I would like to congratulate the authors for their effort in developing open-source software for use in the geosciences. I believe we are close to the critical point where open-source tools will see a rise in adoption by the industry, ushering a new cycle of engagement and development that will benefit the whole field. Overall, the article is clear and well-presented. I consider it in a suitable form for publication, after the minor points below are addressed.

Thank you for your positive review.

Line 23: It may be interesting to mention the difference between manually drawn explicit surfaces and mathematical explicit surfaces (https://en.wikipedia.org/wiki/Parametric_equation). Some people favor the latter definition while I personally prefer the former. I don't think there is an "official" definition of geological explicit vs implicit surfaces yet, so this is an opportunity to take a step in that direction.

We have rephrased this section to define the geologist's definition of explicit as manually drawn in contrast to the mathematical definition.

Line 28: Distance from the surface is not the only way to encode the observations. Gonçalves et al. (2017) work with fixed positive/negative values, while Hillier et al. (2014) use inequality constraints. These would fit in your potential field definition in section 2.1.

This is true – we have changed this sentence to show that the distance is only way of encoding the geological observations.

Line 119: "black and gray arrows. . .". Do you mean solid and dashed arrows? Figure 1: What do you mean by "norm of the implicit function"? If we are dealing with a scalar field, its gradient at a given point has a norm, but I am unfamiliar with the concept of a norm for the field itself. Also, it might be worth mentioning that the gradient constraint is composed of one linear constraint per dimension.

This was a typo, it is meant to be the norm of the gradient of the implicit function. We have fix this.

Line 209: Are these alternative regularizers implemented in the package? Do they provide very different results from the standard one? It would be interesting to discuss situations in which one may be preferable over the other, or to point to works that do so.

They haven't been implemented currently but would easy to implement. The comparison between interpolation methods is a topic in itself and is something that will hopefully be possible using LoopStructural. One of the challenges in a comparison is choosing the appropriate case study(s) that does not preferentially favour a particular interpolation scheme. For this reason we have only briefly touched on this topic in the first case study and we hope that LoopStructural will be a suitable platform for this type of comparison study to be performed.

Regarding implementing the different regularisation terms. We have added a sentence in the manuscript to outline how the interpolation can be easily modified without writing boiler plate code.

Line 216 seems to be misplaced.

Yes it was, it has been removed.

Line 221: Is the interpolation problem always over-constrained in practice? If I understood correctly, M is the number of nodes and N is proportional to the number of data points. Is that so? Are the regularization constraints added to N? If $N > M$, shouldn't the shape of the matrix A be $N \times M$? Also, it seems that the number of basis functions is defined by M in this case (one per node).

You are correct it should be NxM. Regularisation is added to N. Number of basis functions is defined by the number of elements so not directly M.

Lines 341-350: A figure illustrating these difficulties would be useful.

This topic is covered in detail in Laurent et al., 2016. We have added a reference to this to avoid repetition.

Lines 363-383: If the different α values are scalar angles, are they really necessary in the equations, since they represent zero value constraints? It would be useful to write the vectors in boldface, in order to better distinguish them from the scalars. What is hs?

We have changed this section it was incorrect. The constraints are now defined with respect to the fold component vectors (fold axis and fold direction). These are calculated using the rotation angles specified as described in text.

Hs is the expected thickness of the stratigraphy. It is used to constrain the length of the gradient norm. We have added this into the text.

Line 387: "fold axis of the experimental variogram". Do you mean the experimental variogram of the fold axis rotation angle?

Yes, we have fixed this.

Line 481: Instead of pure noise, perhaps you could sample from a spatially correlated model (this can be easily done through the Cholesky decomposition of the covariance matrix), maybe with 10-20% noise, or even the sum of 2-3 structures with different ranges. It may help to better convey the points made later in the text about prioritization of local/global trends. Exact interpolation of noise will certainly result in unrealistic surfaces. I feel the examples are being somewhat unfair to the RBF model.

We have modified the example to be a combination of a few structures and gaussian noise. The addition of the noise is to highlight the impact of noise on how the interpolator fits. This example is not intended to be unfair to RBF, but a way of highlighting the importance of understanding the interpolation process. Specifically exact interpolation (RBF/cokriging) will work well on clean data, whereas the discrete interpolation will work better on noisy data but may add too much smoothing clean data. As mentioned in the previous comment, a more thorough review of the interpolation schemes is required but is outside of the scope of this study.

Line 484: The acronyms PLI and FDI should be defined right alongside their first mention in the text. Section 4.2: Being a non-geologist, it is hard for me to visualize the effect the data has on the final model based on the provided figures. Perhaps you could expand Figure 12, showing the measured orientation disks along with some isosurfaces in 3D.

PLI/FDI are defined in section 2 now and we have changed the visualisation to orientation disks. We have added html interactive figures for each of the examples in the appendix – it is difficult to communicate the 3D nature of the models without a 3D visualisation environment.

Figure 13: The text is too small.

This has been fixed

Line 634: do you mean Ax = b?

Yes, this has been fixed.