

Nonlin. Processes Geophys. Discuss., referee comment RC1
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Comment on npg-2020-45

Anonymous Referee #1

Referee comment on "Analytical Solution for the Influence of Irregular Shape Loads Near the Borehole Strain Observation" by Wei Yan and Zirui Li, Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2020-45-RC1>, 2021

In this manuscript the authors attempted to present an analytical solution for elastic response to surface irregular shape loading in a uniform semi-half space. Analytical solutions have been previously derived successfully for surface loading with loading area being a point, line, rectangle, circle and elliptic, respectively. The derivation of an exact analytical solution for an irregular shape surface loading could be a big, significant contribution. However, seems in this work the authors focused on discussion of how to simplify the model of irregular shape surface loading to the one of surface punctate loading, and didn't directly obtain the exact analytical solution. The title of this manuscript and the wording "exact analytical solution" in context seems very ambiguous and misleading. The hypothesis made for this simplification probably need to be explicitly emphasized and highlighted in the abstract.

I would like to see the strong argument for the hypothesis made by the authors, probably using the comparison to other semi-analytical and numerical solutions. The discussions of convergence in Section 3.1 and 3.2 are very interesting, unfortunately the authors didn't give any details on choosing the grid points (Fig. 3 (b)). From my perspective, the selection of grid points seems to be important for converging analysis. Since at some cases, for example where grid points are chosen elaborately as shown in Fig. 3(b), the converging results indicated in Figs. 4 and 8 may likely only tell us the self-consistent convergence of the simplified punctate loading solution but nothing about the convergence to the real solution. The authors probably need to demonstrate why and how good the simplified model can be used to approximate the original model.

Some other minor comments:

- I am kind of confused by the description of two- and three-dimensional surface loading in Section 3.1 and 3.2. Seems it is better to categorize the models to be uniform and non-uniform surface loading, where non-uniform surface loading could be a function of density, height and coordinates.
- Page 3, line 71, "the coordination" to be changed to "the coordinates"?
- Page 4, line 94, "Fig. 2ab" to be changed to "Fig. 2a, 2b"?

- Page 5, line 106, and page 7, line 157, what is “the total load”? particularly what is meant by “total load” in non-uniform loading (three dimensional loading).
- Page 8, line 160, equation (12), can the authors explain why the sum of P_i is not equal to P ?
- Page 5, line 121, the point M ($z=-0.2m$) is above surface according to the diagram in Fig.1. Should be $z = 0.2m$.
- Page 7, Fig 5, for the annotations, change x/m and y/m to $x(m)$ and $y(m)$?
- Page 12, lines 268 and 271, “19.19” and “20.20” should be “19.” and “20.”, respectively.