

PROFILE

Alona Ben-Tal



Currently an Associate Professor of Mathematics and also Deputy Head of School in the School of Natural and Computational Sciences at Massey University's Albany campus, Alona has a varied scholastic and academic history.

She began with a BSc (cum laude) and an MSc, both in Mechanical Engineering, at the world-renowned Technion Israel Institute of Technology. After 3 years experience as a Research Engineer in the Israel Electric Corporation, Alona moved to NZ (with husband Gadi and then 2-year-old daughter Yael) and pursued a PhD in Mathematics at the University of Auckland from where she graduated in 2001. Following a fixed-term lectureship in the Mathematics Department, she joined the UoA's Bioengineering Institute as a NZ Science & Technology Post-doctoral Fellow. Alona moved to Massey University at Albany in 2005, first as a Lecturer, but was soon promoted to Senior Lecturer, and this year to Associate Professor.

Alona is an established international researcher. Her research is truly interdisciplinary and involves the development and analyses of mathematical models for the study of the cardiorespiratory system.

For example, using several models that vary in complexity and optimal control theory, Alona (in collaboration with Sophie Shamailov and Julian Paton) showed that the acceleration of heart rate during inspiration does not optimize gas exchange as previously thought but instead helps the heart conserve energy while maintaining physiological levels of carbon dioxide in the blood. This work has led to further research into a novel pacemaker that reinstates heart rate variability in people with heart disease (currently being tested on sheep).

Alona has also studied the lungs of birds, which are remarkably different from mammalian lungs. With Emily Harvey she developed and analysed a new discontinuous dynamical model that helps understand how unidirectional flow in birds lungs is generated. Another example demonstrating Alona's wide range of research activities is the numerical technique she developed, based on an Equation Free approach (in collaboration with Yannis Kevrekidis, the founder of this approach) which leads to a better understanding of how neural networks can be simplified.

Apart from Masters, Post-graduate and Post-doctoral Scholarships, Alona's work has attracted significant funding of nearly NZD1 million, through a Marsden Fast Start grant, and for collaborative research from a Marsden Grant (an AI for NZD403k over 3 years), the NIH (a PI for USD210k over 5 years), the HRC (an AI for NZD120k over 3 years) and the Catalyst Seeding Fund (PI for NZD80k over 2 years). These grants show the value that funders place on the work she does.

Alona has more than 20 refereed articles in journals and conference proceedings, mostly with her as principal author. But most are also collaborative works involving NZ and international co-authors, showing recognition that the mathematics she does has an important part to play in cutting-edge physiology studies. She has an extraordinary record of more than 90 presentations of her work at (mostly international) conferences — in the area she works in, Alona's results are disseminated quickly. Alona has given Invited Talks at international conferences in several countries, and most recently (late last year) was a plenary speaker at the NZMS Colloquium in Dunedin.

But this is not all. As a well-rounded academic and researcher, Alona has been a member of degree review panels, but has also taken part in professional organisations. She has been Chair of the NZ Branch of ANZIAM for 3 years, and has also served the branch as Secretary and Treasurer. Alona has been involved with organising several conferences, and has been a member of several judging panels for student talks and posters. She coordinated efforts to establish the ANZIAM-sponsored poster presentations at the annual NZMS Colloquium. Alona has served as a Moderator for MINZ, is an Associate Editor for the ANZIAM Journal, has been a member of a Marsden Fund panel. She is a member of SIAM, ANZIAM, AMS and NZMS; she has been a Fellow of the NZMS since 2016.

As a teacher, Alona has an IIMS Distinguished Teaching Award, and has been nominated for Massey University's Lecturer of the Year many times. She has the 2015 Alexander Aitken Award from the Albany Students' Association for teaching first-year maths (as we all know, this is a real test for a Maths lecturer). Alona has taught across all university levels in Mathematics, and has supervised several postdocs, research assistants and summer students, as well as Project, Masters and PhD students. She is also an experienced examiner of theses.

As might be expected of someone with a mechanical engineering background, she is a staunch supporter of dual-fuel (electric-petrol) vehicles, one of which she uses to commute from her Mangere Bridge residence to Massey each day.

Among her colleagues, Alona is known to be determined, forthright and gutsy, but also kind and generous. Her views are reasoned, balanced and sane; in the context of the usually rather conservative atmosphere of mathematics academia she is a breath of fresh air! Her multi-disciplinary background has provided her with a view that applications are as important as the theory, and that the former are the way to promote the practicality of mathematics.

Robert McKibbin