JONNA C RODEN

School of Mathematics   J.C.Roden@sms.ed.ac.uk
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RESEARCH INTERESTS

- Multiscale particle dynamics, modelling of interacting particle systems, industrial applications of multiscale problems, solving nonlinear integro-PDEs using pseudospectral methods and advanced ODE solvers, statistical mechanics.

- PDE-constrained optimization, industrial applications of optimal control problems, numerical methods for and computational solutions to optimization problems involving nonlinear integro-PDEs.

EDUCATION

PhD Applied and Computational Mathematics   since 09/2018
Maxwell Institute Graduate School in Analysis and its Applications (MIGSAA)
Joint PhD programme of the University of Edinburgh and Heriot-Watt University.

- PhD topic: PDE-constrained optimization for multiscale particle dynamics, with industrial applications.

- Modules taken include: Elliptic and Parabolic PDEs, Measure and Integration, Functional Analysis, Stochastic Processes, Introduction to Python Programming.

BSc Mathematics   09/2014 - 06/2018
University of Strathclyde
First Class Honours, with an average of 86%.

- Modules taken include: Mathematical and Statistical Computing, Numerical Analysis, Mechanics of Rigid Bodies and Fluids, Finite Element Methods for Boundary Value Problems and Approximation, Mathematical Biology.

German Abitur   08/2011 - 07/2014
Berufliches Gymnasium Gesundheit und Soziales

- Abitur Grade: 1.6 (equivalent to A Level grade A*AA)

- Main Subjects: Psychology/Pedagogy, Mathematics, English.

AWARDS

Travel Award   10/2019
Awarded by the Autumn School on Optimal Control and Optimization with PDEs, Trier, Germany.

PhD Funding, 4 Years   09/2018
Awarded by the Maxwell Institute Graduate School in Analysis and its Applications, a Centre for Doctoral Training funded by the UK Engineering and Physical Sciences Research Council (grant EP/L016508/01), the Scottish Funding Council, Heriot-Watt University and the University of Edinburgh.

Astronomical Society of Glasgow Prize   06/2018
Awarded for the most distinguished student in the final examinations for a BSc Honours or MSc degree in Mathematics or Physics.

Member of the Dean's List (Third Year)   06/2017
List of students who have achieved a meritorious standard in the third year of the BSc Mathematics.

SELECTED PROJECTS

An Optimal Control Problem for a Marine Propulsion System 02/2019 - 04/2019

Modelling of a diesel-electric marine propulsion system, using deterministic and neural network models and optimization of the models for fuel efficiency. Collaboration with the industrial partner Duodrive and a team of PhD students. Implementation of the model and optimization routine in Matlab.

BSc Thesis: 01/2018 - 04/2018
The Method of Conformal Mappings Applied to Fluid Flow Around Obstacles

Gained in-depth understanding of the method of conformal mappings as well as concepts in aerodynamics and fluid mechanics involved and completed an extensive literature review on the topic. Presentation of the mathematical content to a general audience.

Vertically Integrated Project (VIP) 02/2016 - 05/2016

Selected to contribute to an interdisciplinary research project on antibiotic drug discovery. Used mathematical techniques and programming, such as clustering algorithms and statistical models. Worked in a team with Biology and Engineering students as well as with supervising professors. Presented the joint result at a VIP conference.

TEACHING EXPERIENCE

University tutor (University of Edinburgh)

Honours Algebra Skills (Computer Lab, using Sage), Linear Algebra, Several Variable Calculus and Differential Equations, Honours Complex Variables, Engineering Mathematics.

Exam marker (University of Edinburgh)

Linear Algebra, Several Variable Calculus and Differential Equations, Honours Complex Variables.

LEADERSHIP AND PROFESSIONAL EXPERIENCE

SIAM-IMA Student Chapter Committee Member since 06/2020

Organizing events to connect PhD students in mathematics with those from other disciplines and to industry. Outreach activities include events for BSc and MSc students as well as hosting a series of talks from alumni that graduated with a PhD in mathematics or adjacent fields.

University of Edinburgh PG Colloquium Organizer 09/2019 - 08/2020

Organization of a seminar series where PhD students talk about their research or other interesting mathematical topics.

Annual MIGSAA Colloquium Organizing Committee 05/2019 - 09/2020

Organization of the annual MIGSAA Colloquium 2019, featuring research talks by three academics from the UK and Europe and an audience of 70 attendees.

LANGUAGES AND ADDITIONAL SKILLS

Languages

Fluent in German and English. Basic knowledge of Spanish.

Programming

Highly proficient in Matlab. Knowledge of Python and R.

TALKS AND POSTER PRESENTATIONS

LMS Scottish Numerical Methods Network Workshop on Multiscale Methods (Invited Talk)	06/2020
SIAM-IMA Student Chapter Colloquium (Invited Talk)	02/2020
Autumn School on Optimal Control and Optimization with PDEs, Trier, Germany	10/2019

PUBLICATIONS

Aduamoah, M., Goddard, B.D., Pearson, J.W. & Roden, J.C. PDE-Constrained Optimization Models and Pseudospectral Methods for Multiscale Particle Dynamics. Preprint at `https://arxiv.org/abs/2009.09850`(2020)

REFERENCES

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