

## **HIGH FREQUENCY ELECTROMAGNETIC RESPONSE FROM SHORT AND LONG WIRES FOR IED AND TUNNEL DETECTION**

*Dan Glaser, Cold Regions Research & Engineering Laboratory*

Detection of buried unexploded ordinance and improvised explosive devices is a problem that continues to challenge the US military. Detection of tunnels, or the infrastructure in tunnels has also been a persistent and perplexing problem. While commercial off the shelf electromagnetic induction systems, generally operating below 100 kHz, have helped to address detection of UXO, they can fail to detect non-metallic UXO and small metallic parts of IEDs.

Previous work has demonstrated the applicability of high-frequency EMI,

up to 15MHz, for the detection and classification of small metallic parts and non-metallic targets by targeting resonance frequencies of materials such as carbon fibre well outside of the standard frequency range used in UXO and IED detection.

Here we demonstrate that high-frequency electromagnetic induction relaxation responses of specific components of the UXO, IED and tunnel construction materials such as wires, cables, and other infrastructure, targets generally too small for COTS systems to meaningfully detect can result in a clear HFEMI signature that can be used for classification of those targets. We show HFEMI signatures from short and long wires, as well as, multi-core cabling.