

Interactive comment on “Ellipsoids (v1.0): 3D Magnetic modelling of ellipsoidal bodies” by Diego Takahashi Tomazella and Vanderlei C. Oliveira Jr.

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This is a well-written exposition of the theory that underlies ellipsoid modelling, with practical algorithms. The mathematics, apart from a few tweaks, is not original, but it is clearly presented in a manner that should assist researchers who want to make use of ellipsoid modelling. The authors' new criterion for assessing the maximum susceptibilities for which self-demagnetization can be neglected is a useful addition to the theory. The software should prove very useful for the geophysical community. I have a few specific comments. 1. On line 5 "only finite bodies" might be better than "only bodies". 2. Line 27. The geoscientific community does indeed lack a FREE easy-to-use-tool for ellipsoid modelling, but commercial software packages (which are not cheap), such as

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Tensor Research's ModelVision or GSS Potent, include ellipsoid modelling. 3. I think it is worth pointing out to the readers that there is a fundamental non-uniqueness of ellipsoidal sources, analogous to the equivalence of concentric spheres with the same magnetic moment. As pointed out by Clark (2014), co-located confocal ellipsoids with the same total magnetic moment vector produce identical anomalies. As the size of the equivalent ellipsoid increases, while maintaining the positions of the foci, its eccentricity decreases. Note that this does not imply, for isotropic susceptibility without remanence, that confocal ellipsoids with appropriately scaled susceptibilities will produce identical anomalies, unless the geomagnetic field happens to lie along one of the principal axes. If the field is oblique to the axes, then the deflection of the induced magnetization due to shape anisotropy will vary, depending on the size of the ellipsoid. In practice, the presence of remanence or anisotropy introduces uncertainty into interpretation of the orientation and axial ratios of the ellipsoid from its total magnetic moment. 4. It would be a simple matter to include remanence into the model. I recommend this for a future version. 5. Perhaps a future version could also generalize the model to consider ellipsoids immersed in a permeable medium. Stratton (2007) gives formulas that could be used for this.

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