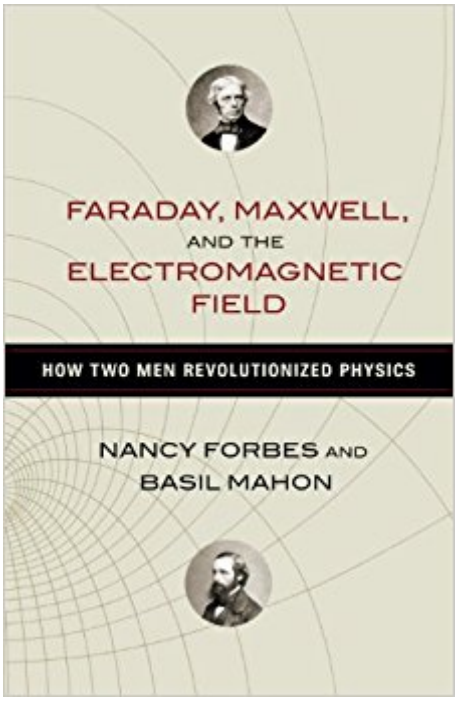
Faraday, Maxwell, And The Electromagnetic Field: How Two Men Revolutionized Physics



Synopsis

The story of two brilliant nineteenth-century scientists who discovered the electromagnetic field, laying the groundwork for the amazing technological and theoretical breakthroughs of the twentieth centuryTwo of the boldest and most creative scientists of all time were Michael Faraday (1791-1867) and James Clerk Maxwell (1831-1879). This is the story of how these two men - separated in age by forty years - discovered the existence of the electromagnetic field and devised a radically new theory which overturned the strictly mechanical view of the world that had prevailed since Newton’s time.The authors, veteran science writers with special expertise in physics and engineering, have created a lively narrative that interweaves rich biographical detail from each man’s life with clear explanations of their scientific accomplishments. Faraday was an autodidact, who overcame class prejudice and a lack of mathematical training to become renowned for his acute powers of experimental observation, technological skills, and prodigious scientific imagination. James Clerk Maxwell was highly regarded as one of the most brilliant mathematical physicists of the age. He made an enormous number of advances in his own right. But when he translated Faraday’s ideas into mathematical language, thus creating field theory, this unified framework of electricity, magnetism and light became the basis for much of later, 20th-century physics.Faraday’s and Maxwell’s collaborative efforts gave rise to many of the technological innovations we take for granted today - from electric power generation to television, and much more. Told with panache, warmth, and clarity, this captivating story of their greatest work - in which each played an equal part - and their inspiring lives will bring new appreciation to these giants of science.

Book Information

File Size: 2697 KB
Print Length: 330 pages
Publisher: Prometheus Books (March 11, 2014)
Publication Date: March 11, 2014
Sold by:Ã Â Digital Services LLC
Language: English
ASIN: B00F8EYYJ6
Text-to-Speech: Enabled
X-Ray: Enabled
Word Wise: Enabled
Lending: Not Enabled

Screen Reader: Supported

Enhanced Typesetting: Enabled

Best Sellers Rank: #91,143 Paid in Kindle Store (See Top 100 Paid in Kindle Store) #1 inÃ Â Kindle Store > Kindle eBooks > Engineering & Transportation > Engineering > Electrical & Electronics > Electromagnetic Theory #13 inÃ Â Kindle Store > Kindle eBooks > Nonfiction > Science > Physics > Electromagnetism #71 inÃ Â Books > Science & Math > Physics > Electromagnetism

Customer Reviews

I can’t find the proper words to describe the emotions that were felt while reading the book. As an electrical engineer, I was familiar with the concepts behind the story. But learning how it was discovered, shows how great these men were. Maybe for the general reader, the book will not trigger these emotions. I always remember the joke among our classmates while we were studying Maxwell’s theory: "And God said... Maxwell’s equations... and there was light". I even have a t-shirt with that joke! It summarizes the beauty of these discoveries. The book made me want to travel in time to see first hand how these discoveries were made!

Faraday, Maxwell, and the Electromagnetic Field is a readable and engaging account of the two pioneers of the subject and how they developed as individuals and developed their respective theories. Electromagnetics and the field theory that came with it is one of the most important development in physics and allowed us to move from the theory of classical physics to what is today modern physics. Nancy Forbes and Basil Mahon give the reader an account of the evolution of thinking on the subject by writing the overlapping biographies of Faraday and Maxwell. It is engaging, readable and gives the reader a sense of the subject by discussing the physical results that both characters and in particular Faraday personally discovered.In reading the book one gets a sense of the character of each and where there strengths and weaknesses lied. Faraday, born in 1791 was an incredible experimental physicist. He had the fortune early in his career to work with Davy who was a skilled experimenter as well. One gets a sense of the totally open nature of the subject during that era and how it was wide open to be explored. Faradays growing stature and influence is documented and the reader is familiarized with the deep insight Faraday had about discussing the phenomenon he was observing via a field theory rather than the action at a distance models that continental europe was focused on. The historical statements that are documented in the book give a sense of how visionary Faraday was. Despite his remarkable qualities as an

experimental scientist he was not mathematically trained and the formalizing of the theory into something along the lines of newtons theory of classical mechanics was lacking. Maxwell, the Scottish prodigy, was to come along and bridge the gap. The history of Maxwell and his family is given as was his academic journey. Maxwell was a polymath and knowledgeable about a great many things without any ego. He brough methods of vector calculus to the subject of electricity and magnetism and at first proposed models purely to try to describe results rather than to figure out the actual physical processes that were occuring. Slowly though his more cumbersome models became more elegant simple mathematical explanations and Maxwell was the one who came up with the terms Div, Grad and Curl- methods fundamental to modern vector calculus and electricity and magnetism. Maxwell died young and his theory became more ane more appreciated as physicists caught up with mathematics and Oliver Heavyside simplified the equations a bit. The author briefly discuss the start of the quantum revolution as well.Faraday Maxwell and the Electromagnetic Field is fun an enjoyable to read. I found it informative both from a historical account of two remarkable physicists and also a refreshed idea of how the theory was slowly developed from experiments that were only pieces of a much larger and complicated puzzle. The two men were remarkable and the authors did a great job giving the reader a sense of their accomplishment and how it has impacted all of our lives.

This book is somewhat uneven. The chapters on Faraday are excellent. But the chapters on Maxwell are disappointing, and the tone in these chapters is decidedly less scholastic. Unlike the chapters on Faraday, the material on Maxwell tends to over-reach; eg., ÃƒÂ¢Ã â ¬Ã Å“MaxwellÃƒÂ¢Ã â ¬Ã â„¢s `On FaradayÃƒÂ¢Ã â ¬Ã â„¢s Lines of Force' is, surely, one of the finest examples of creative thought in the history of scienceÃƒÂ¢Ã â ¬Ã Â• p. 165. They verge on hero-worship, and donÃƒÂ¢Ã â ¬Ã â„¢t give a calm, measured account of MaxwellÃƒÂ¢Ã â ¬Ã â„¢s contribution. The word ÃƒÂ¢Ã â ¬Ã Å“geniusÃƒÂ¢Ã â ¬Ã Â• is used too often, and the discussion of the difficulty that academics had in understanding Maxwell's work is limited to comments about how radical it was, how difficult the mathematics was, etc. As a result the book does not critically discuss the central error of both Faraday and Maxwell; that central to their theories was the idea that energy was stored in the ether. Indeed, the central ether obsession is certainly one of the most interesting aspects of this entire history: that this pernicious misconception was so crucial in enabling their successful development of the theory!The tone of the second half of the book also tends to be a little parochial. European works are downplayed, and there is the usual fawning glorification of the Oxbridge system (ÃƒÂ¢Ã â ¬Ã Å“to become senior wrangler was like

winning an Olympic gold medal"), when others have argued that in pure mathematics at least, the history of 19th Century Britain was one of underachievement; see GrayÃƒÂ¢Ã â ¬Ã â„¢s epilogue in the book ÃƒÂ¢Ã â ¬Ã Å“Mathematics in Victorian BritainÃƒÂ¢Ã â ¬Ã Â•.Overall, in my opinion, this book is well worth the read, despite the disappointing aspects in the second half. A broader view can then be obtained by reading ÃƒÂ¢Ã â ¬Ã Å“The MaxwelliansÃƒÂ¢Ã â ¬Ã Â• by Bruce Hunt and "Oliver Heaviside: The Life, Work, and Times of an Electrical Genius of the Victorian AgeÃƒÂ¢Ã â ¬Ã Â•, by Paul J. Nahin.