



James Clerk Maxwell

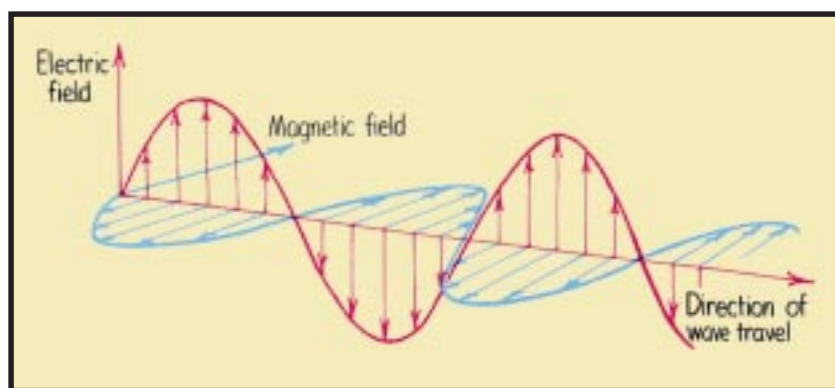
1831 - 1879

James Clerk Maxwell was a Scottish physicist who had a very great influence on 20th century modern physics. He created the electromagnetic theory of light.

Maxwell was born on July 13th, 1831 in Edinburgh. His parents had married late in life, and his mother, Frances Cay, was in her fortieth year at his birth. His father, John Clerk Maxwell, was a lawyer. The family was wealthy. The estate, about 2000 acres of farmland, descended to Maxwell.

The first ten years of Maxwell's life were spent at Glenlair House on the family estate. Up to the time of his mother's death his education was entirely in her hands. She taught him to read, encouraged (as did his father) his curiosity in all things, and took pride in his wonderful memory. Maxwell was eight when she died of cancer. The shock to the boy was severe.

At ten he was sent to Edinburgh Academy. When he was fourteen Maxwell produced his first scientific paper on the geometry of the oval. Later he spent three years at Edinburgh University and about three years at Cambridge. He was elected to a Fellowship at Trinity College. In the first part of Maxwell's paper '*On Faraday's Lines of Force*' (1855-1856) he formulated a group of equations summarizing the relation of electric and magnetic fields to the charges and currents producing them. The central theorem in this work was one which, following Maxwell, we now call *Stock's theorem*. He left Cambridge to become a professor at Marischal College in Aberdeen, where he married the daughter of the Principal of the College. The union was childless but was described by his biographer as a 'married life ... of unexampled devotion'.



He defined the laws for electromagnetic waves

Electric field strength = velocity of light x magnetic field strength

$$E = cB$$



He wrote poetry

All powers of mind, all force of will
May lie in dust when we are dead,
But love is ours, and shall be still
When earth and seas are fled.

J.C. Maxwell

Putting in numbers from an experiment of 1856 by G. Kohlrausch and W. Weber, Maxwell found that the electromagnetic wave propagation velocity is equal to the velocity of light. This theory appeared in two papers in 1865 and 1868 and in his great '*Treatise of Electricity and Magnetism*' published in 1873.

Maxwell made contributions in other areas of physics, too: in the kinetic theory of gas, in molecular physics, in thermodynamics and on the nature of Saturn's rings. Maxwell was far from being an abstruse theoretician, he was skillful in the design of experimental apparatus. Together with his wife he produced one of the first coloured photographs.

In 1861 he became a Fellow of The Royal Society and in 1871 he was elected to the new Cavendish professorship in Cambridge. He set about designing the Cavendish Laboratory and supervising its construction. **Maxwell spent his own money in increasing the stock of apparatus for the laboratory.**

According to his biographer Maxwell was an unusually sensitive man, with strong religious feelings and a fascinating sense of humour. He also had a talent for writing poetry. When his wife was very ill, he spent many days and nights at her bedside. He died after a short illness in 1879. Maxwell received no public honours and was buried quietly in the village of Parton in Scotland.

In Britain, at least, he was the greatest mathematical physicist since Newton.

S.E.