MultiLoop III – A Significant Step Ahead in Electromagnetic Modelling

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MultiLoop III is a versatile modeling package for simulating the electromagnetic response from complex assemblages of conductors. It differs significantly from previous packages in the complexity of the conductivity distributions it can handle. This capability is the result of the unique physical and topological algorithms that it employs.

A MultiLoop III model consists of a tri-mesh of points that describes one or more surfaces, and a resistivity function that is used to "paint" each surface of the mesh. The tri-meshed surfaces can be connected to from junctions between sheets or separated to form distinct conductors. The mesh can also be formed into closed shells, and may contain holes through which flux can escape.

As a result, MultiLoop III can simulate the electromagnetic response of very complex geometries and geologies. For example, junctions between sheets allow the effect of conductors in contact with the overburden to be simulated. Holes in meshes allow the response of conductors containing resistive intrusions to be simulated. Closed shells permit the simulation of massive bodies.

In addition to the models described above, specialized meshes can be used to simulate the response of infinite or semi-infinite sheets. These meshes are useful for simulating the response of overburden or the responses of large regional conductors.

Execution times of the software are impressive due to the proprietary time stepping algorithm employed, and meshes exceeding 1500 points can be routinely handled. Accuracy tests against standard modeling algorithms on simple models, and on more complex geometries with scale models have produced excellent matches.

MultiLoop III broadens the domain of models that can be studied from those that could have been routinely handed in the past. To date, much of our understanding of electromagnetic interpretation theory has been based on modeling studies of simple geometries. While these model studies have been useful in establishing our present understanding, their scope has been limited. Recent modeling studies using MultiLoop III have cast new light on the responses of conductors in contact with overburden, on the interactions of multiple conductors, on the shielding effects of synclines and anticlines, and on the effects of resistive intrusions in borehole electromagnetic responses.

To date, barely a few of the new capabilities offered by MultiLoop III have been studied. As MultiLoop III becomes deployed throughout the industry, our collective understanding of interpretation theory will evolve, and the effectiveness of electromagnetic exploration in complex environments will undoubtedly improve.

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