

This paper investigated the effects of variations of fracture apertures on seismic dispersion and attenuation, which is of great importance for the seismic detection and characterization of fractures.

This paper is well written and hence I only suggest minor revisions. The authors may would like to consider the following suggestions:

1. The authors mentioned several times the variable of ‘density of contact areas’, but no detailed definitions of this variable is given. Since this is one of the major influencing factors that the authors investigated, so the authors should give a clear definition of this variable.
2. Page 4, Line 17: the authors state that ‘We solve this system of equations in the weak formulation...’. What does ‘in the weak formulation’ mean? Please explain this in details.
3. Section 3.1: it seems that the authors choose a REV with only one fracture for the numerical simulations of medium with parallel fractures. This may ignore the boundary condition effects (e.g, Milani et al., 2016, Geophysics) and also the possible fracture interactions. Please comment.
4. Figure 2: the authors consider the contact area to be rectangular, but the contact area in reality can be circular or some other much complicated shapes. What is the possible effects of the contact area shape on seismic attenuation and dispersion? Please comment.
5. Page 15, Line 16: the authors extended the normal incidence case to the oblique incidence case using the approach of Krzikalla and Müller, but no introduction of this approach is given. For the ease of the readers, please give a brief introduction of this approach.
6. Some minor errors that need to be corrected, such as:
 1. Page 2, Line 31: ‘have on the fracture stiffness and on the fluid flow **trough** the fractures’, ‘trough’ should be a typo and should be ‘through’, please correct.

2. Page 7, Line 5: 'This occurs because there is **not** time for fluid pressure', 'not' should be corrected to 'no'.
3. Figures 5 and 7: 'Correlation **length**' should be corrected to 'Correlation **length**'.
4. Figures 6 and 9: Please explain briefly in the figure captions what 'A', 'B', 'C', and 'D' in the figures refer to.

Best,

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