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Computational and Applied Mathematics Seminar

Speaker: Dr. Colin Farquharson

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Date: Wednesday, January 18, 2012

Time: 10:00 .am.

Room: HH-3017

Title: **A Story About Electromagnetics, Integral Equations, and Scale Models**

Abstract:

One geophysical survey method that is particularly good at detecting ore deposits uses time-varying magnetic fields to induce currents to flow in electrically conductive parts of the Earth's subsurface (ore deposits), and measures the magnetic fields that are generated by these induced currents. In order to say something about the depth, size and composition of any subsurface conductive object, we need to be able to compute synthetic survey data for a prospective model of the subsurface. Subsequent revision of the model until the synthetic data match the observed survey data will result (hopefully) in an Earth model that resembles the actual subsurface of the Earth. This process is dependent on being able to compute correctly the synthetic data. One method for computing geophysical electromagnetic data for a 3D Earth model is based on integral equation descriptions of the physical processes involved. Unfortunately, classic implementations do not produce correct data when the contrast in conductivity between the ore deposit and the background rocks is large. In this talk I shall present a revised implementation of the integral equation approach that does generate correct results for large contrasts. The results will be corroborated by results from physical scale modelling experiments.