

## ***Interactive comment on “Roadway backfill method to prevent geo-hazards induced by room and pillar mining: a case study in Changxing coal mine, China” by J. Zhang et al.***

**J. Zhang et al.**

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Thank reviewer for the comments concerning our manuscript entitled “Roadway backfill method to prevent geo-hazards induced by room and pillar mining: a case study in Changxing coal mine, China” (ID: 830587). Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and will try our best to revise this paper. The responds to the reviewer’s comments are as flowing:

Overall comments: The manuscript is potentially interesting, but the overall quality is not acceptable in the present version. The authors need to be more rigorous and the manuscript needs to be strengthened in several aspects.

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Response: Thank reviewer for your recognition to our work. We will try our best to revise this paper according to the reviewer’s comments.

Comment No. 1: Sections 2 needs of a schematic geological section in order to clarify the geological description, which is at present rough and too general.

Response: Thank reviewer for pointing this place out. Figure 1 is the schematic diagram of geological and mining conditions, and we will add more detailed information in the revised paper.

Comment No. 2: Section 3.2 and 3.3: what kind of laboratory test has been carried out? The text does not clarify in the current version. What is the SANS material testing? Is a triaxial test apparatus? What are the boundary conditions and the loading conditions applied? The authors are invited to provide more details on this part of the manuscript, as well as to describe better Figure 3. Why do the authors show only the initial part of the curves and not all the curves? Line 84: What is Scheme 2? This is not clear. The authors are invited to be more rigorous in the description and the comments of the test results.

Response: We will add the schematic diagram of compaction steel chamber in the revised paper for understanding this test well. The standard “Method of compaction testing of solid backfilling materials” issued by China National Energy Administration is used to guide the compaction laboratory tests. Because the backfill materials were granular similar to the caved rocks produced during caving mining method, when the backfill materials were compacted, they showed the strain-hardening behavior. Some detailed information will be added in the revised paper. Also we will add the references about the backfill materials in the revised paper.

Comment No. 3: Section 4 is not so important in the scheme of the overall manuscript. Probably, it can be shortened to a couple of sentences.

Response: Section 4 is the principle of roadway backfill technique including the mining

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and backfill equipment, mining and backfill method. It's essential to keep this section, but we will shorten a couple of sentences appropriately.

Comment No. 4: Section 5.1.1., lines 103 and 104: loading and boundary conditions are not clear. The authors should describe more accurately the simulation domain and boundary conditions applied. Moreover, the sizes of the numerical domain seem too limited with respect to the influence area and the problem to be investigated: risk of boundary effects in the numerical results is really high.

Response: Thank reviewer for pointing this place out. We will add some detailed information about the simulation domain and boundary conditions in the revised paper. After the roadway is excavated, the roadway will be filled by backfill materials immediately. So the influence zone will be smaller and the abutment stress will be lower. As shown in Figure 9(d), when the all roadways were excavated and filled by backfill materials, the advanced abutment pressure on both ends of the model almost is equaled to the virgin stress. Thus, the model is large enough to over the whole zone of influence.

Comment No. 5: Section 5.2., line 124: what is the stress concentration factor? Please define it, before using in the text.

Response: Thank reviewer for pointing this place out. The stress concentration factor is the ratio of the peak value of the abutment stress to the initial rock stress. Some detailed information will be added in the revised paper.

Comment No. 6: All the descriptions of the numerical results provided in sections from 5.2. to 5.3.2. are unclear. The authors are invited to clarify this part of the text by structuring the sentences in a better way and providing more details. Some comments provided by the authors are not justified and need to be explained with more details.

Response: Thank reviewer for pointing this place out. We will rewrite this part of the text by structuring the sentences in a better way and providing more details in the revised paper. Also we will use a professional technical writing service to improve its

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grammar and writing style.

Comment No. 7: The maximum values of roof subsidence in Figure 8 do not correspond to the values provided in lines 136-137. The authors are invited to check this lack of correspondence and correct the values in the text.

Response: Thank reviewer for pointing this error out. The Figure 8(c) is wrong and the correct one will be added in the revised paper. Also we will correct the text accordingly.

Comment No. 8: Plots in Figure 8b (roadway width = 5 m) and 8c (roadway width = 7 m) are very similar. What is the reason for the very limited difference observed? The authors are invited to provide an explanation.

Response: Due to the authors' mistake, the Figure 8(c) is wrong and the correct one will be added in the revised paper. And the Plots in Figure 8b (roadway width = 5 m) and 8c (roadway width = 7 m) are not similar.

Comment No. 9: The definition of safety coefficient of a pillar provided in lines 159-160 is wrong: the right definition is the inverse of the ratio indicated, since the safety factor is equal to the compressive strength divided by the average compressive stress and is general indicated with F or SF, rather than k.

Response: Thank reviewer for pointing this error out. We will correct the equation and text in the revised paper according to the reviewer's comments.

Comment No. 10: Figure 10 is very unclear and too small. The authors need to enlarge it and provide more details. The figure needs a graphic scale. What are "shear-n" and "shear-p" in the legend? The comments provided in lines 172 – 174 are not recoverable from Figure 10.

Response: Thank reviewer for pointing this place out. We will make the Figure 10 clear and add the graphic scale in the revised paper. Shear-n means the zone in the state of shear failure now, and Shear-p means the zone in the state of shear failure previously. Some detailed information will be added in the revised paper.

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Comment No. 11: Line 181: What is the “quadratic stabilization”? The authors are asked to provide a definition.

Response: Before the coal seam was excavated, the coal seam was in the state of first stabilization. After the coal seam was excavated and filled by backfill materials, the surrounding rock would reach the stabilization state. This stabilization state is called “Quadratic stabilization”. Some detailed information will be added in the revised paper.

Comment No. 12: The authors do not clarify where all the indications provided in section 7.2. derive from. They are strongly encouraged to be more rigorous in this section and clarify from what result of their analysis they have derived these indications for the optimization of the excavation and filling sequence.

Response: Thank reviewer for pointing this place out. We will clarify what result of our analysis for the optimization of the excavation and filling sequence in the revised paper.

Comment No. 13: In section 7.3. the authors need to provide a curve showing measured settlements against time and not only the value measured at a certain time. This is very important to understand if the subsidence is completed or not.

Response: Thank reviewer for pointing this place out. We will add the figure to show measured settlements against time in the revised paper.

Once again, thank you very much for your comments and suggestions.

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