Alex **Hiles**

Ph.D.

About Me

A passionate applied mathematician with a keen interest in solving complex problems using mathematical tools.

Personal

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alex-hiles

alexhiles

Alex Hiles (Scholar)

Areas of Expertise

- Applied Mathematics
- Scientific Computing
- Numerical Optimization and Inverse Problems
- Designing algorithms (from Theory to Practice)

Programming Skills

Proficiency
Python, MATLAB, C++, bash, LaTeX
Intermediate
R, Java, FORTRAN

Personal Interests

- Running (ran Manchester Marathon 2019, multiple 10km events).
- Financial Investing (maintaining personal portfolio).
- Reading (mainly non-fiction: economics, business, science and history).

Experience

2016–present — **Ph.D. in Mathematics**
· The University of Manchester, UK

- Thesis titled "Novel algorithms for magnetic induction tomography with applications in security screening".
- Industrially sponsored by Atomic Weapons Establishment (AWE) with direct responsibility to help solve a real business problem.
- Developed software package in Python which includes numerical methods to solve electromagnetic imaging problems. The software will become available soon on my GitHub profile.
- 4 years experience with many libraries in Python. Some of these include: NumPy, SciPy, matplotlib, TensorFlow, Keras, flask, pandas.
- Experience using machine learning algorithms such as Support Vector Machines, Artificial Neural Networks, Decision Trees, k-Nearest Neighbors, for image classification task in PhD thesis.
- Extensive experience using Python, MATLAB, C++ for data visualization purposes.
- Managed relationships with key stakeholders at AWE.
- Experience working with and querying large data sets using SQL.
- Algorithms designed for PhD project are state-of-the-art and are published (listed below).
- Developed strong communication and presentation skills by giving talks at high profile conferences (listed below).
- Strong synthesizing and written skills (see publications listed below)
- Attended countless talks about inverse problems, statistics, fluids, data science, and many other disciplines.

2017–present — **Graduate Teaching Assistant**
· The University of Manchester, UK

- Lead role teaching undergraduate engineering students degree level mathematics, including: vector calculus, complex analysis, numerical methods and probability (30-40 students).
- Assistant role teaching undergraduate mathematics students programming languages MATLAB and Python (40-50 students).

2017–present — **Exam Invigilator and Marker**
· The University of Manchester, UK

- Lead role supervising multiple examinations for undergraduate mathematics and engineering students.
- Marked multiple undergraduate exam papers (300-400 scripts at a time).

Education

2015-2016 — **Applied Mathematics - Distinction (Average: 78%)**
MSc · The University of Manchester

- Obtained industrial sponsor through academic merit.
- Top of class in Scientific Computing (C++ programming course).
- Transferable skills for Applied Mathematicians module honed presentation and communication skills
- MSc thesis titled "Sensitivity analysis of 3D magnetic induction tomography for threat detection".
- Obtained MSc Academic Excellence Award 2015.
- Notable Modules: Numerical Linear Algebra, Scientific Computing, Approximation Theory and Finite Element Analysis, Numerical Optimization and Inverse Problems, Mathematical Methods, Transferable Skills for Applied Mathematicians.

2011-2015 | **Mathematics - First Class Honours (Average: 78%)**
BSc · Northumbria University

- Dissertation titled "The Aldrin Earth-Mars cycler" which focused on using numerical methods to solve equations related to geometry of paths to Mars.
- Completed project in Financial Mathematics module designing algorithms, using Ito calculus, to predict stock prices of London Stock Exchange Group and presented our results for a 30-day period.
- Completed project in Applied Modelling module focusing on optimizing routes for a formula one car around a formula one track.
- Notable Modules: Financial Mathematics, Algebraic Codes and Cryptography, Applied Modelling, Applied Statistical Methods, Computational Mathematics, Further Computational Mathematics, Vector Calculus and Partial Differential Equations.

Publications

2020 | *'Novel algorithms for magnetic induction tomography with applications in security screening'*, PhD Thesis.

2020 | *'Sparsity and level set regularization for near-field electromagnetic imaging in 3D'*, Inverse Problems.

2018 | *'A level set method for magnetic induction tomography of 3D boxes and containers'*, In D.Lesselier and C.Reboud, editors, Electromagnetic Non-Destructive Evaluation (XXI), pages 33-40. IOS Press, Netherlands.

Talks

Sep. 2019 | "Colour Level Set Regularization for the 3D Electromagnetic Imaging of Shielded Boxes", at: *2nd IMA Conference* in London, UK.

Jul. 2019 | "Sparsity and level set regularization for the 3D electromagnetic imaging of shielded containers", at: *Applied Inverse Problems Conference* in Grenoble, France.

Apr. 2018 | Invited talk at Atomic Weapons Establishment, in Aldermaston, UK.

Sep. 2017 | "A Level Set Technique for 3D Magnetic Induction Tomography at Different Scales", at: *Electromagnetic Nondestructive Evaluation Conference* in Paris, France. (80-100 people)

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