

**Seminar on**

Research in Computational Electromagnetics  
and its Applications in Wireless Communications, Imaging, and Rough Surface Scatterings

by  
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**Abstract:**

Computational Electromagnetics include both the development of the fast and stable numerical solver for solving the electromagnetic problems and the applications of these solvers to study the mechanism of the electromagnetic wave scatterings and propagation in engineering applications, e. g. in wireless communications, imaging, and remote sensing. According to this, this lecture is divided into three parts, viz., the first part is just for the numerical solvers development, while the second and third parts are the applications. In the numerical solvers part of the lecture, we first give a brief review of an efficient kernel independent algorithm the MultiLevel Green's Function Interpolation Method (MLGFIM), then introduce the quasi-3D MLGFIM that can be used for efficiently solving the layered patch arrays, and subsequently, report a hybrid method, viz., QR-preranked MLUV, and its applications in soil rough surface scattering. In the second part, a rigorous numerical model using both MLGFIM and ray tracing algorithm is proposed for the Multi-In Multi-Out (MIMO) wireless communication and has been adopted for solving the orbital angular momentum (OAM) problems. We also report the mechanism investigation of the wave propagation in the OAM. In the third part of the lecture, the superlens imaging is studied using the Sommerfeld integral. We found that the proposed loss adding in the imaging region and the back coupling in the source region can greatly enhance the imaging resolution.

**Biography:**

**Haogang Wang**, associate professor, supervisor of PHD students in Department of Information Science and Electronic Engineering of Zhejiang University, primarily focused on computational electromagnetics, and its applications on wireless communications, remote sensing, target scattering, radio frequency integrated circuits and nano plasmonic optics. During the PHD studying at University of Electronic Science and Technology of China, Dr Wang was the first person in China who developed the MLFMA using C++ for fast calculating the scattering from the electric large objects. From 2002 to 2004, he was a Research Assistant in the Wireless Communications Research Center, City University of Hong Kong, Hong Kong, China, where he focused his research in developing high efficiency algorithms used in EM simulation of the parasitic parameters from large scale radio frequency integrated circuits and developed a novel fast integral equation solver called "MultiLevel Green's Function Interpolation Method (MLGFIM)." In April 2004, he joined the EM Academy at Zhejiang University, Hangzhou, China. In April 2005, July 2006, and July 2007 he respectively short-term visited City University of Hong Kong for developing the high efficient full-wave EM algorithm Multi Level Green's Function Interpolation Method (FWMLGFIM). In Zhejiang University, Dr. Wang developed a rigorous numerical model for evaluation of the MIMO wireless channel. From September 2009 to September 2011, as a visiting scholar assigned by Zhejiang University and China scholarship council, he did research on the computational optics for simulating the superlens at University of Washington, Seattle, USA. Dr Wang is a Committee Member of the Chinese Society of Computational Physics, Computational Electromagnetic Group, and the evaluation board member of the National Natural Science Foundation of China.

**Date** : 2 March 2015 (Monday)  
**Time** : 11:00 am – 12:00 noon  
**Venue** : Room 15-202, meeting room of State Key Laboratory of Millimeter Waves,  
15/F, Academic 3, City University of Hong Kong

\*\*\* ALL ARE WELCOME \*\*\*

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