

## ***Interactive comment on “A new open-source visco-elastic Earth deformation module implemented in Elmer (v8.4)” by Thomas Zwinger et al.***

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The module proposed in this article is a good alternative in modeling Glacial Isostatic Adjustment (GIA) because it takes advantage of an open-source and free FEM package Elmer. The article is well written with a clear structure. I can support publishing the article if the author can provide more details of the method and more benchmark tests:

In section 2, what are the boundary conditions on internal boundaries and external surface for a flat Earth model and how are they implemented in the model ? In terms of solving Equation (9), what are the detailed form of the test and weighting functions

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and what is the integration method ?

In section 3. when doing benchmark tests, it is more convincing that if the numerical solution can be compared with the analytical or semi-analytical solution. Therefore, it is good to compare the result from Elmer/Earth with that from normal-mode method for a Heaviside single harmonic load and a flat Earth model.

Below are some small issues:

Figure 1 and Figure 2: font size on axes is too small. Line 148: why does a high viscosity (e.g.  $1 \times 10^{44}$  Pas) in Lithosphere enables an approximately elastic behaviour ? Why the viscosity of upper and lower mantle are set to be  $1 \times 10^{18}$  Pas and  $1 \times 10^{22}$  Pas respectively ?

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-270>, 2019.

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