

BIN CHENG

Curriculum Vitae, August 2017

Title

Lecturer (UK equivalent of tenure-track Assistant Professor)

Contact Information

Department of Mathematics
Faculty of Engineering and Physical Sciences
University of Surrey
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Research Interests

Fluid dynamics. Geophysical and astrophysical sciences. Singular limit problems in nonlinear PDEs. Numerical analysis and scientific computing. Kinetic formulation. Mathematical Biology. Mathematical Physics in connection with these areas.

Education

The University of Maryland, College Park, Maryland USA (2003 - 2007)
Ph.D. in Applied Mathematics and Scientific Computing

- Dissertation advisor: Prof. Eitan Tadmor
- Dissertation topic: Long time stability of rotational Euler dynamics

The University of California, Los Angeles, California USA (2001 - 2003)
M.Sc. in Applied Mathematics

The Peking University, Beijing China (1997 - 2001)
B.Sc. in Mathematics and Information Sciences

Teaching Experiences

University of Surrey, Guildford, Surrey UK (2013 -)
Lecturer (Assistant Professor)

- Classes taught independently: Numerical and computational methods (undergraduate level),
Nonlinear wave equations (graduate level)

Arizona State University, Tempe, Arizona USA (2010 - 2013)
Visiting Assistant Professor

- Classes taught independently: Elementary differential equations, Numerical analysis, Discrete mathematical structure

University of Michigan, Ann Arbor, Michigan USA (2007 - 2010)

Postdoctoral Assistant Professor

- Classes taught independently: Applied partial differential equations, Numerical methods, Fourier analysis and its applications, Differential equations

University of Maryland, College Park, Maryland USA (2003 - 2007)

Graduate Teaching Assistant

- Class taught independently: Introductory Calculus
- Classes taught as a teaching assistant: Numerical analysis (graduate level), Advanced linear Algebra, Calculus I-II

University of California, Los Angeles, California USA (2001 - 2003)

Graduate Teaching Assistant

- Class taught independently: Introduction to Java language
- Classes taught as a teaching assistant: Numerical methods, Ordinary differential equations

Students Advised

Tom O'Neill, PhD, co-supervised with Tom Bridges, University of Surrey (2016 - 2020)

Anna Kostianko, PhD, co-supervised with Sergey Zelik, University of Surrey (2013 - 2017)

“Inertial Manifolds for Semilinear Parabolic Equations which do not Satisfy the Spectral Gap Condition”

Dan Hill, MMath dissertation, University of Surrey (2016-2017)

“3D Incompressible Navier-Stokes Equations in a Thin, Spherical Shell”

Adam Nasim, MSc dissertation, University of Surrey (2016)

“Wave-like Solutions to a Quasi-linear Schrödinger Equations for Large Amplitude Inertial Oscillations in a Rotating Shallow Fluid”

Adam Pretorius, MMath dissertation, University of Surrey (2015-2016)

“Energy Stability of the Navier-Stokes Equations”

Daniel Robinson, BSc dissertation, University of Surrey (2014-2015)

“Linear Evolution Partial Differential Equations on the Half-line”

Timothy Burchell, Undergraduate, University of Surrey, funded by London Mathematical Society

“Undergraduate Research Bursary” (2014)

Hannah Smith, Undergraduate, University of Surrey, EPSRC-funded summer research (2013)

Publications

B. Cheng, P. Qu and C. Xie, “Singularity formation and global existence of classical solutions for one dimensional rotating shallow water system”. submitted (2017)

B. Cheng, J. Cheng, M. Cullen, J. Norbury and M. Turner, “A rigorous treatment of moist convection in a single column”. *to appear in SIAM J. on Mathematical Analysis* (2017)

- B. Cheng, M.J.P. Cullen, J.G. Esler, J. Norbury, M.R. Turner, J. Vanneste and J. Cheng, “A Model for Moist Convection in an Ascending Atmospheric Column”. *to appear in* Quarterly J. of the Royal Meteorological Society (2017)
- B. Cheng, C. Tronci and E. Süli, “Existence of global weak solutions to a hybrid Vlasov-MHD Model for magnetized plasmas”. Proceedings of London Mathematical Society (2017). doi: 10.1112/plms.12053
- B. Cheng and A. Mahalov, “Time-averages of fast oscillatory systems in three-dimensional geophysical fluid dynamics and electromagnetic effects”. *to appear in* Zonal Jets: Phenomenology, Genesis, Physics, eds. Boris Galperin and Peter L. Read, Cambridge University Press (2017)
- Bin Cheng, “Improved accuracy of incompressible approximation of compressible Euler equations”. SIAM J. on Mathematical Analysis, vol. 46 (2014), pp. 3838-3864. doi: 10.1137/140955173
- Bin Cheng and Alex Mahalov, “Euler equations on a fast rotating sphere – time-averages and zonal flows”. European J. Mech. - B/Fluids, vol. 37 (2013), pp. 48-58. doi: 10.1016/j.euromechflu.2012.06.001
- Bin Cheng and Alex Mahalov, “Time averages of fast oscillatory systems”. Discrete and Continuous Dynamical Systems - Series S, vol. 6 (2013), pp. 1151-1162. doi: 10.3934/dcdss.2013.6.1151
- Bin Cheng, “Singular limits and convergence rates of compressible Euler and rotating shallow water equations”. SIAM J. Mathematical Analysis, vol. 44 (2012), pp. 1050-1076. doi: 10.1137/11085147X
- Bin Cheng and Chunjing Xie, “On the classical solutions of two dimensional Rotating Shallow Water system”. J. Differential Equations, vol. 250 (2011), pp. 690-709. doi: 10.1016/j.jde.2010.09.017
- Bin Cheng and Eitan Tadmor, “Approximate periodic solutions for the rapidly rotating shallow-water and related equations”. Water waves: theory and experiment – Proc. of the conference, pp. 69-78, World Scientific Pub. Co. Inc., (2010).
- Bin Cheng and Eitan Tadmor, “An improved local blow-up condition for Euler-Poisson equations with attractive forcing”. Physica D, vol. 238 (2009), pp. 2062-2066. doi: 10.1016/j.physd.2009.08.008
- Bin Cheng, “Multiscale dynamics of 2D rotational compressible Euler equations – an analytical approach”. Hyperbolic problems: theory, numerics and applications, pp. 497-506, Proc. Sympos. Appl. Math., 67, Part 2, American Mathematical Soc., (2009).
- Bin Cheng and Eitan Tadmor, “Long time existence of smooth solutions for the rapidly rotating shallow-water equations and Euler equations”. SIAM J. Mathematical Analysis, vol. 39 (2008), pp. 1668-1685. doi: 10.1137/070693643

Unpublished Work

(available at <http://personal.maths.surrey.ac.uk/st/bc0012/>)

[1] Course pack “Introduction to Numerical Methods”.

[2] Explanatory notes “Geometrical tools for PDEs on a surface”.

Selected Awards

The Leverhulme Trust “Research Project Grant” (PI) (2017-2021)

Royal Society “International Exchanges Scheme” (PI) for the project “Singular limits and convergence rates of multi-scale Euler and MHD systems ” (2016-2018)

Bursary from the “EPSRC Network: Maths Foresees” to organize a workshop at Surrey on “Coupling moist convection and large scale dynamics in numerical weather prediction models” (2016) – *website*

London Mathematical Society “Visits to the UK Grant” (2015)

London Mathematical Society “Conference Grant” (2014) – *website*

London Mathematical Society “Undergraduate Research Bursary” for supporting an undergraduate student at University of Surrey (2014)

Visiting Fellow, “Mathematics for the Fluid Earth”, Isaac Newton Institute for Mathematical Sciences, Cambridge UK (2013)

EPSRC (Engineering and Physical Sciences Research Council) summer research bursary for supporting an undergraduate student at University of Surrey (2013)

Faculty Research Support Fund, University of Surrey (2013, 2014, 2015, 2017)

T. H. Hildebrandt Research Assistant Professorship, Department of Mathematics, University of Michigan (2007 - 2010)

Visiting Fellow, National Institutes of Health, Bethesda, Maryland USA (2007)

Dissertation Fellowship, Department of Mathematics, University of Maryland (2006)

Monroe Martin Prize, Spotlight on Graduate Research Competition, Department of Mathematics, University of Maryland (2006)

Student Travel Award, SIAM Conference on Analysis of PDEs, Boston, Massachusetts USA (2006)

Jacob K. Haber Travel Grant, Graduate School, University of Maryland (2006)

Hedge Fellowship, Mathematics Department, UCLA (2002)

Guanghua Fellowship, and Outstanding Academic Award, Peking University (1997 - 2000)

Services

Referee for international journals including:

- SIAM Journal on Mathematical Analysis, Nonlinearity, Physics Letters A, Journal of Fluid Mechanics, Royal Society of Edinburgh (Proceedings A), Michigan Mathematical Journal, Communications in Mathematical Sciences, Communications in Nonlinear Science and Numerical Simulations, Zeitschrift für angewandte Mathematik und Physik, Journal of Mathematical Analysis and Applications, Science of Asia, American Mathematical Monthly.

Co-organizer of workshop “Coupling moist convection and large scale dynamics in numerical weather prediction models” funded by the *EPSRC Network: Maths Foresees*, University of Surrey, March 2016 – *website*

Co-organizer of “Singular limits in mathematical physics” mini-symposia at the International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, August 2015 – *website*

Co-organizer of “Mathematics, climate and geophysical fluid dynamics” mini-symposia funded by the *CliMathNet* at the joint BMC/BAMC meeting in Cambridge, March 2015 – *website*

Organizer of “Multiscale PDE systems of Fluid Models and Applications in Geophysics” funded by London Mathematical Society *Conference Grant* and the Department of Mathematics, University of Surrey, October 2014 – *website*

Organizer of the colloquium series, Department of Mathematics, University of Surrey, UK (2017 -)

Administrator of “International exchanges and relations”, Department of Mathematics, University of Surrey, UK (2013 -)

- Coordinate with International Relations Office of University of Surrey and partner schools to look after exchange students, both incoming and outgoing, and advise on their selections of courses.
- Work on introducing an exchange program for undergraduate students to conduct mathematical research overseas.

Co-organizer of the special session “Mathematical fluid dynamics and its application in geosciences” in the AMS fall sectional meeting at the University of Arizona, Tucson, AZ, October 2012 – *website*

Mentor for students from the Barrett Honors College (ASU) in a one-to-one fashion, simulating a research environment.

Participant and lecturer of the ASU Math Club (undergraduate).