Anna Persson

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Research Interests

I am interested in numerical methods for solving partial differential equations. In particular, I work on finite element methods for equations with highly varying data, often referred to as multiscale problems. Such equations arise in many interesting applications which include heterogeneous media like composites and porous materials, metamaterials, quantum physics, and much more.

Academic Appointments

2021– **Researcher in Numerical Analysis.**
Department of Mathematics, KTH Royal Institute of Technology, Sweden.

2018–2021 **Brummer & Partners MathDataLab Postdoctoral Fellow.**
Department of Mathematics, KTH Royal Institute of Technology, Sweden.
Including 11 months parental leave.

Education

2018 **Doctor of Philosophy in Mathematics.**
Chalmers University of Technology, Sweden.
Specialization: Numerical Analysis.
Advisor: Axel Målqvist.
Thesis: Numerical Analysis of Evolution Problems in Multiphysics.

2016 **Licentiate of Philosophy in Mathematics.**
Chalmers University of Technology, Sweden.
Specialization: Numerical Analysis.
Advisor: Axel Målqvist.
Thesis: A Generalized Finite Element Method for Linear Thermoelasticity.

2013 **Master of Science in Mathematics.**
University of Gothenburg, Sweden.
Specialization: Mathematical Finance.
Advisor: Stig Larsson.
Thesis: A Finite Element Approach to The Option Pricing Model by Hobson and Rogers.

Publications

1. *A generalized finite element method for the strongly damped wave equation with rapidly varying data*
P. Ljung, A. Målqvist, A. Persson,
To appear in ESAIM: Math. Model. Numer. Anal. arXiv:2011.03311.

2. *Finite element convergence for the time-dependent Joule heating problem with mixed boundary conditions*
   M. Jensen, A. Målqvist, A. Persson,
   To appear in IMA Journal of Numerical Analysis, doi:10.1093/imanum/draa068.

3. *Computational homogenization of time-harmonic Maxwell's equations*
   P. Henning, A. Persson,
   SIAM J. Sci. Comput., 42(3):B581—B607, 2020.

4. *Multiscale differential Riccati equations for linear quadratic regulator problems*
   A. Målqvist, A. Persson, T. Stillfjord,
   SIAM J. Sci. Comput., 40(4), A2406–A2426, 2018.

5. *Multiscale techniques for parabolic equations*
   A. Målqvist, A. Persson,
   Numer. Math. 138(1):191–217, 2018.

6. *A generalized finite element method for linear thermoelasticity*
   A. Målqvist, A. Persson,
   ESAIM Math. Model. Numer. Anal. 51:1147–1171, 2017.

7. *A multiscale method for linear elasticity reducing Poisson locking*
   P. Henning, A. Persson,
   Comput. Methods Appl. Mech. Engrg., 310(4):156–171, 2016.

Professional Activities

Conferences and Presentations

2019   Workshop on Mathematics for Complex Data, Brummer & Partners MathDataLab, KTH Royal Institute of Technology, Sweden.
            Speaker at the workshop.

2019   MAFELAP (Mathematics of Finite Elements and Applications), London, United Kingdom.
            Speaker at the mini-symposium "Multiscale problems and their numerical treatment".

2019   BIRS Women In Numerical Methods for PDEs and their Applications, Banff, Canada.
            Speaker at the workshop. Talk available at:
            http://www.birs.ca/events/2019/5-day-workshops/19w5189/videos/watch/201905130940-Persson.html

2019   Seminar at University of Augsburg, Germany.
            Speaker at the weekly seminar in numerical analysis.

2019   Workshop on Numerical Analysis, KTH Royal Institute of Technology, Sweden.
            Speaker at the workshop.

2018   2nd Workshop on Scientific Computing in Sweden, Lund, Sweden.
            Speaker at the workshop.

2018   EFEF (European Finite Element Fair), Heidelberg, Germany.
            Speaker at the conference.

2018	Workshop on Mathematics for Complex Data, Brummer & Partners MathDataLab, KTH Royal Institute of Technology, Sweden. *Speaker at the workshop.*
2018	Lunch seminar at "Kuggfrågan" Lindholmen Science Park, Chalmers University of Technology, Sweden. *Popular science presentation for a broad audience.*
2018	Seminar at Chalmers University of Technology, Sweden. *Speaker at the weekly seminar in Computational and Applied Mathematics (CAM).*
2017	Trimester program in "Multiscale Problems: Algorithms, Numerical Analysis, and Computation" at Hausdorff Research Institute for Mathematics, Bonn, Germany. *Speaker at the junior seminar.*
2016	MMM (The Multiscale Materials Modeling international conference), Dijon, France. *Speaker at the mini-symposium "Mathematical Theory and Computational Techniques for Multiscale Materials Modeling".*
2016	Seminar at KTH Royal Institute of Technology, Sweden. *Speaker at the weekly seminar in numerical analysis.*
2015	ICIAM (International Congress of Industrial and Applied Mathematics), Beijing, China. *Speaker at the mini-symposium "Multiscale methods with applications in fluid mechanics and materials modeling".*
2014	Seminar at Rheinische Friedrich-Wilhelms-Universität Bonn, Germany. *Speaker at the weekly seminar at the Institute for Numerical Simulation.*
2014	Workshop on Computational multiscale methods, Matematishes Forschungsinstitut Oberwolfach, Germany. *Did not present.*
2014	Seminar at Chalmers University of Technology, Sweden. *Speaker at the weekly seminar in Computational and Applied Mathematics (CAM).*

Summer schools

2014	24:th Jyväskylä Summer School. University of Jyväskylä, Finland.

Workshop Organizer

2019	Study Group on Numerical Analysis and Machine Learning, KTH Royal Institute of Technology, Sweden
2019	Workshop on Numerical Analysis, KTH Royal Institute of Technology, Sweden.

Referee for International Journals

Referee work for BIT Numerical Mathematics, International Journal of Numerical Analysis and Modeling, Communication in Computational Physics.

Teaching Experience

KTH Royal Institute of Technology

2020–2021 Numerical methods and basic programming.
Course responsibility and lecturer.

2020 The Finite Element Method.
Course responsibility and lecturer for the second half of the course.

Chalmers University of Technology and University of Gothenburg

2014-2018 Options and Mathematics.
Teaching Assistant.

2013-2018 Calculus course.
Teaching Assistant.

2009-2013 Teaching Assistant.
Exercise classes at undergraduate courses.

2008-2018 Web-based preparatory course in Mathematics.
Teaching and developing course material.

Student Supervision

2021 B.Sc. Arnab Nandi and Alexandros Simeonidis,
KTH Royal Institute of Technology.
Main supervisor. Thesis: Analysing optimization algorithms for training of neural networks.

2021 B.Sc. Axel Boivie and Victor Bellander,
KTH Royal Institute of Technology.
Main supervisor. Thesis: Implementation and Optimisation of a Neural Network.

2019 B.Sc. Christian L. Thunberg, Niklas Mannerskog,
KTH Royal Institute of Technology, Sweden.
Main supervisor. Thesis: Stochastic Gradient Descent in Machine Learning.

2018 M.Sc. Per Ljung,
Chalmers University of Technology, Sweden.
Assistant supervisor. Thesis: Localized orthogonal decomposition for the strongly damped wave equation.

Pedagogy courses

2014 Teaching, Learning, and Evaluation 3 HEC. Chalmers University of Technology, Sweden.

Awards

2014 Received Göta student union's pedagogical prize, University of Gothenburg, Sweden.