学术讲座

ACADEMIC LECTURE

题目: Bayesian Inferences in solving Electromagnetic Imaging problems

时间：2015年1月13日星期二16:00－17:00

地点： 教十一西门厅101室

报告人：Dr. Caifang Cai（蔡彩芳, caifang.cai@lss.supelec.fr)

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Bio： Dr. Caifang Cai was born in Shaanxi, China, in 1985. She received the B.E. degree in Electrical Information Engineering from Xidian University, China, in 2007, and the M. S. degree in Signal & Image Processing from Télécom-Bretagne, France, in 2009. She was awarded the Ph.D degree in Physics from University Paris-Sud, France, in 2013. She joined the Laboratory of Signals & Systems (L2S), CNRS-SUPELEC-PARIS SUD, from November 2013. She presently is a postdoctoral fellow working jointly with the Group of Inverse Problems and the Group of Electromagnetics in the project Bypass (Bayesian Methods for the diagnosis and Probability of Detection assisted by Simulation), supported by the French National Research Agency (ANR), in cooperation with research centers (CEA in France, ELEDIA in Italy) and industrial companies (EDF, Airbus, etc.). One of her major research topics is to tackle linear and non-linear inverse problems by using statistical approaches. Her interests include solving electromagnetic imaging problems by using meta-modeling and Bayesian methods in combined fashion. Her recent research focuses on flaw characterization in Eddy-Current Testing for aeronautic applications. She is experienced also in solving large-scale non-linear problems, such as the spectral Computed Tomography with application to medical imaging.

Abstract: Bayesian inferences have great potential in solving electromagnetic inverse problems. Unfortunately, they often suffer from high computational cost. This is mainly due to the fact that the forward models dealt with are often non-linear and computationally expensive. To overcome such a difficulty, in this lecture, a metamodeling method based on the pre-training of databases is going to be discussed first. By referring to this method, the computational cost can be considerably reduced. This makes the Bayesian inferences usable for practical applications. Secondly, two of the Bayesian inferences recently evaluated in our group and used for Non-Destructive Testing are considered in detail. The first is a Markov Chain Monte-Carlo (MCMC) sampling method proposed for parameter inversion; the second is a Nested Sampling (NS) method proposed for joint parameter inversion and automatic model selection. The MCMC method allows the estimation of unknown parameters while the NS method makes it possible for us to tell the correct defect model.