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The Victoria Section of the Institute of Electrical and Electronic Engineers

University of Victoria, EOW 430, Friday 26 April 2013, 10:30 AM

Modeling Laser-Metal Interactions with the Particle-In-Cell Method

Wee Shing KOH, *IHPC Independent Investigator and Scientist*
Electronics & Photonics Department
A*STAR Institute of High Performance Computing, Singapore

ABSTRACT

An in-house parallel object oriented particle-in-cell (PIC) code that is under development at IHPC will be presented. The fundamental equations and the implementation of the PIC code will be briefly described. The particle-in-cell method is used to simulate a vast amount of areas, including but not limited to gas plasmas, plasma processes in semiconductors and vacuum electronics device. However, it is well known that in the electromagnetic modeling, the Drude (or linear plasma) Model is frequently used to describe the frequency-dependent characteristics of metals. This implies that PIC could be used to simulate the interactions of laser and metals too. Thus, some applications of the developed PIC code on simulation of (i) scattering of metallic nanoparticles, (ii) intense THz radiation, and (iii) laser processing of metals will also be presented.

BIOGRAPHY

Wee Shing KOH (S'03-M'07) was born in Singapore in 1977. He received his B.Eng. (Hons) and Ph.D. degrees in Electrical and Electronics Engineering (EEE) from the Nanyang Technology University (NTU), Singapore, in 2002 and 2007, respectively. He joined the A*STAR Institute of High Performance of High Performance Computing (IHPC), Singapore, as a Research Engineer and has been with IHPC since June 2006. He is recently awarded the inaugural IHPC Independent Investigatorship in late 2010 and is currently an IHPC Independent Investigator and Scientist at the Electronics & Photonics Department in IHPC. His research interests include organic solar cell device physics & simulation, computational plasmonics for thin film solar cells, sensors and various microelectronics applications. He is also interested in field emission theory, multi-dimensional space-charge-limited transport and particle-in-cell simulations for both micro- and nano-electronic applications. He has published more than 50 journal and conference papers.