14-Apr-2020

Re: comments of the editors

Dear Dr. Richard Gloaguen:

We would like to express our sincere gratitude to the editors for their time and effort in handling our manuscript **(npg-2020-8)** entitled **“An enhanced correlation identification algorithm and its application on spread spectrum induced polarization data”.**
We would like to say thanks again sincerely to the editors and anonymous reviews for their time and effort spent in handing our paper, as well as providing us many constructive comments for improving very much the presentation and quality of this manuscript.
It is worth pointing out that the reviewers’ comments and suggestions have really constructively helped us improve further the quality and presentation of the manuscript. In light of their inspiring comments and suggestions, we have revised the manuscript duly and carefully, and the specific responses to the editors are listed as below, with the corresponding revisions **highlighted in blue color** in the revised manuscript.

Sincerely,
Dr. Siming He
hsmfly1982@163.com

Responses to comments of Editors

We greatly appreciate your suggestions, and we hope our revisions have addressed your questions and made this manuscript better.

Comment 1. I will have to recommend the rejection of this manuscript if a proper discussion is not included. The discussion should be clearly separated from the results and encompass the aspects raised by the reviewers and myself.

Response.

1) Yes, we have added this discussion to the paper.

Page 10, Line 14 to 18.

Page 11, Line 1 to 6.

This modifications is as follows:

5 Discussion

The simulation results indicate that the ECI algorithm has very good performance in noise reduction and robustness. Along with the increase of the Gaussian noise level, we found that the ECI algorithm can to some extend overcome the shortcoming that the TSIP algorithm is susceptible to the noise of the current. This result coincided with Eq. (6) and Eq. (13), which provides a novel approach for correlated identification noise reduction. In the impulsive noise experiment, we found that the ECI algorithm still has good noise reduction when the discrete point is more than 60%, which compensates for the disadvantage of the traditional denoising algorithm. Moreover, these simulation results also reveal that the ECI algorithm should have high robustness.

The standard deviations analysis of the real data indicates that that the ECI algorithm improves the accuracy and robustness of the collected data, which are compatible with the simulation analyses. This consistency shows that the ECI algorithm can obtain the location and shape of two abnormal bodies by improving the SNR of SSIP data, which can increase the resolution of inversion results.

2) Also, we have modified the conclusions.

Page 11, Line 15 to 18.

This modifications is as follows:

For the amplitude spectrum, the ECI algorithm can more effectively suppress the background noise, including the Gaussian random and impulsive noises. Still, its effect is very limited for the phase spectrum. Therefore, denoising algorithm based on pseudo-random sequence correlation identification is still left open for more investigation.

Note:

We also add the sections "Code availability", "Data availability", "Author contribution", "Competing interests", "Acknowledgements", and "Financial support".

Page 11, Line 20 to 37.

The sections is as follows:

Code availability. The code is a collection of routine in MATLAB (MathWorks) and is available upon request to the author (e-mail: hsmfly1982@163.com).

Data availability. ALL the SSIP data are collected by ZW-CMDSII and are available upon request to the author (e-mail: hsmfly1982@163.com).

Author contributions. SH and YW designed the study, performed the research, analyzed data, and wrote the paper. JG contributed to language polishing and response. XJ and HX contributed to refining the ideas, carrying out additional analyses, and finalizing this paper.

Competing interests. The authors declare that they have no conflict of interest.

Acknowledgements. We are grateful for the help of J. Wang, S. Zhu, H. Wang and J. S. Cui. We thank the editors and the reviewers for the constructive comments that helped to improve this article.

Financial support. This research has been supported by Key technology projects of science and Technology Department of Jilin Province Scientific (20190303015SF), Research Project of Jilin Provincial Department of Education (JJKH20210692KJ and JJKH20211053KJ) and the Fundamental Research and Theme Funds for Changchun Institute of Technology, China.