Ernest Oliver Tuck

1 June 1939 – 11 March 2009

Ernie Tuck was born in Adelaide, South Australia. He and his brother were raised by their mother, after their father was killed in an automobile accident. This family tragedy had a happy consequence later, when Ernie met Helen Wood at a camp for children of deceased military veterans.

Ernie studied Applied Mathematics as an undergraduate at the University of Adelaide, where his principal mentor was Professor R.B. Potts. Ren Potts' interests in operations research and statistics rubbed off on his student, and provided the topic of Ernie's first research paper. In 1960, after completing the requirements for his Honours degree and receiving a scholarship, he embarked by ship to the UK to study with Fritz Ursell at Cambridge University. In addition to Ursell's influence, Tuck's subsequent focus on ship hydrodynamics and related fields may be attributed to his observations on the long voyage, and to a deep inquisitiveness of science, technology, and engineering applications. Another possible connection with the field of hydrodynamics is suggested by the fact that Sir Horace Lamb had been the first Professor of Applied Mathematics at Adelaide.

With guidance and encouragement from Ursell, Ernie focused his PhD research on one of the first applications of slender-body theory to ships. Tuck's approach was revolutionary, based on the method of matched asymptotic expansions, and applied to the prediction of the wave resistance of a ship moving in steady motion on the free surface. When Ursell moved to Manchester after Tuck's first year, an arrangement was made where Ernie spent his second year at Cambridge and his third at Manchester, ultimately receiving his PhD from Cambridge in 1963. After his second year a small meeting was organised at Wageningen, Netherlands, to discuss his research and the complementary work of Gerrit Vossers on the same topic. That meeting, which was supported by the US Office of Naval Research, was attended by Tuck, Vossers, Reinier Timman, Fritz Ursell, Nick Newman and Francis Ogilvie.

Helen followed Ernie to Cambridge after his first year, and they were married in the chapel of Trinity College on 21 October 1961. Their son Warren was born in Washington, and their second son Geoffrey was born after they returned to Adelaide. Ernie and his family, which now includes four grandchildren, enjoyed a close enduring relationship. When the boys were young they often traveled with their parents, living for extended periods in the United States. Ernie and Helen shared a strong interest in backgammon, and other games of chance, where Ernie's early exposure to statistics suggests a possible advantage. Ernie published papers on this subject, and on at least one occasion they were asked to leave the Adelaide Casino!

In 1963 Ernie and Helen came to the United States, initially to work with Ogilvie and Newman at the David Taylor Model Basin, a research facility of the US Navy outside Washington, and subsequently with Ted Wu at CalTech. Ernie worked on a wide variety of topics related to ship hydrodynamics, acoustics, bio-fluid mechanics, and numerical analysis. His contributions to these fields were based primarily on analytic methods, but it was during this time that `high-speed' mainframe computers were becoming available. Ernie was quick to embrace the developing field of numerical computation in order to produce practical and illustrative results based on his theoretical analyses. One of his most exciting papers (J Fluid Mech, **22**, 1965, pp 401-414) presented computations of the nonlinear waves generated by a submerged two-dimensional dipole in steady motion. The streamlines include jets emerging from the free surface, which generated much discussion. Helen embroidered a splendid wall hanging with images of these streamlines.

In 1968 Ernie returned to Adelaide University as a Reader in Applied Mathematics. Subsequently he was appointed the Elder Professor of Applied Mathematics. He served for several years as Department Chair and also as Dean of the Faculty of Mathematics and Computer Science. He received many honours including election as a Fellow of the Australian Academy of Science (1988), award of the Georg Weinblum Lectureship (1990), Fellow of the Australian Academy of Technological Science and Engineering (1995), award of the Thomas Ranken Lyle Medal by the Australian Academy of Science (1999), and the ANZIAM Medal by the Australian and New Zealand Industrial and Applied Mathematics division of the Australian Mathematical Society (1999). From 1984 to 1992 he served as Editor of Series B (Applied Mathematics) of the Journal of the Australian Mathematical Society. He was an early advocate of LaTeX, and in 1992 he established TeXAdel, an organization responsible for automating the production of the AMS journals. After he retired officially, a symposium was held in his honour in January 2003, and attended by many of his colleagues and former students from all over the world. At the time of his retirement his students and friends funded the E.O. Tuck Prize, a cash prize to be awarded each year to students of Applied Mathematics. In 2008 Ernie served as President of the IUTAM Congress, a prestigious responsibility which he accomplished with his usual skill and enthusiasm.

From the perspective of colleagues in the northern hemisphere, Adelaide is one of the most remote universities in the world. Ernie traveled extensively to overcome this handicap, often returning to his old haunts in the US and UK. He spent sabbaticals as a Visiting Professor at CalTech, Stanford, the University of Michigan, and MIT. Adding some symmetry to his own travels, he attracted many visitors and students from other countries. In addition to frequent participation in ANZIAM conferences, he made many longer trips to attend the (ONR) Symposia on Naval Hydrodynamics, IUTAM Congress, International Workshop on Water Waves and Floating Bodies (IWWWFB), etc. He was particularly active in small informal meetings, stimulated no doubt by his early exposure to seminars at Cambridge, the ad hoc meeting in Wageningen, and his membership on the Analytical Ship-Wave Panel (H-5) of the US Society of Naval Architects and Marine Engineers. When the IWWWFB was started as an annual event in 1986 he was an enthusiastic participant, bringing much value to the meetings with his experience and insight.

Ernie's research was characterised by the recognition of new or unsolved problems, application of novel mathematical methods, and careful numerical analysis. He was particularly adept at solving complex problems with simple approximations, as in his applications of matched asymptotic expansions. When he first employed this method to analyse the wave resistance of slender ships it was relatively new, and unknown to most of us. Subsequently he found other problems to which the same method was applicable, including the `squat' of ships in shallow water, various types of flow or wave transmission through small gaps, end effects on blunt slender bodies, and bodies moving near a plane wall or in close proximity to other bodies. Several other topics which recur throughout the list of his publications include the strip theory of ship motions, Michell's thin-ship theory of wave resistance, planing, bodies with zero wave resistance, nonlinear free-boundary problems, numerical solution of integral equations, low-Reynolds number flows, wave resistance of multihull vessels, and lifting-surface theory. In later years he extended his horizon to include problems in pure mathematics related to Riemann's hypothesis and properties of the zeta function. His papers and lectures are clear, concise, and stimulating.

Adding to Ernie's long list of honours, the IWWWFB and Adelaide University have established the Tuck Fellowship Fund, to support participation in the Workshops by students and younger researchers. This Fund is supported by contributions from a large number of individuals from many countries, who have gained so much from Ernie Tuck's wisdom and friendship.

Nick Newman
13 April 2009