

# Æthereal Waves Make History

*The four scientists who saved James Clerk Maxwell's theories*

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**ABSTRACT** Maxwell first published what came to be called “Maxwell’s equations” in 1865. However, it was not until 1888, and Heinrich Hertz’s experimental validation that Maxwell’s equations were widely accepted as correct. The story of the intervening 23 years is little known. Maxwell, who died in 1879, was exceptionally modest and did not promote his own results at any time. The survival of Maxwell’s equations was up to the only three researchers in the entire world who paid serious attention to Maxwell’s paper in 1865, and his seminal Treatise in 1873: Oliver Heaviside, Oliver Lodge, and George Francis FitzGerald. Later, Hertz joined the group forming “The Four Maxwellians”. This presentation describes the torturous 23 year path Maxwell’s equations took from their creation to their initial acceptance. No mathematical knowledge is needed; this presentation is ideal for a general audience.



**ABOUT THE AUTHOR** James C. Rautio (S’77–M’78–SM’91–F’00) received the B.S.E.E. degree from Cornell University, Ithaca, NY, in 1978, the M.S. degree in systems engineering from the University of Pennsylvania, Philadelphia, in 1982, and the Ph.D. degree in electrical engineering from Syracuse University, Syracuse, NY, in 1986.

From 1978 to 1986, he was with General Electric, initially with the Valley Forge Space Division, then with the Syracuse Electronics Laboratory.

During this time, he developed microwave design and measurement software and designed microwave circuits on alumina and on GaAs. From 1986 to 1988, he was a Visiting Professor with Syracuse University and Cornell University. In 1988, he joined Sonnet Software, Liverpool, NY, full time, a company he had founded in 1983. In 1995, Sonnet Software was listed on the Inc. 500 list of the fastest growing privately held U.S. companies, the first microwave software company ever to be so listed. Today, Sonnet Software is the leading vendor of high accuracy three-dimensional planar high-frequency electromagnetic analysis software.

Dr. Rautio was the recipient of the 2001 IEEE Microwave Theory and Techniques Society (IEEE MTT-S) Microwave Application Award and the 2014 IEEE MTT Distinguished Service Award. He was appointed MTT Distinguished Microwave Lecturer for 2005 – 2007 lecturing on the life of James Clerk Maxwell. His efforts have also resulted in the preservation and restoration of Glenlair, Maxwell’s home.

