Review of the paper:

Nonlinear Wavefield Characteristics of Seismic Translation and Rotation in Small-Strain Deformation: Insights from Moment Tensor Simulations

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The authors present an updated version of their previous submitted work. Despite the topic is of interest to the community I have rejected the paper in several previous occasions and despite the authors have made some modifications to the text, I am sorry but I still recommend rejection of this work. I will elaborate why I still think this way.

As I previously stated, the authors present a numerical study based on a code that they have developed. This is something important and difficult to do. However, they don't do any benchmark of their code, which makes the reader (very) doubtful of their numerical results.

On the one hand, one can see the effort done by the authors on improving the clarity of the presentation of the mathematics and the structure of the paper. This is nicely done now. The paper has a clear structure and the mathematics is clearly presented. On the other hand, the lack of validation of the code renders their numerical experiments doubtful.

I can bypass, for a moment, the lack of benchmarking of their code and trust that the numerical code is well written and read and try to understand their simulations. Then it comes the next problem: The authors present an analysis of seismograms (time histories) and they insist in plotting all components over the same line and present, in my opinion, a mathematical/statistical study of the waveforms. This, in my onion, is not a proper way to understand seismic waveforms because: on the one hand we look to understand the physics of wave propagation when we analyze seismograms and, on the other hand, this kind of presentation obscures the information that seismograms contain.

In simpler words: when we look at differences in seismograms we look to analyze differences in different waveforms: P waves, S waves, Love and or Rayleigh waves, etc and not to say this part of the seismogram is different and the other one not. This will tell you the properties of the material where the non-linearity is observed and why is it this way.

An easy way to invalidate the results presented in this paper is by looking at Figs. 11 and 12. If one makes a zoom we can see the similarity between trans.R and trans.T at the beginning of the seismogram and this simply cannot be happening in an isotropic medium. The first arrival that we are able to see in trans.R and trans.Z is the P wave, however, trans.T should not show any arrival whatsoever. The first arrival of the trans.T component is the S wave an before that one should see simply nothing, absolutely zeros. This is seismology 101.

One then is left with the doubt: the authors did not correctly benchmark their code? and/or their simply fail in rotating the seismograms? I cannot answer this question from the information

presented in the manuscript. Therefore, I am sadly to say that I cannot believe their results in any case.

I do acknowledge that the authors present a challenging study but if there is the inability of benchmarking their code in 3D and there are serious doubts about their results, I canot believe what is written here. I thus suggest to simplify the study. The authors could simply run a 2D SH wave simulation to which the analytical solution is very easy to do for the code (see Heiner Igel's book) and the authors can then focus on understanding the difference in their seismograms in different 2D SH heterogenous scenarios. In another paper the authors can focus on 2D PSV and repeat the experiment. This will allow to gain insight and intuition on how to analyze seismograms and numerical model the results.

To make the review short, I am sorry to say that I still find hard to believe the results presented by the authors. They have improved a lot; however, I am still left with serious doubts about the validity of the results presented here because the lack of validation of the code and due to the incongruence in the physics that the seismograms show.

With best regards,

A reviewer