MultiLoop III: UXO Modeling Examples

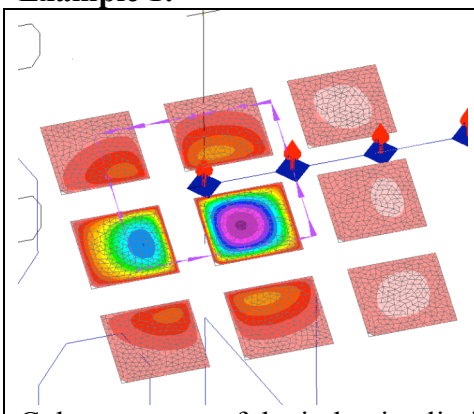
One of the major problems in UXO detection is the separation of scrap from munitions type targets. To do this effectively, one must be able to accurately compute the effects of multiple scattering objects.

In the examples presented on the following pages, MultiLoop III is used to compute the effect of multiple scattering objects.

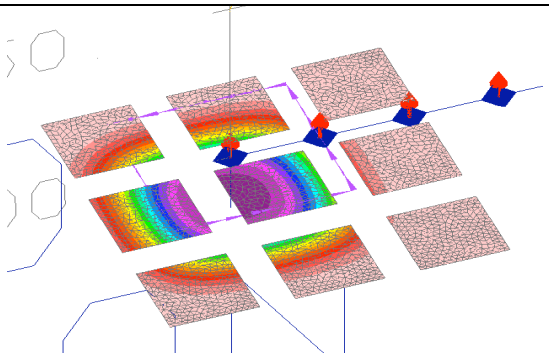
Example 1: In this example, a 10 x 10 meter loop is energized with an exponentially rising / linear step-off wave form with a 3 Hz base frequency. The loop energizes a set of 9 square horizontal plates with dimensions of 5 x 5 meters, and conductance of 100 S. The response is computed on a profile of vertical receivers. Each plate had 268 nodes

Examination of the effect of the stream potential on various channels shows the interaction of the plates is important for determining the time decays of each object individually. Models of this complexity are routinely computed with MultiLoop III.

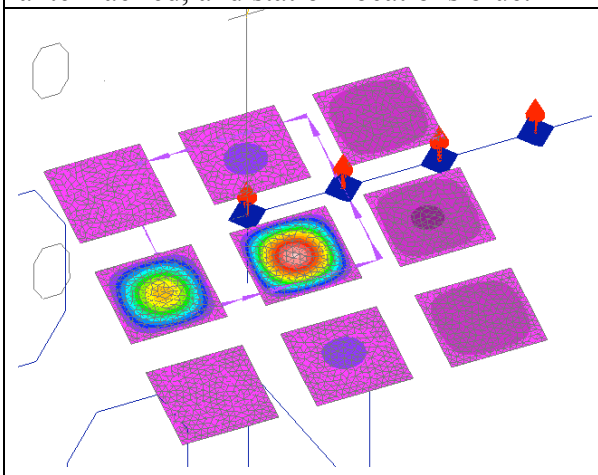
Example 1:



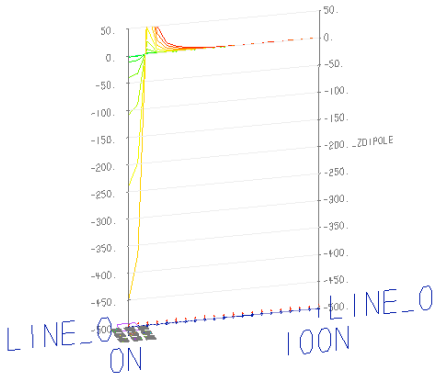
Color contours of the inductive limit of the stream potential. The loop is mauve, dipole antennae red, and station locations blue.



Color contours of the primary magnetic field (normal component).

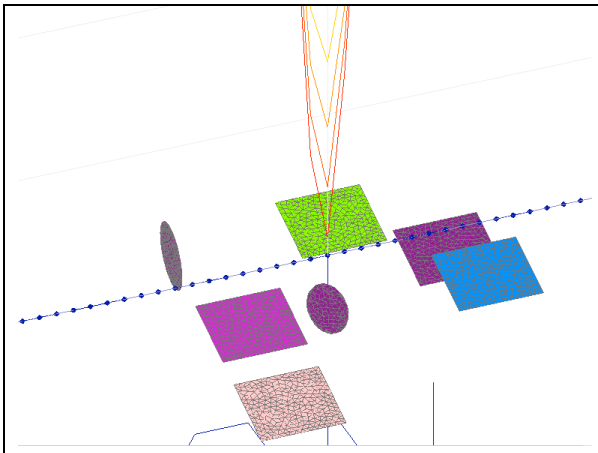


Color contours of the stream potential generating the channel 0 response.

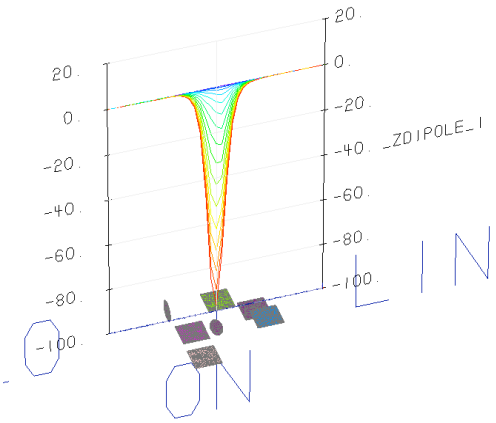


View of the plotted profile response, the 9 conductors, and the line with the antennae.

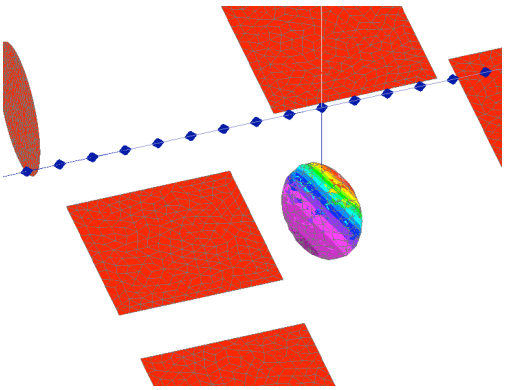
Example 2: In this example, a moving dipole-dipole system is profiled over a simulated debris field consisting of several plates, a disk and a closed highly conductive shell. This type of simulation could represent the electromagnetic response of a highly-conducting, non-permeable shell in a debris field.



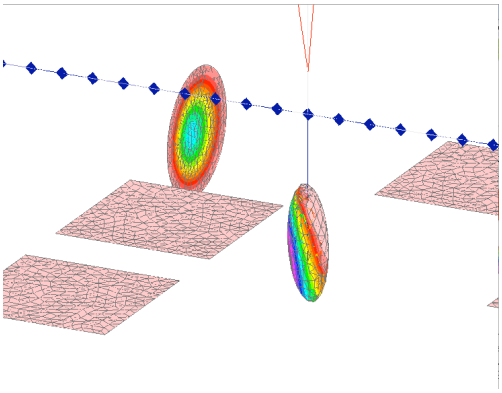
An illustration of the model, colored by conductance, the red being the more conductive.



The computed scattered field response from the assembly of objects illustrated to the left.



Detailed view of the inductive limit response at station 22. The largest variation in the stream potential (largest current density) is on the closed shell.



The stream potential for channel 7, station 10 showing the strongest excitation on the disk and closed shell.