Dear Editor,

First and foremost, thank you for your helpful feedback. We made a concerted attempt to respond to most of the comments clearly and concisely as follows:

***Editor's letter:***

I am sorry to say, there is still one major issue which must be modified or clearly mentioned as a strong limitation in the approach, as the problem modeled is different, and this must be said. In short, the 2D approximation for a 3D helicoidal cable is simply wrong, or not justified enough. The issue is in the appendix A, where all the modeling development is performed. At line 507, youmention that "because the plane wave incident upon layer 1 is assumed to lie in the X-Z plane",then "the problem becomes 2D". This is simply wrong. I try to show it in the figure below.

On the left, the 3D real situation is represented, on the right the 2D approximation. In the 3D case, even if the incident plane wave is in the plane XZ, there will be rays (example R3) which will reflect in the layers with a different path as the one in the XZ plane, as they hit the layer one with a different incident angle, and therefore will modify amplitudes of the signal catched by both fibres, linear or helicoidal. In 2D, this is much more simple to evaluate indeed, as R3 will not interact with the plan XZ at the location of the cable, and will behave as R1 and R2, and not interact with R1 and r", contrary to the 3D situation.

Therefore, the approximation of the 3D into 2D is completely wrong and you cannot claim that the equations you derive are an approximation for the 3D case. As long as I do not see a true comparison between the real situation modeled in 3D and the 2D approximation, I would not agree that the discrepancy is small enough that your results represent an approximation of the 3D. Now, indeed you can estimate what would be the amplitudes for a 2D case, but the problem addressed is completely different. Actually, even in this 2D approximation, as the fibre is helicoidal, it is really 3D, and therefore you cannot assume everything is happening in 2 dimensions. Those point have been actually raised by all reviewers, but not properly addressed so far.

Response: Thank you Philippe! I agree with you! We decided to focus more on 3-D modeling aspect of HWC. As a result, the analytical part and 2D model have been deleted from the paper. However, we would like to clarify that we didn't want to compare 3D with 2D model/analytical model, and 2D model was compared with analytical equations to assure that the boundary conditions have been set correct. It was explicitly stated that "However, results between 2D and 3D simulations cannot be directly compared quantitatively."

In addition, there are minor elements:

line 16 and line 19: you define incident angle and Aftor mine at the wrong place. Those terms are already used earlier in the abstract, spo move the details to the first instance

Response: Addressed

Line 46: The year of the reference Kuvshinov is not correct
Response: Addressed
Line 58 why only the latter is dependent on the material around?
Response: Addressed, we meant more dependent

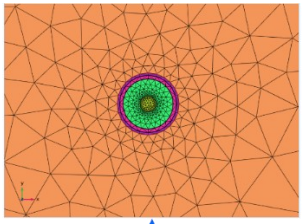
Line 136: typo at analytical
Response: Deleted

Line 184: scenario 5: 2 times cable?
Response: Deleted

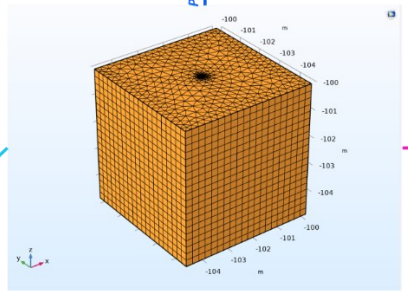
Figure 3. The text are much too small. Please increase the text size.
Response: Addressed

Line 236. a dot is missing at the end of the sentence.
Response: Addressed

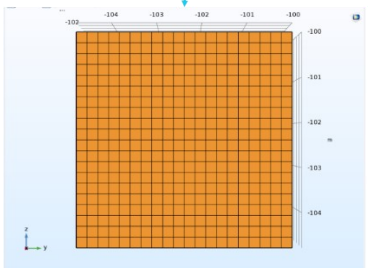
Line 255. I do not understand the issue with the graphics.
Response: The picture below should clarify that there are no meshing issues with COMSOL. Inside the domain, a tetrahedral mesh was employed, while lower reflecting surfaces were covered with a swept mesh.



Plan View

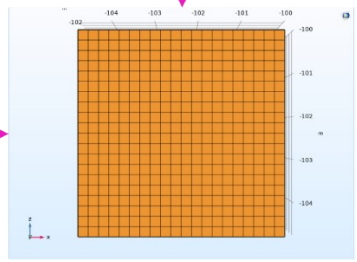


Front View



- *This Type of Mesh is mapped mesh. It is strongly recommended to use mapped meshing in the infinite boundaries to prevent poor mesh element quality, giving rise to poor or slow convergence for iterative solvers and making the problem ill-conditioned in general.*

Side View



- *This Type of Mesh is mapped mesh. It is strongly recommended to use mapped meshing in the infinite boundaries to prevent poor mesh element quality, giving rise to poor or slow convergence for iterative solvers and making the problem ill-conditioned in general.*

Figure 11: Why the plot is not symetric? What is the reason ? Is there a specificity in this case?
Response: The seismic load is applied on one side in this simulation (the right-hand side of the model). Because of this, the strain distribution around the borehole shouldn't generally have a symmetrical pattern (as you can see even in the other scenarios even slightly). The reflection coefficient is higher in this scenario than in the others due to the notable change in material properties between the cable and the soft cement (formation), which makes the asymmetric pattern more obvious.

Why do you show only cases where the incident angle is 90°?
Response: Maximum fiber strain occurs at 90°. On the graphs 13 to 16, the results for lower incident angles are given.

Line 380. How more performant HWC systems could be better designed with approximated modeling? It would be important to mention that full 3d modeling is required.
Response: The HWC/straight fibre installation in the field could be guided by this 3D model, and the results could even be interpreted using it. For instance, as shown in scenario 6, the fibre will be under extension rather than compression at an angle between 10 and 30. The fibre won't be able to record the strain if it occurs in the field, and the numerical model can predict/justify it. These findings may also indicate the conditions in which fibre will perform the best.

References: Daley, 2016; Innanen et al., 2019, Reinsch et al., 2017 are not cited in the text
Response: addressed

Line 447: please complete the reference, with all authors.
Response: Addressed

Line 482: What is " " is the formulas A.1, A.8, A.9 etc… If simple $*$ multiplication, it should be removed, like the product between w and t is written wt and not w*t.
Line 485. Not clear what Nabla is. I guess is it not a collection, but a symbol for an operator. There is also 2 times "is".
Line 419. remove the upper case B at because.
Line 505. Please make clear what are the "multilayered media". I suppose those are the different concentric layers (cement, water, etc.) and not the geological layers.
Line 532. not clear "… and using = n, x= hn, …"
Best regards, Philippe Jousset, 17.06.2022

Response: Appendices are deleted.