

## Dr. Jehan Alswaihli

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### Research Interest

Applied mathematics, neural modelling, data assimilation, and inverse problems.

My PhD thesis introduces an iterative approach of both inverse problems and data assimilation for neural field equations and analyses its convergence. The main goal is to develop an iterative method based on both inversion and data assimilation techniques and to discuss its stability. The results include:

- 1- Proof of the existence and uniqueness of the solution of the direct problem.
- 2- Applying the inverse problem technique and then regularizing for ill-posedness.
- 3- The sensitivity analysis for the kernel reconstruction.
- 4- The analysis of the convergence of the iterative approach.
- 5- Numerical examples using MATLAB.

Part of this work is a published paper titled 'Kernel Reconstruction for delayed neural field equations' which includes the proof of the existence of a unique solution for the delayed neural field equations, application of the inverse problem approach to reconstruct the kernel, the ill-posedness of the problem, the sensitivity analysis and numerical examples using MATLAB.

### Professional Positions

Part-time Maths lecturer at New College Swindon from February 2023.

Teaching Assistant for School of Management, UCL, (Zero-hour contract), January – March 2023

Notetaker for Accessibility & Disability Resource Centre, University of Cambridge, (Zero-hour contract), January 2023 to present.

Cover Maths Lecturer at New College Swindon for JJFox recruitment, December 2022-February 2023.

Module development consultant for Kaplan Pathways, April-August 2022.

Cover Supervisor for Anzuk Education, 8th Dec 2021 to present

Various Hours Maths Lecturer at Wiltshire College, Chippenham, UK, 3<sup>rd</sup> Dec 2021 to present.

Arabic Community Services Interpreter at Language Empire, UK, Nov 2021 to Dec 2022.

Sessional Tutor at Kaplan International College London, UK, Sept 2021 to August 2022.

Attendance Officer Assistant (temporary) at Swindon Academy, Sep-Dec 2021.

Arbor Setting up Assistant (temporary) at Nova Hreod Academy, Sept 2021.

Attendance Officer Assistant (cover) at Nova Hreod Academy, Swindon, UK, July 2021.

Covid-19 Test Processor at Nova Hreod Academy, Swindon, UK, Mar - Jan 2022.

Exam Invigilator at Nova Hreod Academy, Swindon, UK, May 2018 – June 2023.

Cover Supervisor for TradeWind recruitment, Swindon, UK, Mar 2020 – Dec 2022.

Cover Supervisor for Monarch Education, Swindon, UK, May 2022-Dec 2022.  
Cover Supervisor for Protocol recruitment, Swindon, UK, Jan 2019-Dec 2022.  
Student Demonstrator at University of Reading, UK, Jan 2015 - May 2020.  
Voluntary Adult Leader for Beavers of 12<sup>th</sup> Swindon Old Town Air Scouts, April 2018 - present.  
Voluntary Assistant Teacher for coding club at Museum of Computing Swindon, April 2017 - Jan 2019.  
Voluntary Assistant Class Teacher for King William Street Primary School, Swindon, June - Dec 2017.  
Casual Exam Invigilator at Isambard Community School, Swindon, Nov 2015 - May 2016.  
Assistant Lecturer – contract (14 hours per week) at Misurata University, Misurata, Libya, Mar 2010 – May 2013.  
Assistant Lecturer – noncontract (8 hours per week) at Misurata University, Sept 2008 - Mar 2010.  
Math Teacher at Misurata Secondary School for girls, Misurata, Libya, Oct 1996 - May 2006.

## **Education and Qualifications**

**PhD in Mathematics** at University of Reading, UK, Sept 2014 – May 2020.

-Thesis title “Iteration of Inverse Problems and Data Assimilation Techniques for Neural Field Equations”.

-Supervised by Professor R. Potthast and Professor D.Saddy, University of Reading, UK.

-Passed viva with minor corrections on 30th October 2019, degree awarded on 29th May 2020

-Modules studied: Theory and Techniques of Data Assimilation (79%), Integral Equations (59%), Numerical Solution of Ordinary Differential Equations (64%), Numerical Solution of Partial Differential Equations (58%), Theory of Partial Differential Equations (Magic,56%).

-Training courses and summer schools:

“TA Training Course” at the University of Reading, UK, Oct 2014.

“NAG FORTRAN Modernization Workshop” at the University of Reading, UK, 13&14 February 2017.

“Scenario Data Assimilation Training” at the University of Reading, UK, 14-17 February 2017.

"Preparing to Teach" at the University of Reading, UK, 2016-2017.

"Mathematical Modelling in Neuroscience" (summer school in Bornholm) at University of Copenhagen, Denmark, 26 – 30 June 2017.

"Mathematical Aspects of Inverse Problems" (summer school) at The Alan Turing Institute, London, 29 Aug – 1 Sept 2017.

**MSc in Mathematics** (score 70.50%) at Misurata University, Libya, Sept 2003 – June 2008.

-Modules included: Numerical Analysis, Pure Algebra, Real Analysis, and Partial differential Equations.

-Thesis title “The Collocation Methods”.

-Supervised by Prof. Ahmad Habbireeh, Department of mathematics, Faculty of Science, Misurata University, Libya.

**BSc in mathematics** (score 77.36%) at Misurata University, Libya, Sept 1990 – July 1994.

**Libyan Secondary School Certificate** (score 89%) at Misurata Institute for Basic Sciences, Libya, Sept 1986 – July 1990.

### **English Language**

GSCE Equivalency Testing for Career Development Examination, English higher level (grade 5), UK, July 2019.

Classroom TEFL course (20 hours), The TEFL Academy, Oxford, UK, October 2017.

6-week pre-sessional English course at University of Reading, UK, August-Sept 2014

English language to advanced level at Leeds English Language School, Leeds, UK, Sept 2013 – July 2014.

### **Publications**

-Completed:

**Alswaihli, J.**, Potthast, R., Bojak, I. *et al.* Kernel Reconstruction for Delayed Neural Field Equations. *J. Math. Neurosci.* **8**, 3 (2018). <https://doi.org/10.1186/s13408-018-0058-8>.

-Work in Progress:

**Alswaihli, J.**, Potthast, R., Hutt, A. *et al.* An Iterative Approach to Data Assimilation and Inversion for Neural Field Equations.

*Potthast, R., Alswaihli, J. The Convergence of Data Assimilation Based Kernel Reconstruction.*

### **Presentations**

6<sup>th</sup> SIAM-UKIE National Student Chapter Conference, 26 May 2017 at NUI Galway (poster), <http://www.maths.nuigalway.ie/SIAM-Galway/Conference2017/Abstracts.pdf>.

5<sup>th</sup> Doctoral Research Conference, 20 June 2017 at University of Reading (poster), <https://www.reading.ac.uk/graduateschool/events/gs-DoctoralResearchConference2017newpage.aspx>.

4<sup>th</sup> International Conference on Neural Field Theory (ICNFT) – The Interplay of Models and Data Assimilation, 3-5 July 2017 at University of Reading (talk and poster), <http://www.inverseproblems.info/icnft2017>.

7<sup>th</sup> SIAM-UKIE National Student Chapter Conference, 18-19 June 2018 at the University of Bath (talk and poster), <http://go.bath.ac.uk/SNSCC-2018>.

7<sup>th</sup> International Symposium on Data Assimilation (ISDA 2019), 21-24 Jan 2019 at Riken, Kobe, Japan (poster), <http://www.data-assimilation.riken.jp/isda2019>.

Symposium on Machine Learning and Dynamical Systems, 11-13 Feb 2019 at Imperial College London (poster),

<https://sites.google.com/site/boumedienehamzi/symposium-on-machine-learning-for-dynamical-systems-2019>.

ICAAMM 2019, 10-13 March 2019 at Gelisim University, Istanbul, Turkey (talk), <https://ntmsci.com/Conferences/ICAAMM2019>.

Control in Times of Crisis, 3 June 2021, Online seminar (talk).

<https://www.youtube.com/watch?v=huyVUPwV6h0>

## **Teaching Experience**

### **Module Development Consultant**

Worked as a reviewer of the 'Mathematics for Computing' module for the international year one course for Kaplan Pathways at the University of Essex International College

### **Cover Supervisor**

Covered teachers at different schools in Swindon such as Crowdys Hill School, Dorcan Academy, Lydiard Park Academy, St Joseph's Catholic College, the Deanery CE Academy, and New College Swindon.

### **Various Hours Maths Lecturer at Wiltshire College**

Teaching GCSE maths, 3 hours a week

Teaching functional skills maths for adults (evening class), 3 hours a week

Invigilating and marking exams

### **Sessional Tutor at Kaplan International College London**

Teaching maths and statistics for Foundation and international year one students, 4 hours face to face on Mondays, and online on Wednesdays and Thursdays

Modules: Intermediate Mathematics, Quantitative Methods, and Information Systems for Business

Lead workshops and skills learning sessions, cover colleagues in maths, statistics and business and management modules, assist in applied learning week and learning support sessions, invigilate and mark tests and reports

### **Student Demonstrator at University of Reading:**

Tutorial Assistant for Department of Mathematics: Holding tutorials for undergraduate mathematics courses. Courses: Calculus, Mathematical & Scientific Programming, Linear Algebra, and Mathematics for Computer Science, Spring 2016 - Autumn 2019.

Marker: assignments, the Department of Mathematics coursework, and the Henley Business School formative essay. Courses: Calculus, Ordinary Differential Equations, and Numerical Analysis 1 & 2, Spring 2015 – Autumn 2019.

### **Assistant Lecturer at Misurata University, Misurata, Libya:**

Teaching mathematical modules for undergraduate students at the Faculty of Education.

Departments: Mathematics, Physics, and Computer Science.

Courses: Calculus, Numerical Analysis, Linear Algebra, Ordinary and Partial Differential Equations, Spatial Geometry.

Supervise projects, develop modules and organize events.

Acting Head of Department between March and May 2013

Set, invigilate, and mark assessments.

### **Math Teacher at Misurata Secondary School for Girls:**

Teaching mathematics to secondary school students (16–18 years old).

## **Computer Skills**

MATLAB, LaTeX, Microsoft Office, FORTRAN.

## **Languages**

Arabic: native speaker

English: advanced level