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SEMINAR:

An Inverse Scattering Method based on the Field Equivalence Principle

Speaker: **Prof. Takashi Takenaka**
(Nagasaki University – Nagasaki - JAPAN)

Date: 7 September 2012 @ 3:00 PM

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

Note: The seminar will be held in English

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A significant number of inverse scattering methods have been proposed in last two decades due to theoretical interests and a variety of potential applications such as medical diagnosis, geophysical exploration, and nondestructive testing. In most inversion methods based on integral equations, the incident field illuminating the region of interest is often assumed to be known. When only the measured field data in absence of an unknown scattering object is available as information on the incident field, a reasonable model for the incident field which fits the measured data must be considered in those inverse scattering methods explicitly using incident field. In case that the object of interest is located near a transmitting antenna such as applications in medical imaging, it is preferable to model the incident field as accurately as possible since inverse scattering problems are ill-posed and non-linear. It has been shown that the reconstruction of electrical parameter distributions can be done only from the measured total field data using wave-splitting techniques. In this talk, we first present a novel inverse scattering method for reconstructing of electrical parameters of an inhomogeneous object only from the measured total field data without explicit use of the information of incident field in the region of interest. The basic idea of the proposed method is based on the field equivalence principle. The method requires both electric and magnetic tangential components of the total field on a measurement surface. In order to make it tractable, only the measurement of the electric component is preferable. We show inversion from only the electric component of the measured field data is possible provided that two measurements with and without the unknown scattering object are performed. In order to assess the effectiveness of the approach, some numerical simulations are carried out.

- **About the Speaker**

Prof. Takashi Takenaka received the B.E., M.E., and D.E. degrees from Kyushu University, Fukuoka, Japan, in 1973, 1975, and 1979, respectively, all in communication engineering.

In 1978, he joined the Department of Computer Science and Communication Engineering, Kyushu University. In 1989, he worked with Nagasaki University, Nagasaki, Japan, where he is currently a Professor with the Department of Electrical and Electronic Engineering. His current research interests are in direct/inverse scattering problems and complex materials in electromagnetics.

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