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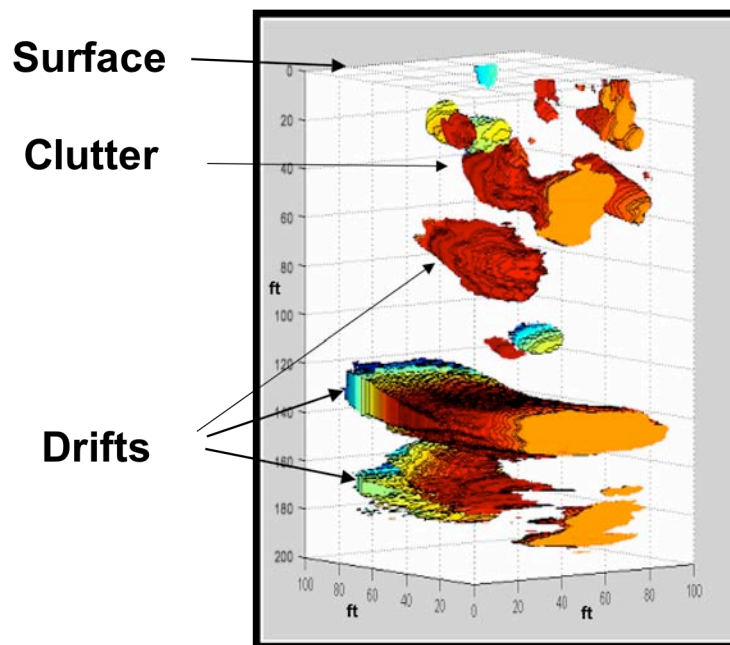
Center for **IMAGING** SCIENCE

Seminar Series

A Geometrically Accurate Target Model for a Ground Penetrating Synthetic Aperture Radar System

Vincent Amuso

*Associate Professor and Dept. Head
Electrical Engineering, RIT*



4pm, Wed, April 25, 2007

Auditorium of the Center for Imaging Science

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Abstract

Deep ground penetrating radar (GPR) lends itself to many applications world wide, including both military and civilian applications. Different ground penetrating radar applications all share a common goal, to detect and identify targets beneath the Earth's surface. Specific military applications may include mine detection, underground bunker detection, and under ground weapon detection. Civilian applications may range from detecting buried pipes, underground water wells, and buried cables to an abundance of geological information. The benefits of a GPR system have the potential to enable one to see hundreds of feet into the Earth's surface, using a wide bandwidth frequency modulated, continuous wave transmission signal. With the added resolution gained through the incorporation of Synthetic Aperture Radar (SAR) processing, a detailed image of what lies beneath the Earth's surface can be obtained. The ability to resolve targets hundreds of feet under the Earth's surface relies on the propagation of the electromagnetic (EM) wave that is radiated by the system.

The complexity of the deep ground penetrating radar system presents the need for theoretical models to describe the radar system. The theoretical models developed must include key deep ground penetrating radar components to accurately portray the actual system. The theoretical models must also include natural phenomena that occur in physics and nature. The complexity of describing natural phenomena increases when dealing with underground phenomenology. This increase in complexity is directly correlated to the effects that the ground has on electromagnetic radiation, such as path attenuation and the frequency fluctuations.

Speaker Bio

Dr. Vincent J. Amuso is Associate Professor and Head of the Electrical Engineering Department at the Rochester Institute of Technology. He teaches courses in the areas of signal processing and communications systems and has delivered courses in the areas of neural networks and evolutionary computation techniques applied to radar and acoustic systems. His research area includes the design and analysis of deep Ground Penetrating Radar (GPR) systems as well as three dimensional SAR target modeling. He is also actively working both as a researcher and consultant in the area of Waveform Diversity & Design. Previously he was in industry with positions that include senior radar systems engineer at Sensis Corporation (1997-1999), electrical/systems engineer at General Electric (1988 – 1994) and electronics engineer at Rome Air Development Center (1987 – 1988). He received his BSEE degree from Western New England College in 1987, his MSEE degree from Syracuse University in 1989 and his Ph.D. in electrical engineering from the Rensselaer Polytechnic Institute in 1998.