

PROFILE

Shixiao Wang



Dr Shixiao Wang is a Senior Lecturer in the Department of Mathematics at the University of Auckland and is retiring at the end of the year 2022. Before he joined the University of Auckland in 2003, Shixiao's academic journey was far from smooth and straightforward. Let us relate some aspects of it.

Shixiao was born in Shanghai, China, in the 50's. As he turned 13, the Great Cultural Revolution started and Shixiao had to stop going to school. Afterwards, he studied by himself mathematics and physics up to the undergraduate level in only three or four years. Neither schools nor universities were available at the time, Shixiao had to self-educate. Aged 17, Shixiao left Shanghai to move about 1000 km away to a rural place, where he spent six years farming the land.

After the Great Cultural Revolution, universities and schools reopened, and this was an opportunity for Shixiao to join the Northwestern Polytechnical University, Xi'an, China. He studied mathematics and physics, and passed his postgraduate examination within a year, before becoming a lecturer in that same university.

In 1985, after getting a general scholarship for overseas study, Shixiao moved to Paris, France, leaving wife and daughter in his home country, to pursue Ph.D. studies under the supervision of Prof Haim Brezis. He graduated in 1989 and multiplied post-doctoral positions in the USA afterwards, for instance at Rutgers University and Rensselaer Polytechnic Institute New York.

During his years in the States, his family joined him and he had to make a choice about his career to support his family. As a result, from 1997 to 2003, Shixiao worked in industry as a Researcher at General Electric. He designed an aerodynamically high efficiency blower with which he was awarded an USA patent. He also designed the ultra-quiet fan-series for GE refrigerators in 2000 based on cutting-edge aero acoustic technology. Multi-millions units have been manufactured with this fan-series in the past decades.

As his daughter graduated from high school in 2003 and entered adulthood, Shixiao decided to go back to academia and applied at the University of Auckland. At that time, the University of Auckland was seeking applicants for a new lectureship in Industrial Mathematics. Shixiao, with his exceptional academic background,

and experience with industry, got the position. He was welcomed by Prof David Gauld, who was the Head of Department at the time.

A key aspect of Shixiao's research was the development of a novel theory of the instability of rotating fluids (vortex breakdown). The long established linear theory was by Lord Rayleigh in 1917, but this mysteriously disagreed with modern experiments. People had been trying unsuccessfully to explain the discrepancy since the 1960's. Finally, in a series of papers from 1995 to 1997, Shixiao and his collaborator, Zvi Rusak, were able to explain this using nonlinear functional analysis.

Shixiao's early days at Auckland were not without challenges. Having entered the "publish or perish" environment of academia directly from industry, Shixiao, unlike most people starting with a position at a university, had no publications in the pipeline. He worked hard to resolve this situation, but the new perspectives that featured in his work took time to be accepted by the established fluid mechanics community. Shixiao was aware that he needed publications for his position at the University of Auckland, so the delays lead to anxious times.

Shixiao continued his research on stability of rotating flows over the past twenty years at Auckland. He always believed that mathematics and physics should go together to answer applicable questions, with the mathematics used as a tool to reveal the underlying physics. In this sense, Shixiao's Ph.D. with Brezis, which was very much in the area of nonlinear functional analysis, seems to have given Shixiao the power to see things that others have missed. After publishing their original papers, which have since attracted hundreds of citations, Shixiao continued to collaborate mainly with Rusak over this time, until Rusak sadly and unexpectedly passed away in 2020. Shixiao's research is published in highly ranked journals on fluid flow, often with Ph.D. students that he has supervised while at Auckland.

In his spare time, Shixiao plays the violin and is happy to play to his dinner guests.

At the day of our conversation, Shixiao expressed a deep satisfaction with the work achieved and is happily retiring, letting future generations of researchers looking at the subsequent challenges. He now plans to move to New Jersey, where he will be with his daughter and two grand-children. And as a conclusion, Shixiao wishes to acknowledge New Zealand, the University of Auckland and all his colleagues.

Marie Graff and Steve Taylor