



Department of
Mechanical Engineering
The University of Hong Kong



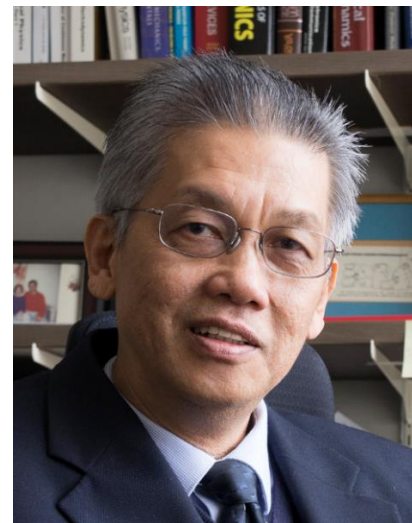
SEMINAR

(online and onsite)

Some Unsolved Problems in Quantum and Classical Electromagnetics

Date: 3 May, 2024 (Friday)
Time: 2:00 p.m. (HKT)
Venue: CPD-3.01, Centennial Campus
HKU

Speaker: Professor Weng Cho Chew
Elmore Family School of Electrical
and Computer Engineering
Purdue University
Department of Electrical
and Computer Engineering
University of Illinois
USA



Join Zoom Meeting:

<https://hku.zoom.us/j/91993809991?pwd=TVBYeXVhdys5MTRMOFZrVHEzN1VSZz09>

Meeting ID: 919 9380 9991

Password: 694197

Abstract:

Many classical electromagnetics problems are couched in terms of classical calculus that dates back to the time of Cauchy, Leibniz, and Newton. The recent advent of differential geometry allows one to write electromagnetics theory in terms of differential forms. It expresses electromagnetic theory elegantly, but the important question to ask is if new problems can be solved with this new calculus?

Almost all matrix equations in electromagnetics are solved with iterative solvers. While elliptic problems can be solved in $O(1)$ iterations, it is not clear if in general, other problems can be solved in a small number of iterations. It will be great to find solutions methods that can be solved in $O(1)$ iterations or there about.

The second important development in EM theory is the development of quantum EM theory. The question to ask is if one should formulate the quantum EM theory in terms of least action, or energy conservation. Both of them lead to same equations of motion, but which is more fundamental? We will show that what is commonly known as Dirac's fundamental postulate can be derived from energy conservation.

Present quantum computing technologies are fraught with noise. Most groups around the world are building quantum computers working with microwave photons. Microwave photons are about one million times weaker than optical photons. Did we get here by accident of history? Can we use multi-shot averaging to improve the signal-to-noise ratio in quantum computers?

Biography:

Weng Cho Chew received all his degrees from MIT. His research interests are in wave physics, specializing in fast algorithms for inverse scattering imaging and computational electromagnetics. His recent interest is in combining quantum theory and differential geometry with electromagnetics. After MIT, he joined Schlumberger-Doll Research, U Illinois, where he was EM Lab Director, Founder Professor, YT Lo chair and Fisher Distinguished Professor. He joined Purdue U in August 2017 as a Distinguished Professor. He has co-authored three books, many lecture notes, over 450 journal papers, and over 600 conference papers. He is a fellow of various societies, and an ISI highly cited author. He received in 2000, he received the IEEE Graduate Teaching Award and in 2017, IEEE Electromagnetics Award. In 2008, he received the IEEE AP-S CT Tai Distinguished Educator Award, in 2013, elected to the National Academy of Engineering, and in 2015 received the ACES Computational Electromagnetics Award. In 2018, he served as the IEEE AP-S President. He was a distinguished visiting professor at Tsinghua U, Hong Kong U, and still is at National Taiwan U. When he served as the Chair of the Search Comm Sect 7, for NAE (2020), the section had the largest number of under-represented nominees, which brought about 2 new slots to the section. In November 2022, he gave the inaugural lecture on quantum electromagnetics workshop at Madonna di Campiglio in Italy. In July 2023, he gave a keynote speech at Physics-2023 in Los Angeles. He was the general Co-Chair of PIERS 2023 in Prague and general Co-Chair of PIERS 2024 in Chengdu. He is the co-EIC of PIER Journals and is the chair of the Committee on Promoting Equality at IEEE AP Society. From 2007-2011, he served as the Dean of Engineering at the U of Hong Kong, and was involved with the HK AoE project on Theory, Modeling, and Simulation of Emerging Electronics, 2009-2017. After three years as the Dean of Engineering at Hong Kong U, the ranking of Engineering was ranked first among the engineering faculties in China Proper.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. N.X. Fang at 3917 2639.