

Maxwell's Equations: Using Math and Physics to Advance Technology



Weng Cho Chew

Professor, Electrical & Computer Engineering George and Ann Fisher Distinguished Professor, Engineering

CURRENT RESEARCH

Equations with incredible accuracy, incorporating modern physics, are the key to future advancement

Maxwell's equations are some of the most important equations in physics because of their incredible impact on many technologies including, phones, computer chip design, wireless technologies, oil exploration, remote sensing, inter-galactic signals, radio astronomy, and more. Valid from sub-atomic length scales all the way to galaxy length scales; from static to ultraviolet frequencies; from classical physics to quantum physics, these equations have incredible predictive power for numerous novel applications. In fact, Maxwell's equations have been validated to about a few parts in a billion, which is the size of a few millimeters compared to the distance from New York to Los Angeles. Dr. Weng Cho Chew, George and Ann Fisher Distinguished Professor of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign has dedicated his professional career to studying efficient ways to solve Maxwell's Equations with the hope that they may advance fundamental science towards technology developments and applications for the future.

With beauty interwoven within the complexity of Maxwell's equations, Dr. Chew's research brings deeply theoretical mathematical computations to life through the promise of applied research work that will advance frontier technologies. These equations have far ranging impact, when solved with modern math and physics concepts, as well as harnessing the power of parallel computers. This is made possible by the incredible accuracy of Maxwell's equations. Therefore, studying efficient ways to solve these equations enables designs and applications that are useful in engineering and science. Dr. Chew's work helps to find solutions for multi-...

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AFFILIATION

University of Illinois Urbana-Champaign

EDUCATION

- B.S.E.E., in Electrical Engineering, 1976 , Massachusetts Institute of Technology
- M.S.E.E., in Electrical Engineering, 1978 , Massachusetts Institute of Technology
- Ph.D.E.E., in Electrical Engineering, 1980 , Massachusetts Institute of Technology
- Postdoctoral Fellowship, in Electromagnetics, 1981 , Massachusetts Institute of Technology

AWARDS

- Member, National Academy of Engineering
- C.T. Tai Distinguished Educator Award of IEEE-AP-S
- IEEE AP Distinguished Lecturer
- IEEE Graduate Teaching Award
- Schekulnoff Best Paper Award
- and 2 more...

RESEARCH AREAS

Technology, Computational Sciences / Mathematics, Electronics / Sensors, Materials Science / Physics

FUNDING REQUEST

Your contributions will support the continued research of Dr. Weng Cho Chew, of the University of Illinois, Urbana-Champaign, as he studies efficient ways to solve Maxwell's equations. Donations will fund the necessary \$200K required each year primarily for personnel and also for equipment. Join Dr. Chew in further developing quantum electromagnetics which is quickly becoming the foundation of modern technologies!