Interactive comment on "Determining the focal mechanisms of the events in the Carpathian region of Ukraine" *by* A. Pavlova et al.

Anonymous Referee #1

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The authors introduce a method that could be useful in constraining the displacement and stress field as a response of anisotropic layered medium. The proposed approach allows determining the focal mechanisms as well as other source parameters for small earthquakes. It is especially important for regions where the lack of sufficient strong-motion observations causes large uncertainties in constructing the focal mechanism from first-motion polarities. The authors demonstrate the approach by using trial and error method for 4 micro-earthquakes that occurred in the Carpathian region of Ukraine. The results obtained by trial and error show remarkable agreement with the fault plane solutions obtained by traditional graphical method, based on the first arrivals of P-waves. This paper has a potential to be of interest for seismologists. However, in its current form this manuscript is not quite ready for publication, and needs some

revisions. My main concern is on poor English that needs a strong revision. Moreover, I have three major and several minor points that I present below.

SCIENTIFIC QUESTIONS / COMMENTS

First of all, the written English is not adequate. From the abstract through the conclusion, this manuscript should be smoothly revised. Authors should consult with colleagues having native English or address to professional service.

I assume that all the mathematical transformations and calculations are correct.

Major points:

1. It's not clear what type of waves, which components and frequencies were used in the presented simulations. I think that the authors should clarify it and even show it in the Figures (for example, the comparison of the real records and your synthetics).

It's not clear how many stations were used in the trial and error method and what does the correlation coefficient R mean (average for all stations or maybe for the closest station)? How the authors estimate the time window for R computation?

2. Are the obtained solutions demonstrated in Figs. 5, 9, 13 and 17 correspond to the single station or to mean solution? It must be explained in detail.

3. I am missing some information about this method limitation.

Minor pointes: I would like to draw the attention to the following issues: - I suggest to combine tables describing the same features into one table. It is relevant for tables 3,5,7,9,11,13,15,17 describing focal mechanisms, for tables 4, 8,12,16, describing spectral parameters and tables 2,6,10,14 comprising input data for the determining the focal mechanism by the traditional graphical method.

- I suggest to revise the captions for Figs. 3, 5, 7, 11, 13 15, 17, -It's not clear which earthquakes are shown in the Figures. Please, specify the events.

- I suggest to combine Figures 2, 6, 10, 14 and to mark all events clearer. The all these figures are exactly the same excluding one point. It took some time for me to find out the differences on the figures.

- Figures 4, 8, 12, 16. Please, label the horizontal axis and explain what we see on the top and bottom.

- Authors should check the List of References. I found here some inconsistencies. I have not checked all the details; the authors should make sure the List of references is correct and complete, while unused entries should be removed.

For instance,

Alford, R. M., Kelly, K. R., and Boore, D. M.: Accuracy of finite difference modeling of the acoustic wave equation, Geophysics, 39, 834– 842, 1974. – unused

Auld, B. A. Acoustic fields and waves in solids, J. Wiley and Sons, New York, 18 pp., 1973. – unused

p. 119. Brace and Byerlee, 1966.

p. 121. Cheng et al, 1992.

p. 118 Choy and Boatwright, 1981.

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