# Comparison of Physical and Numerical Modelling Related to the Influence of Current Gathering on the EM Response of a Thin Plate.

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CSEG Geophysics 2002

The treatment of high conductivity contrasts in the theoretical modelling of the behaviour of EM exploration systems is becoming more accessible and now allows a comparison with the results of physical scale modelling which inherently deals with models which involve high conductivity contrasts.

Physical modelling of the performance of EM exploration systems of the moving source and fixed source types (Duckworth and Krebes (1997) Duckworth et al. (2001)) indicate that plate type conductors which display high conductivity contrasts with their host rocks produce a distictive separate dispersion due to the gathering of current from the host as shown in Figure 1 below.

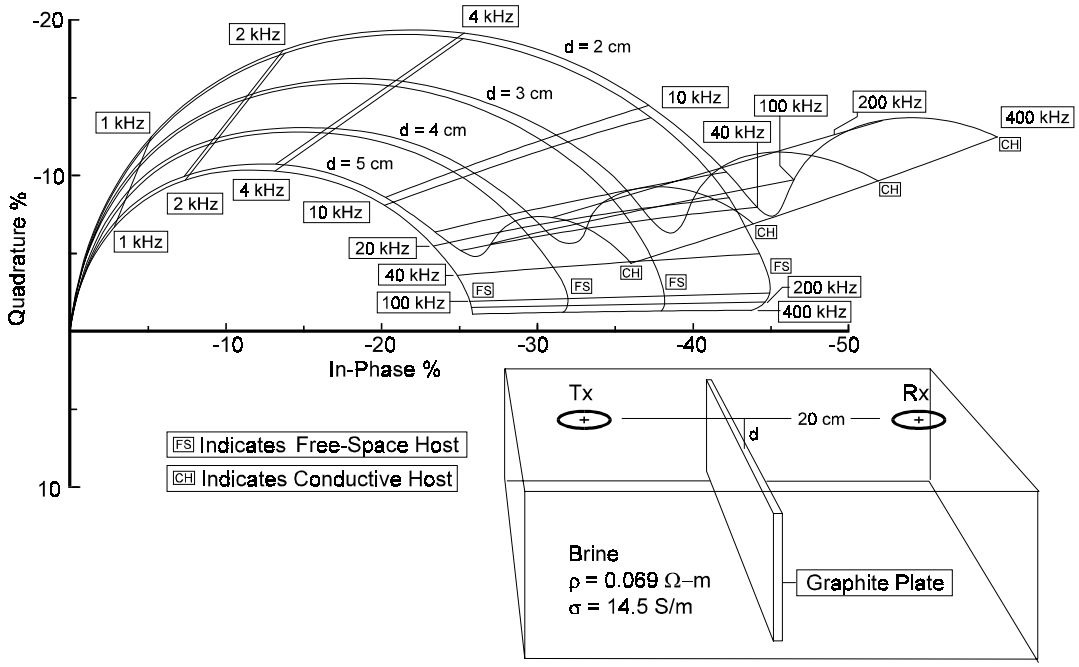


Figure 1. ***Complex space anomaly index diagram of the response of a thin vertical plate conductor to a two coil moving source EM system. Responses with a free-space host then with a conductive host are presented.***

The high conductivity contrast between the conductor and its host has presented problems for theoretical modelling in the past (Hanneson and West (1984)) but commercial software is now offering capabilities that overcome this problem. A comparison of thin plate responses obtained by theoretical modelling with the physical model responses for the thin plate indicate that the theoretical models can now display effects such as the one displayed in Figure 1. In addition, the theoretical models can treat unconventional EM systems such as the coincident coil frequency-domain system described by Duckworth and Krebes (1998) and tested by means of physical modelling (Duckworth et al.(2001)). A range of examples of the comparison between the two approaches will be presented which show the agreement and disagreement between physical and theoretical modelling.

**References**

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Hanneson, J.E., and West, G.F., 1984, The horizontal loop electromagnetic response of a thin plate in a conductive earth: Part II computational results and examples: Geophysics, **49**, 421-432.