



Department of Engineering, Macquarie University
IEEE Macquarie University Student Branch/MTT-S Chapter
IEEE NSW AP/MTT Joint Chapter

IEEE MTT-S Invited Lecture by

Professor Sergiy Kharkivskiy (Sergey Kharkovsky)

Date : Wednesday, 27 April 2016
Time : 17:00 pm to 18:30 pm
Location : E6A 102 Theatre (9 Wallys Walk),
Macquarie University, NSW 2109



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Microwave and Millimeter Wave Imaging of Composite Materials

Non-uniform materials and structures including composite structures are widely used in different areas such as infrastructure and aerospace transportation. Nondestructive testing and evaluation of these structures for the detection of damages and flaws are important practical issue. Microwave and millimeter wave (mw and mmw) imaging techniques have demonstrated a great potential for this purpose. In this presentation some applications of mw and mmw imaging will be introduced. They include evaluating and monitoring of reinforced concrete- structures, painted metal surfaces, and dielectric layered walls used in infrastructure. For this purpose imaging with two types of scan and different continuous wave (CW) reflectometers have been used. Furthermore, the use of imaging methods such as synthetic aperture radar (SAR) results in high resolution three-dimensional images used for the detection and evaluation of damages, cracks and corrosion under dielectric coating such as paint, debonding and delaminations. Most of these results were obtained at the Applied Microwave Nondestructive Testing Laboratory (*amntl*) at the Missouri University of Science and Technology (formerly University Missouri-Rolla), Rolla, USA, (Director Prof Reza Zoughi) in 2003 – 2011. Recent results obtained in 2012- 2015 with a multifunctional imaging system developed and built in the Institute for Infrastructure Engineering, Western Sydney University (formerly University of Western Sydney), Australia, will be also presented. This imaging system incorporates a 3-axis multifunctional scanning mechanism and can provide contour following, optimization of standoff distance, etc. The potential of the development and application of mw and mmw CW imaging will be also discussed. This discussion will focus on the use of the internal and external collaborations, and involving students and postdoctoral research fellows to the high-level research.

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Professor Sergiy Kharkivskiy (Sergey Kharkovsky) Biography

Dr. Sergiy Kharkivskiy (professional name is **Sergey Kharkovsky**) received the Diploma in electronics engineering from Kharkov National University of Radioelectronics, Ukraine, in 1975, and his Ph.D. and D.Sc. degrees in radiophysics from the Kharkov National University, Ukraine, and from the Institute of Radio-Physics and Electronics (IRE) of National Academy of Sciences of Ukraine, Kharkov, in 1985 and 1994, respectively. Currently he is an Associate Professor in the Institute for Infrastructure Engineering at the Western Sydney University, Australia. Prior to joining this university in July 2011 he was a Member of the Research Staff at IRE from 1975 to 1998, a Professor in the Electrical and Electronics Engineering Department at the Cukurova University, Adana, Turkey, from December 1998 to February 2003, and a Research Associate Professor in the Applied Microwave Nondestructive Laboratory (*amntl*), the Electrical and Computer Engineering Department at Missouri University of Science and Technology, Rolla, USA, from March 2003 to June 2011. He has authored and co authored more than 120 publications in the microwave and millimeter wave physics and engineering, material characterization and nondestructive evaluation, and he has 11 USSR patents and 5 US patents in his credit. He is a *Fellow* of the Institute of Electrical and Electronics Engineers (IEEE) and an Associate Editor for *the IEEE Transactions on Instrumentation and Measurement (IEEE TIM)*. He was recognized as a *IEEE TIM Outstanding Associate Editor* in 2010-2012, 2014 and he is a recipient of the 2013 Harold A. Wheeler Applications Prize Paper Award of the IEEE Antennas and Propagation Society. Dr. Kharkovsky is a member of the American Society for Nondestructive Testing (ASNT). He served as the Guest Editor for the ICONIC 2009 special issue of *the IEEE TIM*, 2010, and he was a Technical Program Committee co-chair for the IEEE International Instrumentation and Measurement Technology Conference (I2MTC 2013) which was held in Minneapolis, USA, in 2013. His current research interest is microwave and millimeter physics and engineering, material characterization, sensor technologies, nondestructive evaluation and imaging of composite structures, structural health monitoring, and instrumentation and measurement.

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