

This work contains interesting improvements over a previous work from the authors (Gebre and Lewi, 2022) concerning gravity inversion using L0-norm regularization. The main contributions include auto-adaptive regularization and combined stopping criteria. The results shown include many tests with synthetic data and real data which supports the claim of the article. In general, the article is well written and should be accepted after few minor modifications.

- The article contains typos and minor grammar mistakes that should be corrected. For example, in line 122, it should be “Here the misfit functional is $\Phi_d = \dots$ and \mathbf{W}_e is the error...”. In line 334, it should be “total number of model parameters”, etc...
- For the sake of completeness, the expression of the stabilizing functional, $S(\rho)$ should be given to explicit the role of \mathbf{W}_c^k in the objective function and improve the understandability of (4).
- Also, as the method is based on iteratively reweighted least squares (IRLS), it should be mentioned on the text.
- In (18), the max operation should be defined.
- In (19), please use a notation similar to:

$$[\tilde{\rho}^k]_j = \begin{cases} [\rho_{max}]_j & \text{if } [\rho^k]_j > [\rho_{max}]_j \\ [\rho^k]_j & \text{if } [\rho_{min}]_j \leq [\rho^k]_j \leq [\rho_{max}]_j \\ [\rho_{min}]_j & \text{if } [\rho^k]_j < [\rho_{min}]_j \end{cases}$$