
Inversion-Friendly Modelling for Inverse Electromagnetic Scattering Problems

Speaker: Dr. Yu Zhong

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Location: Room GARDA – Polo Scientifico F. Ferrari – Povo

Note: The seminar will be held in English

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Abstract:

As a representative of nonlinear and ill-posed problems that concern many important inspection/imaging applications, inverse scattering problems (ISPs) are of great interests in academic researches. Nevertheless, due to the intrinsic ill-posedness and non-linearity, the conventional computational methods are rather inefficient, especially when handling problems with low-quality data or with strong wave/fields interactions. In this talk, we will mainly discuss our lately contributions in computational methods for ISPs, with special emphases on the inversion-friendly modelling that can effectively handle these two major difficulties in ISPs. To tackle the ill-posedness, we impose proper constraints in the numerical models, leading to a new type of modelling-based regularization methods. For non-linearity, novel numerical models are derived from the fundamental physical models so as to cope with the highly nonlinear problems that the fundamental models cannot handle. Merging the efforts of physical modelling, signal processing and mathematical analysis, we will show the efficiency of solving the ISPs can be substantially increased.

About the Speaker:

Dr. Zhong Yu received the B.E. and M.E. degrees in electronic engineering from Zhejiang University, Hangzhou, China, in 2003 and 2006, respectively, and the Ph.D. degree in electrical and computer engineering from the National University of Singapore, Singapore, in 2010. He was a Research Engineer and a Fellow with the National University of Singapore, from 2009 to 2013, where he was involved in a French-Singaporean MERLION Cooperative Program. Since 2014, he has been a Scientist with the Institute of High Performance Computing, Agency for Science, Technology and Research, Singapore. He was invited to the Laboratoire des Signaux et Systèmes, Paris, France, as an Invited Senior Scientific Expert between 2012 and 2015, once per year. As a Visiting Professor, he is now visiting the ELEDIA Research Center, University of Trento. His current research interests include numerical methods for inverse problems associated with waves and fields, including imaging and design problems, electromagnetic and acoustic modelling with complex materials, and non-destructive testing.

Additional Notes:

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