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"**Synthesis Techniques for Antenna Arrays (Part 5) – 'Conventional' Synthesis Methods for Uniformly-Spaced Linear Arrays (USLA)"**

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Antenna arrays are key technologies enabling a large number of applications within Electromagnetics Engineering including satellite and ground wireless communications, radar, remote sensing, biomedical imaging, and radio-astronomy. For instance, arrays with large "synthetic" apertures are exploited in Synthetic Aperture Radar (SAR) applications for increasing the resolution and improving the quality of the acquired data by means of suitable beam-forming synthesis techniques. On the other hand, the design of high-resolution probing source is a key-issue in NDE/NDT towards structural health monitoring (SHM).

Because of their wide range of applications, the large number of degrees of freedom in the synthesis (comprising the type, position, and excitation of each radiating element in the layout), the available architectures (fully populated, thinned, clustered, etc.), and the possible objectives (maximum directivity, minimum sidelobes, maximum beam efficiency, etc.), the synthesis of arrays turns out to be a very complex task to be tackled with suitable methodologies customized to the application at hand. Indeed, several techniques have been developed in the last sixty years, but despite such a heterogeneity, most of them share a common theoretical framework which is of paramount importance for all engineers and students interested in such a topic.

The objective of the short-course is therefore to provide the attendees the fundamentals of Antenna Array synthesis, starting from intuitive explanations to rigorous mathematical and methodological insights about their behavior and design. More specifically, the Part 5 of the course will be concerned with the following '*Conventional*' synthesis methods for USLA

- *Optimal Compromise SLL-BW Synthesis Methods*
  (e.g., Dolph-Chebyshev method, Taylor synthesis, and Zolotarev method);
- *Pattern Matching Synthesis Methods*
  (e.g., Fourier method, Woodward-Lawson technique, Least-Square method, and Iterative Projection method).

Applicative examples, including exercises, corroborated the developed concepts.

The Short Course includes 9 hours of classes (7 hours of lessons and 2 hours of software exercises) spanning over 3 days.

Andrea Massa received the “laurea” degree in Electronic Engineering from the University of Genoa, Genoa, Italy, in 1992 and Ph.D. degree in EECS from the same university in 1996. From 1997 to 1999, he was an Assistant Professor of Electromagnetic Fields at the Department of Biophysical and Electronic Engineering (University of Genoa). From 2001 to 2004, he was an Associate Professor at the University of Trento. Since 2005, he has been a Full Professor of Electromagnetic Fields at the University of Trento, where he currently teaches electromagnetic fields, inverse scattering techniques, antennas and wireless communications, wireless services and devices, and optimization techniques.

At present, Prof. Massa is the director of the ELEDIA Research Center with a staff of more than 30 researchers located in the headquarter at the University of Trento and in the offshore labs (ELEDIA@L2S within the L2S-CentraleSupélec (Paris), ELEDIA@UniNAGA at the University of Nagasaki – Lab-Director: Prof. T. Moriyama). Moreover, he is Adjunct Professor at Penn State University (USA) and holder of a Senior DIGITEO Chair developed in co-operation between the Laboratoire des Signaux et Systèmes in Gif-sur-Yvette and the Department "Imagerie et Simulation for the Contrôle" of CEA LIST in Saclay (France) from December 2014, and he has been Visiting Professor at the Missouri University of Science and Technology (USA), the Nagasaki University (Japan), the University of Paris Sud (France), the Kumamoto University (Japan), and the National University of Singapore (Singapore). Recently, it has been appointed IEEE AP-S Distinguished Lecturer.

Prof. Massa serves as Associate Editor of the “IEEE Transaction on Antennas and Propagation” and Associate Editor of the “International Journal of Microwave and Wireless Technologies” and he is member of the Editorial Board of the “Journal of Electromagnetic Waves and Applications”, a permanent member of the “PIERS Technical Committee” and of the “EuMW Technical Committee”, and a ESoA member. He has been appointed in the Scientific Board of the “Società Italiana di Elettromagnetismo (SIEm)” and elected in the Scientific Board of the Interuniversity National Center for Telecommunications (CNIT). Moreover, he has been appointed in 2011 by the National Agency for the Evaluation of the University System and National Research (ANVUR) as a member of the Recognized Expert Evaluation Group (Area 09, ‘Industrial and Information Engineering’) for the evaluation of the researches at the Italian University and Research Center for the period 2004-2010. Furthermore, he has been elected as the Italian Member of the Management Committee of the COST Action TU1208 “Civil Engineering Applications of Ground Penetrating Radar”.

His research activities are mainly concerned with inverse problems, analysis/synthesis of antenna systems and large arrays, cross‐layer optimization and planning of wireless/RF systems, semantic wireless technologies, system-by-design and material‐by‐design (metamaterials and reconfigurable ‐materials), and theory/applications of optimization techniques to engineering problems (tele-communications, medicine, and biology).

Prof. Massa published more than 600 scientific publications among which about 270 on international journals and more than 350 in international conferences where he presented more than 70 invited contributions. He has organized more than 50 scientific sessions in international conferences and has participated to several technological projects in the European framework (20 EU Projects) as well as at the national and local level with national agencies (more than 100 Projects/Grants).