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Manuscript ID nsg-2004-0003 "Dipole-dipole array configuration in the framework of the reciprocity principle"

Dear Dr. Frasherri,

Thank you for submitting your manuscript to *Near Surface Geophysics* (NSG). As associate editor for NSG, I received your manuscript. Although the subject of the manuscript in general is of relevance to NSG, I decided, on consultation with the editor Ugur Yaramanci, to not accept the manuscript in its present form since in my view it does not meet the standard of NSG in terms of structure, extent, and content. Please let me explain my decision to you.

The manuscript discusses pseudo-section responses of surface electrode configurations (in particular dipole-dipole) over simple prismatic bodies and relates them to the principle of reciprocity. From numerical modelling studies it is concluded that the principle of reciprocity may not be valid for certain subsurface structures. Now, I would like here to recall three well-known facts:

- 1) The principle of reciprocity in the context of electrostatics is a theoretically proven basic physical principle which is valid for any electrical conductivity distribution. A proof is given, for example, in the classic textbooks *Electrodynamics of Continuous Media: Volume 8 (Course of Theoretical Physics)* by Landau and Lifschitz (for the extended electrodynamic case), or *Classical Electrodynamics*, 2nd Edition, by Jackson.
- 2) Pseudo-sections of surface electrode arrays over an inhomogeneous underground generally reveal asymmetric patterns which depend on the employed electrode configuration type as well as the subsurface structure.
- 3) The principle of reciprocity may be violated, of course, in numerical modelling or real physical (e.g. field) measurements due to modelling or measurement errors (the latter for instance due to electrode effects).

Therefore, in my opinion the taken scientific approach is inadequate and, thus, in conjunction with an insufficient presentation of concepts, theory, and methodologies, as well as discussion and conclusions, the manuscript in its present form can not be considered for publication in NSG. It is absolutely necessary to strictly distinguish between the principle of reciprocity and its possible violation (as visible in Figs. 3, 4, and 5a), on the one hand, and the occurrence of

asymmetric pseudo sections over an (asymmetrically) inhomogeneous underground (as visible in Figs. 5b, 5c, and 8), on the other hand. For inclined prism models, the pseudo-section plot of a survey employing a linear surface electrode array must obviously reveal an asymmetric pattern. This, however, has nothing to do with reciprocity, but just reflects the given subsurface structure.

In its current state, the manuscript only presents (i) numerical examples (vertical prisms) where the principle of reciprocity is obviously violated, which can only be due to modelling inaccuracies, and (ii) numerical examples (inclined prisms) with corresponding, asymmetric pseudo sections (which are, by the way, likely to be subject to similar modelling inaccuracies). Both aspects do not at all involve any new methodological insight, result, or problem which is pointed out. A publication in NSG can therefore not be supported.

However, I would like to encourage you to perhaps use the current manuscript as a basis for the writing of a new (and extended) manuscript which actually addresses the principle of reciprocity and its possible violation in modelling and/or measurement practice, discusses reasons for this, and studies any implications for surveying practice or data interpretation/processing. This would certainly be a contribution of interest to the reader of NSG, and could represent an original piece of work.

I hope you can follow my reasoning and understand my decision.

With kind regards

A handwritten signature in black ink, appearing to read 'Andreas Kemna'. The signature is written in a cursive, flowing style.

(A. Kemna)