

# A Biography of J.N. Newman

by E.O. Tuck

John Nicholas (Nick) Newman was born in New Haven, Connecticut in 1935. He completed his secondary education at The George School, a Quaker boarding school in Pennsylvania, where he met Kathleen Smedley Kirk. They were married in 1956. They have three children, Jim, Nancy and Carol, and 5 grandchildren.

Nick's degrees (S.B. 1956, S.M. 1957 and Sc.D. 1960) are all from MIT, Cambridge, Mass., and were all taken in the field of Naval Architecture and Marine Engineering. However, being strongly influenced and inspired by his supervisor, the mathematician Fritz Ursell, Nick's work at the doctoral level began to be quite mathematical. This mathematical theme continued throughout his career, although his main research application interests remained in naval architecture, with emphasis on ship hydrodynamics.

The two major Newman employers were the David Taylor Model Basin (1959-1967) and MIT (1967-1996). At DTMB, he joined a particularly active group known as "Code 584" led by Francis Ogilvie, which was part of the Hydromechanics Laboratory whose head was Bill Cummins. Throughout his 8 years in Code 584, Nick was exposed to (and/or was the source of) an endless stream of interesting and challenging problems in the naval area. A number of young researchers joined Code 584, in part because of the attraction of working with Newman. These included people who made significant contributions to ship hydrodynamics then or later, such as Chris von Kerczek, Nils Salvesen, Choung Mouk Lee, and me (about which more later).

In 1966-7, there was an exodus from Code 584, with Tuck, Newman and Ogilvie all moving to academic positions. Nick's choice to move back to his alma mater led to a long academic career at MIT. During that period he supervised 30 or more graduate students, including 13 doctorates.

Among many highlights of Newman's career have been publication of his landmark book "Marine Hydrodynamics" in 1977, initiation (together with

David Evans) in 1985 of the annual International Workshop on Water Waves and Floating Bodies, now in its 21st year, election to the National Academy of Engineering in 1989, development (with Paul Sclavounos and others) of the body-wave interaction code WAMIT through the 1980s, and publication of more than 150 technical papers.

It is appropriate at this point for me to expand upon my own relationship with Nick Newman.

There is some doubt about when Nick and I first met. Probably it was when he visited Cambridge briefly in 1961 when I was a very new and shy PhD student, and I may not have said very much to him at that time. Nick had finished his MIT Naval Architecture thesis a year or so before I started mine at Cambridge in Applied Mathematics. The feature that brought us together in 1961 was that both of us were supervised by Fritz Ursell, who had visited MIT for a year in the late 1950s, and had started Nick off on his thesis work, after which Nick spent a year at Cambridge. Fritz is of course much more of a real mathematician than either of us.

Fritz moved from Cambridge to Manchester in 1961, and I followed him in August 1962. It was then and there that my second meeting with Nick occurred, and this was a most significant event for both of us. By then I was less shy, and capable of vigorous research interactions with Nick, especially on slender-body theory. We hit it off instantly, both technically and personally, and a life-long friendship began. We have been close colleagues for more than 40 years, in spite of most of those years being spent at opposite sides of the earth.

Nick and I have not actually published together very often. There were a couple of important joint papers at ONR Naval Hydrodynamics Symposia, first in 1964 (on ship motions) and then in 1974 (on ship-ship interactions). On the first of these occasions I displayed my naivety and ignorance by expressing an outrageous opinion during the formal discussion of our joint paper, an opinion which Nick did not share. I have never forgotten that lesson, which could have cost us our friendship, were it not for his tolerance and kindness.

We inspired each other's work, especially on shallow-water ship hydrodynamics, through the 1970s, but had just the one actual joint paper (on squat in canals, together with Bob Beck). Much more recently, we have done work together on moonpool sloshing modes, which was presented at the 2002 meeting of the IWWWFB.

But formal joint publications or not, the years between have been full

of technical interactions. We have bounced ideas off each other like billiard balls, or rather like a rolling ball that does gather moss, getting bigger and better with each bounce. For example, I recall introducing him to “economised series” as a tool for efficient computation of special functions, following which he wrote several significant papers using that tool to evaluate functions of importance in ship hydrodynamics, which I then used subsequently in ship wave computations.

We have visited each other often, Nick coming to Australia with Kathy about three times, and I to Boston with Helen a similar number of times. Our families grew close, and there was and is much love between us all.

Many others have expressed similar warm feelings about Nick Newman. Here are a few random quotes. Those of Ursell, Evans and Nielsen are extracted and condensed from the preface to the IWWWFB20 proceedings.

*Harry Bingham:*

... I immediately realized (1989) that this was a model for an effective, dynamic, stimulating group making real scientific progress. Nick, Paul Slavounos, Dick Yue, Chang-Ho Lee, and Tom Korsmeyer all sat in a small suite clustered around an air-conditioned room sheltering a small “main-frame” computer, a machine of laughable power by today’s standards, shared by the entire group of 15 or so people. Masashi Kashiwagi was there on a visit, John Grue had just left. Nick’s unique spirit of humbleness, rigorousness, and single-minded pursuit of the truth infused the group. By his example I soon realized that it was not about competition, but about working together towards a process of discovery and understanding, preferably leading to practical solutions.

*Ada Gotman:*

... One and a half hundred works on hydrodynamics and the remarkable textbook on marine hydrodynamics (which has a large popularity in Russia) characterize him as a scientist, but I want to mark his remarkable human features, which manifest themselves even in correspondence; it is openness in dialogue, readiness to help and to have taken up a part of the work.

*John Grue:*

... Thanks to the then newly published book “Marine Hydrodynamics” by Professor J. N. Newman, the teaching (of a new master study in ship hydrodynamics at The University of Oslo) got an easy start. I remember very

well the first time the course was given, it was the academic year 1980/81. The whole book, except Chapter 3, was curriculum.

... I was generously accepted by Nick Newman as post-doc in his group at MIT the academic year 1987-88. This was a very stimulating experience. Nick took good care of all the members of his dynamic hydro-group including me and my family.

... In the spring of 1992 it happened that Nick worked on the same problem as Enok Palm and I were working on: wave drift damping, a problem that has been important to applications in the Norwegian offshore industry. The two papers were published almost simultaneously in the *Journal of Fluid Mechanics* in 1993. We were then scientifically very, very close.

*Klaus Eggers:*

... I have met Nick Newman again and again, but for short spells only. Our mutual encounters may have had marginal importance within his professional career, but for me they proved to be cornerstones, so that I feel justified to add my story to this documentation.

... I had just obtained my degree in mathematics at the Hamburg University in 1954, when I wrote a paper on the flow due to an oscillatory source in translation. And here Nick came in. He had made similar investigations, and he could draw my attention to some minor arithmetical flaw in my work. This was a singular event in all of my life: if in later years there were errors in my work, I always had to detect them myself.

.... Prior to the (1961 ship motions) seminar, Nick introduced me to a meeting of the SNAME H-5 panel, where I first met John Wehausen, Ted Wu, and Larry Ward, together with Lou Landweber, Reiner Timman and other members of the hydrodynamic community who I should meet again and again in the decades to come.

*Rod Rainey:*

... At the 5th IWWFEB in Manchester, where I met Nick for the first time, his comment on my paper on slender-body analysis of offshore structures I took to be hostile, and I complained afterwards to Francis Noblesse that it was because MIT were developing a rival program to ours. "No..." replied Francis, "not Nick".

... As I came to know him better, I never again suspected him of commercial need. Quite the contrary. I have often observed him put all personal

and commercial considerations completely aside, when there is a point of science at stake.

*Fritz Ursell:*

... My first encounter with Nick was in the academic year 1957-58, at MIT. At that time Nick was a graduate student in Naval Architecture, and I was a visitor in the Hydro Lab lecturing on various aspects of fluid mechanics, particularly waves.

... Theoretical ship hydrodynamics barely existed as a useful subject; there were results such as the infinitely thin Michell ship but they were difficult to compute numerically. Havelock was the acknowledged expert. The basic experimental tool was the Towing Tank. This state of affairs was frustrating to Nick who wished to understand the problems on which he was working.

... Nick was interested in these lectures and accompanying seminars and took a lively part in the discussions. He obtained permission to spend 1958-59 with me at Cambridge University where there was a lively group associated with Sir Geoffrey Taylor, the leader on the experimental side was Alan Townsend, and the leader on the theoretical side was George Batchelor. The graduate students were housed in some big rooms and they educated each other. I cannot now remember in detail what help Nick received from me.

*David Evans:*

... It was at the ONR Symposium in Hamburg in 1984 that the first idea for the (IWWWFB) Workshop emerged. Both Nick and I had a small group of junior faculty and research students with us, including in my case Phil McIver and Chris Linton, and in Nick's, Paul Sclavounos and Dick Yue.

... We had originally thought in terms of an annual meeting crossing the Atlantic between the UK and the US, the first being at MIT for which Nick had already secured informal promises of support, and the second being in Bristol. But it soon became clear as we talked that we needed to widen the scope and the word "International" crept in to our thinking. We were determined that all attendees should be required to participate fully and attend all sessions so the word "Workshop" emerged. As for the subject area, it was the interaction between waves and bodies that was crucial to our mutual interests.

... The first Workshop was held in February 1986 at MIT. The next few years were critical for the Workshop which would have folded had not Nick

come to the rescue by hosting it in Woods Hole on two separate occasions.

*Finn Gunnar Nielsen:*

... Most offshore engineers working within marine hydrodynamics have at least three associations to Nick Newman: His 1977 book “Marine Hydrodynamics”, the Newman approximation, and the computer code “WAMIT”. Marine Hydrodynamics still serves as a key reference book almost thirty years after it was issued.

... The Newman approximation from 1974 on second-order slowly-varying forces on vessels in irregular waves has been used for more than thirty years to estimate slow drift resonant response of floating structures. The position of the approximation in the industry has been so firm that sometimes it is hard to convince people that it really is an approximation.

... The program WAMIT has become a world industrial standard for computing wave loads and motions of large volume structures in waves. Nick’s sense for practical solutions has also been demonstrated in his eagerness to make the code available on state of art PCs. I cannot imagine that any other code has been as important as WAMIT in the analysis of floating offshore structures.

... Nick has attracted a large number of visitors and students to MIT. We have all experienced the kindness and open attitude of Nick. He assisted with cultural as well as personal and practical related issues, always with the same caring attitude.

*Paul Sclavounos:*

... I first met Nick as his doctoral student upon my arrival at MIT in the fall of 1977. He encouraged me to work on slender body theory and the unified theory framework that he had just developed. This exposed me to some of the most challenging issues of the field of marine hydrodynamics in the pre-PC era. Nick steered my doctoral studies with his kind, caring and reassuring demeanor.

... Nick’s contributions span the entire field of marine hydrodynamics and are distinguished by the elegance of his intuition, mastery of analytical methods and pertinence of problem selection to the real world.

... Nick soon recognized in the early 80s the impact that the PC and simulation were to have upon the field. His decision to embark upon the development of panel methods and of the WAMIT code was visionary. What is often not fully appreciated is that the development of WAMIT has drawn

enormously from the earlier analytical contributions of Nick's, and his profound understanding of both the fundamental and practical aspects of the field.

... Analytical methods, slender body theories and WAMIT are today established tools in practice. The value of analytical models and use of robust panel methods, has recently been further enhanced by the emerging intersections between marine hydrodynamics and optimal control theory.

*Bob Beck:*

... I started working with Nick when he first arrived at MIT (in 1967), and I completed my Ph.D. thesis under his supervision in 1970. One of the first courses that Nick taught at MIT was on his favorite topic of advanced marine hydrodynamics. The lecture notes eventually became the basis of his widely acclaimed book entitled Marine Hydrodynamics. He was an outstanding teacher and his lectures altered how I looked at problems. No longer was the game to find the correct formula, rather it was to understand the physics of the problem, and then make simplifying assumptions so that analytic methods could be used to develop an approximate solution.

... His knowledge of the subject is legendary. He has made significant contributions in the analytical areas of the application of slender-body theory to marine problems. His research into numerical methods for the fast computation of Green functions and their use in panel methods is widely cited. The computer code WAMIT that he and his students have developed over the years is a standard in the offshore industry.

... Since I left MIT, Nick and I have collaborated on technical work, been involved in organizing meetings such as the H-5 panel and the Weinblum lectures, and have spent many hours sailing together. What started out as a teacher/pupil relationship has blossomed into a lifelong friendship.

A less personal quotation but an indication of the respect in which Newman is held in a wide community, is from the Charter of the USENET newsgroup `sci.engr.marine.hydrodynamics`, founded November 1994, which essentially takes its definition from the 1977 Newman textbook. This Charter reads in part:

*The proposed unmoderated newsgroup sci.engr.marine.hydrodynamics will be a newsgroup for people interested in marine hydrodynamics.*

*What is "Marine Hydrodynamics" ?*

*Marine Hydrodynamics is a major topic within naval architecture and marine engineering. Professor J.N. Newman at MIT gave an introductory description in his book “Marine Hydrodynamics”...*

Nick Newman is now in his 8th decade, and continues to be an inspiration and friend to many throughout the world. May he continue in that role for many years to come.

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June 2006