

CURRICULUM VITAE

PERSONAL DETAILS

Name: Shane Cooper
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Date of Birth: 28th December 1983
Nationality: British

CURRENT POSITION

EPSRC POSTDOCTORAL RESEARCH FELLOW at the Department of Mathematical Sciences, University of Bath since 1st April 2015.

PREVIOUS POSTS

04/14 - 03/15 Postdoc at Université de Montpellier 2, LMGC, France.
04/13 - 03/14 Postdoc at Institut Fresnel, Marseille, France.
04/12 - 03/13 Wales Institute of Mathematical and Computational Sciences -
Leverhulme Fellow at Cardiff University, UK.

EDUCATION

2008 - 2012 PhD in Mathematics (2012), University of Bath.
THESIS: Two-scale homogenisation of partially degenerating PDEs with applications to photonic crystals and elasticity.
SUPERVISORS: Dr I.V. Kamotski and Prof. V.P. Smyshlyaev.
2007 - 2008 MSc in Modern Applications of Mathematics with **distinction** (Average 86%). Graded top of cohort of 21 students from two Applied Maths MScs.
THESIS: Non-classical homogenisation, related analytic tools and applications to dynamic problems with partially high contrasts.
SUPERVISOR: Prof. V.P. Smyshlyaev.
2004 - 2007 BSc in Natural Sciences with **Honours Class 1 (Graduated top of my year)** - Major subjects: Mathematics and Physics.

RESEARCH INTERESTS

Asymptotic analysis, Elliptic PDE theory, Functional analysis, Measure theory, Operator theory and Spectral theory with applications in the contexts of Acoustics, Elasticity and Electromagnetism such as: Linear wave theory, Homogenisation theory for multi-scale composites (such as metamaterials), and analysis of thin structures.

GRANTS

04/15 - 03/18 Principal Investigator of EPSRC Postdoctoral Fellowship grant EP/M017281/1: "Operator asymptotics, a new approach to length-scale interactions in metamaterials". **Value £221,738.**
09/06 - 02/17 EPSRC Impact Acceleration Account Funding (IAA): "New wave-dampening composites" (as CI) **Value £7822.**

PATENT

- TITLE Composite Elastic Wave Waveguide. (Application number GB1507537.7)
SUBMITTED 1st May 2015.

AWARDS

- La Bourse de la ville Marseille
- Bath University Excellent Research Student Award
- Natural Sciences Finalists Prize - Awarded to the student who has shown the best performance in the final year.

STUDENT SUPERVISION

From Nov. 2016	Postdoctoral research assistant supervision (joint supervision with Dr Kirill Cherednichenko) PROJECT: Analysis of Piezoelectric waveguides
From May 2016	PhD supervision (joint supervision with Dr Kirill Cherednichenko) TITLE: Operator-theoretic methods in homogenisation of singular periodic structures STUDENT: Serena D'Onofrio
From June 2016	SUMMER PROJECT: Analysis of surface waves in stratified electromagnetic Media with Leontovich boundary conditions (joint supervision with Dr Kirill Cherednichenko) STUDENT: Will Graham
From June 2016	MMATH PROJECT: Analysis of Rayleigh-type surface waves in stratified elastic media for a general class of boundary conditions (joint supervision with Dr Kirill Cherednichenko) STUDENT: Dan Gardham
From June 2016	MSC PROJECT: Analysis of Love-type surface waves in acoustic and elastic layered media (joint supervision with Dr Kirill Cherednichenko) STUDENT: Felix Maxey-Hawkins

TEACHING EXPERIENCE

2016	READING COURSE prepared and delivered on "Analysis of elasticity equations for singular structures with applications"
2015-2016	GRADUATE LECTURES on "Homogenisation of elliptic partial differential equations with partially degeneracies and spectral convergence"
2014-2015	LECTURES on "Weak and Weak star topologies"
2008-2012	TUTORIALS AND PROBLEM CLASSES in Applied Mathematics for undergraduates at the University of Bath
2008	PRIVATE TUTOR in Mathematical Methods for PDEs

RECENT CONFERENCE & WORKSHOP TALK INVITATIONS

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| 06-09/06/16 | “Computational and Analytic problems in Spectral Theory”. Cardiff University, UK |
| 26-27/05/16 | “Young Applied Analysts in the UK” conference. University of Bath, UK |
| 16-19/05/16 | “Operators, Operator families and Asymptotics” conference. University of Bath, UK |
| 26-30/10/15 | “Mathematics, Mechanics and Physics for materials of tomorrow”. ICMS Edinburgh |
| 01-05/06/15 | “Periodic and Ergodic Spectral Problems” workshop, Isaac Newton Institute, Cambridge, UK |

RECENT SEMINAR TALK INVITATIONS

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| 16/06/16 | POEMS Homogenisation Seminar, ENSTA, Palaiseau, France |
| 05/05/16 | “Dynamical Systems and PDE Seminar Series”. University of Surrey, UK |
| 24/02/16 | Warwick University, UK |
| 15/10/15 | “Analysis and Differential Equations Seminar”. University of Bath, UK |

INTERNATIONAL CONFERENCE TALK INVITATIONS

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| 23-29/09/13 | Crimean International Mathematical Conference CIMC, Sudak, Crimea |
| 02-07/09/12 | The 9 th International ETOPIIM, Marseille, France |
| 06-07/04/11 | International Conference on the occasion of Vasily Zhikov’s birthday, Naples, Italy |

ADDITIONAL RECENT CONFERENCE & WORKSHOP INVITATIONS

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| 12-20/07/16 | “Computational and Mathematical Aspects of Maxwell’s equations”. Durham University, UK |
| 20-24/06/16 | “Metamaterials Beyond Photonics”. ICMS, Edinburgh, UK |
| 18-22/04/16 | “Spectral Theory for Novel Materials”. CIRM, Luminy, France |
| 13-15/03/16 | “Spectral theory and applications”. Stockholm, Sweden |
| 05-07/10/15 | “Asymptotic analysis and Spectral theory”. Orsay, Paris, France |
| 25-30/08/15 | “Partial Differential Equations, Optimal Design and Numerics”. Benasque, Spain |

PUBLICATIONS LIST

- [A:1] (with Bellieud, M.,) 2016. Analyse asymptotique de milieux élastiques stratifiés dans les espaces de fonctions á déformation bornée. (**trans.** Asymptotic analysis of elastic stratified media in the space of functions with bounded deformation) *Comptes Rendus Mathématique*, **354**(4), pp.437- 442.
- [A:2] (with Cherednichenko, K.,) 2016. Resolvent estimates for high-contrast elliptic problems with periodic coefficients. *Archive for Rational Mechanics and Analysis*, **219**(3), pp.1061-1086.
- [A:3] (with Cherednichenko, K.,) 2015. On the existence of high-frequency boundary resonances in layered elastic media. *Proceedings of the Royal Society A*, **471**(2178).
- [A:4] (with Cherednichenko, K.,) 2015. Homogenisation of the system of high-contrast Maxwell equations. *Mathematika*, **61**(02), pp.475- 500.
- [A:5] (with Cherednichenko, K., Guenneau, S.,) 2015. Spectral analysis of one-dimensional high-contrast elliptic problems with periodic coefficients. *Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal*, **13**(1), pp.72- 98.
- [A:6] 2013. Homogenisation and spectral convergence of a periodic elastic composite with weakly compressible inclusions. *Applicable Analysis*, **93**(7), pp.1401- 1430.

SUBMISSIONS AND PREPRINTS

- [A:7] (with Bellieud, M.) Asymptotic analysis of stratified elastic media in the space of functions with bounded deformation. **Submitted** to *SIAM Journal on Mathematical Analysis (SIMA)* (2016).
- [A:8] (with Cherednichenko, K.) Asymptotic behaviour of the spectra of systems of Maxwell equations in periodic composite media with high contrast. *Preprint* available at <https://arxiv.org/abs/1601.01305>.
- [A:9] (with Kamotski, I., Smyshlyaev, V.) On band gaps in Photonic Crystal Fibres. *Preprint* available at <https://arxiv.org/abs/1411.0238>.
- [A:10] (with Cherdantsev, M. Cherednichenko, K.) Extreme localisation of eigenfunctions in one-dimensional high-contrast problems with a defect. **Submitted**. *Preprint* available at <http://salcooper.co.uk>.
- [A:11] Quasi-periodic two-scale homogenisation and effective spatial dispersion in high-contrast media **Submitted**. *Preprint* available at <https://arxiv.org/abs/1701.05661>.

PHD THESIS

- [A:12] *Two-scale homogenisation of partially degenerating PDEs with applications to photonic crystals and elasticity*. 2012, University of Bath.

MSc THESIS

- [A:13] *Non-classical homogenisation, related analytical tools and applications to dynamic problems with partially high contrasts*. 2007, University of Bath.

These publications, submissions and pre-prints are available at <http://salcooper.ac.uk>.

BOOK CHAPTER

- [A:14] (with Antonakakis, T., Cherednichenko, K., Guenneau, S. and Craster. R.,) 2012. “Homogenisation techniques for periodic structures” in: *Gratings: Theory and Numeric Application* (ISBN: 978-2-85399860-4), Fresnel Institute.