**Project Lead**, FUSE 2025, Faraday Institution	*UK*
2024	**Higher Performance Contribution Award**, University of Warwick	*Coventry, UK*
2024	**Post-Doctoral Research Prize 2024 (Mathematics)**, Faculty of Science, Engineering and Medicine (FSEM)	*University of Warwick, UK*
2017	**Recognition for Publications**, Presidency of Salahaddin University-Erbil	*Erbil, Iraq*
2020	**Teaching Excellence Recognition**, Presidency of Salahaddin University-Erbil	*Erbil, Iraq*

Software Skills

Programming Languages	Python, Matlab, Fortran, C#, JavaScript, Visual Basic, Pascal
Web Development	HTML, CSS, Bootstrap, Node.js, Express
Databases	PostgreSQL, MongoDB
Office Software	Microsoft Word, Excel (PivotTables, VBA), PowerPoint
Modelling Packages	OpenFOAM, Paraview, Abaqus, PyBaMM (Maintainer)
Tools	Git, Github, LaTeX