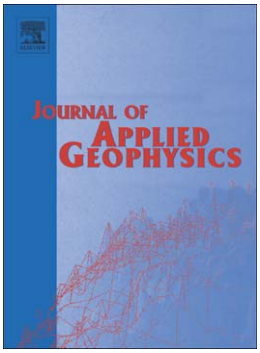


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PII: S0926-9851(17)30783-8
DOI: doi:10.1016/j.jappgeo.2018.01.017
Reference: APPGEO 3416

To appear in: *Journal of Applied Geophysics*

Received date: 22 August 2017
Revised date: 14 January 2018
Accepted date: 17 January 2018

Please cite this article as: Xiao, Pan, Wu, Xin, Shi, Zongyang, Li, Jutao, Liu, Lihua, Fang, Guangyou, Helicopter TEM parameters analysis and system optimization based on time constant, *Journal of Applied Geophysics* (2018), doi:10.1016/j.jappgeo.2018.01.017

# Helicopter TEM parameters analysis and system optimization based on time constant

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**Abstract**

Helicopter transient electromagnetic (TEM) method is a kind of common geophysical prospecting method, widely used in mineral detection, underground water exploration and environment investigation. In order to develop an efficient helicopter TEM system, it is necessary to analyze and optimize the system parameters. In this paper, a simple and quantitative method is proposed to analyze the system parameters, such as waveform, power, base frequency, measured field and sampling time. A wire loop model is used to define a comprehensive 'time constant domain' that shows a range of time constant, analogous to a range of conductance, after which the characteristics of the system parameters in this domain is obtained. It is found that the distortion caused by the transmitting base frequency is less than 5% when the ratio of the transmitting period to the target time constant is greater than 6. When the sampling time window is less than the target time constant, the distortion caused by the sampling time window is less than 5%. According to this method, a helicopter TEM system, called CASHTEM, is designed, and flight test has been carried out in the known mining area. The test results show that the system has good detection performance, verifying the effectiveness of the method.

*Keywords:* Helicopter TEM system, parameters design, time constant, spectral characteristics

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