Sir Maurice Vincent Wilkes FREng FRS (1913 – 2010)

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Sir Maurice Wilkes died at his home in Cambridge, UK, on 29th November 2010 at the age of 97. Though his name is almost synonymous with the world of computer science and engineering he started his research career working on ionospheric physics under J A Ratcliffe at the Cavendish Laboratory. He also played a part in the development of radar during WWII and even had a small (if not immediately positive) role in the evolution of what became radio astronomy.

Wilkes will probably be best remembered for EDSAC (Electronic Delay Storage Automatic Calculator), the first practical stored-program computer, which became operational in May 1949. He then proposed and proved the concept of microprogramming in 1951 and wrote the first paper on the cache memory in 1965. In addition, he introduced time-sharing computing, ultimately in the form of the Cambridge Ring, a decade later. The University of Cambridge, where all this work was done, was the immediate beneficiary of Wilkes's work because he always saw computing as a tool for scientific investigation. Every advance he made had to satisfy some practical application. He was, after all, an engineer as well as a mathematical physicist of prodigious ability.

Maurice Wilkes was awarded his PhD in 1937 for a thesis on an experimental investigation of the reflection of VLF signals from the ionosphere. This work was described in his first published paper (along with his co-authors J E Best and Ratcliffe himself) in the *Proc Roy Soc* vol.156, 1936. His next paper, published in the same journal in 1939, was written with Ratcliffe again but this time they were joined by K G Budden. In it Wilkes made a significant contribution by using Chapman's theory of electron production in an isothermal atmosphere to calculate the temperature of the D region. In addition, he used his mathematical skills to find what Ratcliffe called the 'full wave solutions' so necessary when the ionosphere cannot be assumed to be unchanging within the dimensions of a wavelength, as was indeed the case at VLF. The following year Wilkes produced his first solo effort, again in the *Proceedings*, under the title of 'Theory of Reflection of Very Long Wireless Waves from the Ionosphere'. In all he would write another five papers directly related to his ionosphere research with the last appearing in 1947. Nearly thirty years later, by which time he was Professor of Computing Technology at Cambridge and completely detached from ionospheric physics, Wilkes responded to WJG Beynon's invitation to write a short appendix to Beynon's paper about URSI and the early history of ionospheric investigation. It duly appeared in the special issue of the *Philosophical Transactions of the Royal Society, Pt A, 1975.*

Perhaps most interesting of all in the context of the ionosphere is the part played by Maurice Wilkes in the use of the capital letters X, Y, Z to denote the three defining terms relating the various angular frequencies in the Appleton-Hartree equations. Appleton had used the symbols x, y and z for these but this could (and did) cause much confusion with the symbols for spatial Cartesian coordinates. It was Wilkes who suggested to Ratcliffe that X, Y and Z be substituted instead. This was done and has remained the accepted notation ever since.

During the Second World War, Wilkes worked initially at the Air Defence Research and Development Establishment (ADRDE) that evolved into the Army Operational Research Group (AORG) after which he transferred to the Telecommunications Research Establishment (TRE). He specialised in radar and particularly in the determination of what we now know as the radar cross section of targets. His important paper on this work (co-written with JA Ramsay), 'A theory on the performance of radar on ship targets' was published in the *Proc. Camb. Phil. Soc. 47, 156* in 1947. While at the AORG, his colleague JS Hey discovered that radio emissions around 50MHz from the sun were being misinterpreted by the operators as jamming of British radars by the Germans. On hearing of this astounding finding from Hey himself, Wilkes expressed his profound scepticism because he like most physicists at that time (including Appleton) assumed the sun to be a true black body source having minimal output at such long wavelengths. When the evidence was shown to be unassailable Wilkes was the first to admit his mistake.

In retirement Maurice Wilkes devoted much time to writing. His autobiography 'Memoirs of a Computer Pioneer' (1985) is both very readable and particularly interesting. He had a great interest in the history of science and stressed how important it was for scientists to be aware of the history of their subjects. In 1997 he published a stout defence of Appleton who had been accused, many years after his death, of plagiarising the ideas of another scientist. As was so typical of Wilkes, the evidence he amassed against that charge was meticulously researched and was presented with Rumpolian* precision.

* For those unfamiliar with British televison, *Rumpole of the Bailey* was a favourite with audiences who followed his legal arguments with rapt attention and often much amusement.

The author with Sir Maurice Wilkes in 2001.