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Comment on gi-2021-14

Anonymous Referee #2

Referee comment on "Research into using a fiber Bragg grating sensor group for three-dimensional in situ stress measurement" by Yimin Liu et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-14-RC2>, 2021

In this manuscript, a quasi-distributed strain sensing array based on fiber Bragg grating (FBG) is designed by using the main structure of the classical hollow inclusion cell. The in-situ stress inversion algorithm of hole-wall strain to stress is deduced. ABAQUS finite element software is used to simulate the in-situ stress measurement process of the overcoring stress relieving. Through the comparison of the inversion results, it is feasible and reliable that the FBG sensor module designed in this manuscript can invert the three-dimensional in-situ stress by measuring the hole-wall strain. This work presents a meaningful theoretical and experimental foundation for the development and application of FBG hole-wall strain gauge. This manuscript is recommended to be revised for the following reasons.

- FBG is just sensitive to axial strain. As shown in Figure 5, the FBG strain sensor group adopts the installation mode of multi-group distributed winding, and twenty-six FBG sensing elements are arranged on the surface of the deformed tube by using six optical fibers. The actual strain direction is inconsistent with the FBG axial direction. How does the in-situ stress inversion algorithm of hole-wall strain to stress eliminate this kind of error?
- The epoxy resin can cause the reflection spectra of some FBGs to chirp, which has an impact on the accuracy of FBG wavelength. This factor isn't considered in the three-dimensional calculation model based on ABAQUS software.
- The author is recommended to give the detailed index parameters of FBG wavelength demodulator and expound how the measurement accuracy of FBG wavelength demodulator (as shown in Figure 8(b)) affects the accuracy of in-situ stress inversion algorithm.
- The novelty of the proposed method should be discussed. The authors must discuss the improvements of the technique in the submitted manuscript compared with the previous work which should be properly cited.

