CENTREFOLD

Robert McLachlan

It is perhaps an understatement to say that Robert McLachlan is a well known member of the New Zealand mathematics community. In his nineteen years as an academic in New Zealand he has left a large footprint here and abroad not only through his research in numerical analysis, but also through his extensive involvement with the NZMS and the Royal Society among other organizations. If, for example, we look at his contributions to the NZMS we find that he served six years on the council, he edited the newsletter for six years (matching Mike Hendy's term), he was the president of the society in 2008 and 2009, becoming vice president in 2010. He is still an editor for the New Zealand Journal of Mathematics. Given his extensive research record, it is hard to see where he found the time to serve on so many committees and panels.

Robert is known worldwide for his contributions to geometric integration and, in particular, the application of symplectic techniques to the numerical solution of differential equations. The field is not narrow: to tackle questions one must have a taste for differential geometry, groups, dynamical systems, classical mechanics, analysis, and of course numerical analysis. Keeping in touch with all these fields, he never lost sight of solving concrete problems in dynamics and in industry. The central idea is to develop numerical techniques that mimic the symmetry/structure of the equations. If, for instance, energy is conserved, an algorithm should reflect this property. The field was emerging in the early 1990's and Robert soon made his contributions. His research went from strength to strength as he and his collaborators investigated Hamiltonian systems and differential equations with symmetries. He developed novel numerical techniques that exploited the underlying structure of the equations and led to more efficient and stable computation. In 2007, he was awarded the prestigious Dahlquist Prize for his work on the numerical solutions of differential equations.

Robert is a native of Christchurch. He was schooled there and went to the University of Canterbury, where in 1984 he earned his BSc honours in mathematics. Asked about "defining moments" in his education that sparked interest in what would later be his passion (numerical analysis) he is quick to cite two instances. In his last year of high school, the institution, like many others, had acquired a computer. This was in the very early 1980's before micro computers were available and still in the last days of computer cards. Although the school had the machine (a PDP-11/10), it did not appear to have a structured learning programme for its use. Robert had freedom to experiment and play with the computer and thus develop his computing and programming skills (remember Assembly Language). His second formative experience was at the University of Canterbury. Here, Bob Broughton introduced project based computing papers that provided students with the freedom to learn, develop and apply algorithms among other things. Other highlights were Gordon Petersen's famous Analysis I [1] and a Moore method course on topology with Bill Baritompa. Robert flourished in this environment and went on to do graduate work in numerical analysis.

He embarked on his Ph.D. studies in the United States at the California Institute of Technology in 1986 under the supervision of Herb Keller. His work here was in computational fluid dynamics. He finished his Ph.D in 1990

[1] The first words he heard at university were not "Good morning" or "Welcome" but "We'll start with metric spaces"

having submitted the thesis "Separated Viscous Flows via Multigrid". Robert went on to a postdoctoral position at the University of Colorado, Boulder, and soon his interest turned from computational fluid dynamics to the emerging field of symplectic geometry and the use of it in numerical analysis. Jürgen Moser was visiting Boulder at the time and met with Robert frequently to discuss the new field. Robert found these meetings formative and he went on to take a postdoctoral position at ETH Zurich for six months. Yet another formative person in his early career was Jerry Marsden, who invited Robert to one of the first conferences on geometric integration.

Robert came to Massey University in 1994 and expanded his worldwide network of collaborations. Of particular note is the long and fruitful collaboration with Reinout Quispel at La Trobe that led to some 26 publications on geometric integration including a weighty tome on splitting methods published in *Acta Numerica* (2002). More recently, Robert has turned his attention to B-series, which were pioneered in the 1960s and 1970s by John Butcher. Robert and his collaborators found new structure and generalizations of these series, particularly when the underlying vector field is Hamiltonian. In this case, there is a detailed structure with respect to the vector field's Hamiltonian and its symplectic structure. A generalization to affine-equivariant series has structure with respect to Euclidean volume.

Aside from a prolific research output, Robert was also busy facilitating research in NZ and abroad through organizing conferences. He was a founder and organizer of the Manawatu-Wellington Applied Mathematics Conference, which began in 1998 and is now an annual event. Over the last decade, he organized conferences on dynamical systems and geometric integration along with more general events such as the NZ Mathematics Colloquium.

In 2002, Robert was appointed to a chair in applied mathematics at Massey University and was made a fellow of the Royal Society of New Zealand. Other highlights include an NZIMA Maclaurin Fellowship and an NZMS Research Award in 2005, and a James Cook Fellowship in 2013. Aside from his research output, Robert found time to accept numerous plenary speaker invitations and supervise twelve graduate students. It does not look like things are going to slow down. Currently Robert is supervising four Ph.D. students, he just finished organizing the international conference "Manifolds and Geometric Integration", and he is running the joint EU-NZ project "Collaborative Research in Structure Preservation" that brings some twenty international visitors to NZ. In September, he is off to the UK to deliver the LMS Aitken Lectures at six universities.

Bruce van Brunt