



Curriculum Vitae: BRAILEY SIMS

Qualifications:

BSc (Hons I and University Medal) [University of Newcastle, 1969]

PhD [University of Newcastle, 1972], thesis: *On Numerical range and its application to Banach algebra*, Supervisor: A/Prof John R. Giles.

Current Appointment:

Associate Professor, School of Mathematical and Physical Sciences, The University of Newcastle, Australia [Three year post-retirement contract at 35% FT]

Previous Academic appointments:

Associate Professor, School of Mathematical and Physical Sciences, The University of Newcastle, Australia [January 1990 - March 2012]

Senior Lecturer, Department of Mathematics, The University of New England [1972-1989]

Visiting Appointments:

Distinguished Visiting Professor at the University of Saville (2013)

Visiting Professor CIMAT, Mexico (2004)

Distinguished Visiting Professor Chiang Mai University, Thailand (2002, 2003, 2004, 2010)

Distinguished Visiting Professor at 6 Korean Universities in 1999

Distinguished Visiting Professor at the University of Pretoria, South Africa, (1997)

Distinguished Visiting Scholar at the University of Valencia, Spain (1997)

Visiting Scholar at Simon Fraser University (1996)

Visiting Scholar at Kent State University (1986)

Research:

My principal area of research is functional and nonlinear analysis, in which I have published over 70 refereed papers in major international journals and conference proceedings. My focus has largely been on *attainment* problems in the setting of Banach spaces and more recently geodesic metric spaces, especially CAT(0) spaces.

My latest work has concerned the solution of feasibility problems by projection type algorithms (for example those of Von Neumann and of Douglas-Rachford) particularly in the presence of non-convex constraints, where, although the methods are observed to often work well we have almost no underlying theory to justify its use.

Much of my work has been in metric fixed point theory, where I have primarily concentrated on the interplay between a space's geometry and its enjoyment of the (weak) fixed point property; that is, every nonexpansive self-mapping of a bounded, nonempty, closed (weakly compact), and convex subset has a fixed point.

Strong properties involving restrictions on various (Banach space) moduli, such as uniform convexity (rotundity) and Uniform smoothness (Fréchet differentiability), imply normal structure which in turn implies the fixed point property. Of greater interest are conditions sufficient for the (weak) fixed point property, but not strong enough to entail (weak) normal structure. Such conditions frequently concern the nature of weak null sequences in the space. Stability of the fixed point property under equivalent renormings is also an area of special interest as is the use of iterative schemes (such as that of Ishakawa) to approximate fixed points when they exist.

An important tool in many of my investigations is the use of metric and Banach space ultraproducts, one of my areas of strength.

Research impact: As a result of my research I am internationally recognized as one of the leading contributors to, and experts in, metric fixed point theory and related topics, as evidenced by the following.

My work has received in excess of 2,000 citations and I have an overall **h** index of 19 placing me well within the top quartile of mathematical scientists (quite high for a pure mathematician).

The *Handbook of Metric Fixed Point Theory*, Kluwer, 2001, 716 pages, edited by William A. Kirk and myself, in which I also authored one and co-authored three of the 19 chapters, remains the definitive work in the area [Math. Reviews; MR1904271 and those following].

In the last 20 years I have delivered over 25 invited key note and plenary addresses at major international conferences in eight countries.

I have served or am currently serving as a member of the Editorial Board and/or Associate Editor for eight major international mathematics journals.

I was/am a member of the Organizing and Scientific Committees for: the International Conference on Fixed Point Theory and Applications in Israel (2001), Sspain (2003), Mexico (2005), Thailand (2007), Taiwan (2009), Romania (2012) and Turkey (2015); the World Congress of Nonlinear Analysts (involving over 1,500 participants), in Catania (2000), Orlando (2004) and Orlando (2008); as well as several local mini-conferences and workshops.

By invitation I have given series of specialist lectures at research workshops in Seville (1995), Chiang Mai (2000 and 2003), the Centro de Investigacion en Matematicas, Mexico (2004) and Bangkok (2012).

I am also widely known as an expert in the application of ultraproducts to analysis, partly through the above work and partly through my monograph, *Ultra-techniques in Banach Space theory*, Queen's Papers in Pure and Applied Mathematics **60** (1982), 117 pages (24 citations recorded in Google Scholar since 2000) – together with my former PhD student, Mark Smith, an updated and enlarged edition is currently being prepared for publication by Springer.

A monograph on *Nonlinear analysis in geodesic metric spaces* is currently under preparation jointly with my former PhD student, Ian Searston, for the Australian Mathematical Society's Lecture Series (published by Cambridge University Press).

Principal Research collaborators:

Professor Jonathan M. Borwein (Australia), Professor Jesus Garcia-Falset, Professor Enrique Llorens-Fuster and Professor Tomas Dominguez Benavides (Spain), Dr George Yuan (Australia and USA), Professor Hong-Kun Xu (Taiwan and China), Professor William A (Art) Kirk and Professor Christopher Lennard (USA), Professor Yunan Cui and Professor Gang Li (China), Professor Kazimierz Goebel, Professor Henryk Hudzik and Professor Stanislaw Prus (Poland).

Research affiliations and income:

I was a Chief Investigator in the Mathematical Systems Theory Program of the ARC Centre for Complex Dynamic Systems and Control (1998 - 2010)

I have been a Principal Researcher in the UoN PRC for Computer Aided Research Mathematics and its Application (CARMA) from its inception.

Since 2005 I have been a co-investigator on grants totaling \$6.5M and recipient of \$50K in research support from international sources.

Refereed research papers (56 publications prior to 2005):

- [72] David Borwein, Jonathan M. Borwein and Brailey Sims, Monotonicity of symmetric Riemann sums, submitted *Mathematics Gazette*.
- [71] Jonathan M. Borwein, Brailey Sims and Mathew K. Tam, Norm convergence of realistic projection and reflection methods, to appear in *Optimization*, pp 18.
- [70] D. Borwein, J. M. Borwein and B. Sims, On the Solution of Linear Mean Recurrences, *AMERICAN MATHEMATICAL MONTHLY*, **121**, (2014), 486–498.
- [69] W. M. Kozłowski and B. Sims, On the Convergence of Iteration Processes for Semigroups of Nonlinear Mappings in Banach Spaces, in D. H. Bailey, H. H. Bauschke, P. Borwein, F. Garvin, M. Théra, J. Vanderwerff and H. Wolkowicz (Eds.), *Computational and Analytical Mathematics*, Springer, Vol. **50**, (2013), 463–484.
- [68] M. Bacak, I. J. Searston and B. Sims, Alternating projections in CAT(0) spaces, *Journal of Mathematical Analysis and Applications*, **385**, (2012), 599–607.

- [67] Y. Cui, H. Hudzik and B. Sims, Properties \tilde{U}^* and \tilde{W} in Orlicz spaces and some of their consequences. *Journal of Mathematical Analysis and Applications*, **387**, (2012), 400–409.
- [66] J. M. Borwein and B. Sims, The Douglas-Rachford algorithm in the absence of convexity, in H. H. Bauschke, R. S. Burachik, P. L. Combettes, V. Elser, D. R. Luke, & H. Wolkowicz (Eds.), *Fixed-Point Algorithms for Inverse Problems in Science and Engineering* Vol. **49**, (2011), Springer, 93–109.
- [65] H. Khandani, S. M. Vaezpour and B. Sims, Common fixed points of generalized multivalued contraction on complete metric spaces, *Journal of Computational Analysis and Applications*, **13**, (2011), 1025–1038.
- [64] K. Goebel and B. Sims, Mean Lipschitzian mappings. *Contemporary Mathematics*, **513**, (2010), 157–167.
- [63] Z. Mustafa and B. Sims, Fixed point theorems for contractive mappings in complete G-metric spaces, *Fixed Point Theory and Applications*, **9**, (2009), 1–10.
- [62] G. Li and B. Sims, T-Demicloseness principle and asymptotic behavior for semigroups of nonexpansive mappings in metric spaces, in S. Dhompongsa, K. Goebel, W. A. Kirk, S. Plubtieng, B. Sims, & S. Suant (Eds.), *Fixed Point Theory and its Applications*, Yokohama Publishers, (2007), 103–108.
- [61] Tim Dalby and Brailey Sims, Banach lattices and the weak fixed point property, *Proceedings of the Seventh International Conference on Fixed Point Theory and its Applications*, Yokohama Publ., Yokohama, 2006, 63–72.
- [60] S. Dhompongsa, W. A. Kirk and B. Sims, Fixed points of uniformly Lipschitzian maps, *Nonlinear Anal.*, **65**, (2006), 762 – 772.
- [59] Zead Mustafa and Brailey Sims, A new approach to generalized metric spaces, *J. Nonlinear & Convex Anal.*, **7**, (2006), 289–297.
- [58] W. A. Kirk, and B. Sims, An ultrafilter approach to locally almost nonexpansive maps, *Nonlinear Analysis, Theory, Methods and Applications*, **63**, (2005), 1241–1251.
- [57] W. A. Kirk, and Brailey Sims, An ultrafilter approach to locally almost nonexpansive maps, *Nonlinear Anal.*, **63**, (2005), 1241–1251.

Higher degree supervision:

I have been sole or principal supervisor for eight successful PhD's, including three international students, and three research Masters degrees. Currently I am co-supervisor for one domestic Research Masters candidate and four PhD candidates, including one international student.

Teaching:

I have:

extensive experience in curriculum development, coordination and teaching in most areas of mathematics, at all levels and to students with a wide range of abilities,

developed new courses often in collaboration with other Faculties,

produced extensive material to enrich the instruction in various subjects, for example, a 107 page book on *Mathematical theory of Optimization*,

initiated and undertook a complete revision of the applied mathematics offerings at the University of Newcastle (1999),

introduced the Finance co-major within the Bachelor of Mathematics in 1998,

engineered an improved mode and format for the mathematics tutorial program at the 2000-level,

developed an audio recording *verbalizing mathematics* for international students who's non-native English speakers,

published 16 papers, over half in fully refereed journals, that are related to the promotion and teaching of mathematics,

been awarded a University Teaching Grant to develop computer-aided instructional material.

Administrative activities:

Deputy President of the Academic Senate of the University of Newcastle, 2002 - 2008.

Member of the Academic Senate, 1992 - 1993, 1999 - 2001.

Head of the Department of Mathematics, 1997, 1998.

Head of the School of Mathematical and Physical Sciences, 1999-2001.

Head of the Mathematics Discipline, 2002-2010.

Assistant Dean of the Faculty of Science 1994-1996 and 2002-2004.

Professional activities and Scholarship

I have served, or am currently serving, as a member of the Editorial Board and an Associate Editor for eight major international mathematics journals, including the Journal of Mathematical Analysis and Applications, the Journal of Nonlinear Analysis – Theory, Methods and Applications, the Journal of Fixed Point Theory and Applications, the Bulletin of the Australian Mathematical Society, and the Journal of Nonlinear and Convex Analysis.

Referee for numerous major international mathematical journals.

Reviewer for Mathematical Reviews of the American Mathematical Society.

Member of the governing Council of the Australian Mathematical Society, 1987-1990, 1994-1997 and Editor of the Society's Gazette 1991-1994.

Assessor for the Australian Research Council and for the Natural Sciences and Engineering Research Council of Canada.

Deputy Chair (since 2011) of the NSW-AVCC Technical Committee on Scaling, responsible for calculating, monitoring, and policy development for, the NSW and ACT ATAR, and a member of the Committee between 1985-1989 and 1995-2010.

I was a member for 10 years of the former N.S.W. Board of Senior Studies (High School) Curriculum Committee for Mathematics and more recently I have served on a number of Board of Studies' and other Advisory Committees, including committees related to the development of the National Mathematics Curriculum (F-12).

University of Newcastle representative on the Hunter Institute of TAFE Advisory Council (2006-2010).

Member of the Advisory Board of Avondale College (1994 - 2013)

President of the New England Mathematics Association (NEMA) 1973-1975 and President of the Newcastle Mathematics Association (NMA) 1992-1994, now a Chapter of the Maths. Association of NSW (MANSW), itself a branch of the Australian Association of Mathematics Teachers, and member of the NMA Executive 1991-present.

I have broad mathematical interests ranging from mathematical education to aspects of mathematical modeling in the life and physical sciences, and Engineering, and have acted as a consultant to people working in these areas.

Community outreach activities:

From its inception until recently I was actively involved in the planning and operation of the University's (now *National Science and Engineering Challenge*) program.

I initiated and co-managed the highly successful final year high school *Experiment Fest* (engaging over 2,000 students each year),

I initiated a Mathematics Enrichment Programme for talented High School Students which operated from 1992 to 2004 and was re-activated in 2013.

I conceived and managed The *UniStudi* Scheme (a University operated tutorial programme for HSC students in Chemistry, English, Mathematics and Physics) which operated successfully as a self-supporting enterprise from 1997 to 2000.

On several occasions I was responsible for offering the University subject MATH1210 - *Advanced Mathematics* to able students during their senior high school years and was Chair of a University Committee to establish procedures for early admission of accelerated high school students.

In addition I have been actively involved in numerous secondary schools Visits Days and secondary school liaison and promotion activities, including Career and Information 'Nights', meetings with teachers, HSC Study Days and the *SMART* Program.

I was Assistant Dean (Marketing) for the Faculty of Science (2002 - 2004).

SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
THE UNIVERSITY OF NEWCASTLE, NSW 2308, AUSTRALIA