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Ursell, Fritz Joseph (1923–2012), *applied mathematician*
by P.A. Martin

Ursell, Fritz Joseph (1923–2012), applied mathematician, was born on 28 April 1923 in Düsseldorf, Germany, the son of Siegfried Ursell, paediatrician, and his wife, Leonore Hélène, *née* Mayer. His parents belonged to the German-Jewish bourgeoisie and had long been settled in western Germany. From 1933 to 1936 he attended the Comenius Gymnasium in Düsseldorf, but when he was thirteen he was sent to England, starting at a preparatory school in Kent in January 1937, and then going on to Clifton College, Bristol. In May 1940 he was informed that he had to leave Bristol: he was an enemy alien and Bristol was near the coast. A place was found for him at Marlborough College. He took the Cambridge scholarship examinations and won a major scholarship to Trinity College, Cambridge, in December 1940. He went there in January 1941, advancing to the part three course in October 1942. The classes were very small with five students: Freeman Dyson, Alison Falconer, James Lighthill, Tony Skyrme, and Ursell. He took the part three examinations and obtained a distinction.

Late in 1943 Ursell was interviewed by a visiting committee of three, including Sir Henry Thirkill and the novelist C. P. Snow. Its purpose was to put him somewhere in the scientific civil service, where he could contribute to the war effort. In December 1943 he was posted to the Admiralty research laboratory at Teddington in south-west London. He started in Group H (electromagnetics) but then, almost by accident, he was assigned to Group W (the wave group) in June 1944. The mathematics of waves would prove to be his major research area throughout his career.

Wave forecasts were made for the Normandy landings in June 1944. They were accurate because the local waves were generated by the local weather. Landings were expected in Japan in 1946, but forecasting the waves there would be more difficult because they are largely generated by distant storms. Group W was given the task of finding rules for forecasting these waves. The head of Group W was the noted hydrologist and oceanographer George Deacon, but most of the group were young, with no previous research experience. Ursell, after reading Horace Lamb's *Hydrodynamics*, suggested exploiting the fact that long water waves travel faster than short waves. As a localized storm generates waves of all possible lengths, it might be feasible to measure the waves far from their source and then to trace them back in space and time so as to locate the storm. Experiments were done to confirm Ursell's idea. Meanwhile, the war against Japan ended, but Ursell remained at the Admiralty until 1947.

Ursell began to work on mathematical problems arising in the theory of water waves. He devised a new method for calculating the waves generated by a floating horizontal cylinder. In September 1947 he moved to Manchester University, where he held an ICI fellowship in the mathematics department, where Sydney Goldstein held the Beyer chair of applied mathematics. One of the major research areas in Manchester was supersonic aerodynamics.

Ursell joined the aerodynamicists and wrote two papers in that area, but then decided to return briefly to his research on water waves. He never returned to aerodynamics, but he did write three important papers on water waves in the presence of a submerged circular cylinder, one proving that such a cylinder does not reflect waves, one proving a uniqueness theorem, and one proving the existence of what became known as trapped modes.

In 1950 Ursell returned to Cambridge as a university lecturer in applied mathematics. At dinner one day, Sir Geoffrey Taylor told him that he had seen the paper on trapped modes, but he thought that the work needed experimental verification. Ursell doubted his experimental abilities, but Taylor insisted, and so Ursell found himself in Taylor's two-room laboratory. By this time, he had shown that a plane beach can support ‘edge waves’ (generalizing an old result of Stokes), and it was this theory that he checked by experiment. He remained in Cambridge for eleven years. During this time he developed new methods for understanding how short waves interact with objects. Asymptotic techniques were devised, in which the presence of a large parameter within the formulation of a mathematical problem is exploited. He wrote a much-cited paper with T. Brooke Benjamin on Faraday waves; he wrote another on long waves on shallow water containing what became known as the Ursell number; and he wrote an influential review on the generation of water waves by wind.

Ursell spent one year (1957–8) at the Massachusetts Institute of Technology. He met his future wife, (Katharina) Renate Brande, widow of Ernest Brande and daughter of Paul Zander, lawyer, during a visit to New York. On his return to Cambridge, he obtained a DSc degree, motivated by the perceived importance of having a doctoral degree within the American academic system. On 19 June 1959, at the synagogue in Thompson's Lane, Cambridge, he married Renate. They had two daughters, Ruth (*b.* 1960) and Susie (*b.* 1965).

In 1961 Ursell accepted the Beyer chair of applied mathematics at Manchester University. He remained there for the rest of his career. He became interested in the development of slender-body theories for ship hydrodynamics, and in the analysis of transient water waves. He continued to devise rigorous asymptotic methods, especially for the approximation of functions defined by integrals. He was elected a fellow of the Royal Society in 1972. He retired from Manchester University in 1990, becoming an emeritus professor there.

Ursell was an influential applied mathematician. His papers, collected and published in two large volumes in 1994, were notable for their clarity and precision. But he was more than a fine mathematician. He had very broad interests, especially in politics and history. He was an active participant in university politics. For example, he fought against the change from a collegial to a management style of university government, although he knew this was a losing battle. He had a strong sense of fairness and was not afraid to stand up for those whom he thought were being treated unjustly, perhaps because he had suffered grave injustice in Germany in his early life. Having lived latterly in Didsbury, Manchester, he died of heart disease at Wythenshawe Hospital, Manchester, on 11 May 2012, and was survived by his wife, Renate, and their two daughters.

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