



SEMINAR

Room 1035 ETB

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A Contact-less UWB Microwave System for Time-Domain Dielectric Spectroscopy

by

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Abstract: The broadband dielectric spectroscopy is a powerful technique for a unique characterization of materials under test (MUT). Therefore, it has been employed for a wide variety of applications such as chemical/biological sensing, disease diagnosis, and food safety. In this presentation, a contact-less broadband dielectric spectroscopy system with a combined frequency domain/ time domain technique for 3–10 GHz frequency range is presented. It is implemented by generating a 450 MHz bandwidth baseband pulse and then upconverting it to only 9 microwave sub-bands within UWB frequency range one at a time, passing each upconverted pulse through MUT and detecting the output signal using a UWB receiver. The sensing unit in this system includes two Vivaldi antennas that are coupled to each other in their radiative near-field, while the MUT is placed in between. The near-field sensing allows for a compact size sensor and low volume of the MUT. As a proof of the concept, the accurate characterization of three MUTs, xylene, ethanol, and methanol are reported.

Reza Ebrahimi Ghiri received his B.Sc. degree from Shiraz University, Shiraz, Iran, in 2010 and M.Sc. degree from Amirkabir University of Technology, Tehran, Iran, in 2013, both in Electrical Engineering. He worked as a Space Systems Engineer at Iranian Space Research Center (ISRC) from 2013 to 2015. He is currently working toward the PhD degree in Electrical Engineering at Texas A&M University, College Station, TX, USA. His research interests include RF, microwave, and millimeter wave circuits and systems.