Dear Editors and Reviewers:

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled "Distribution Features of Minimum Overburden Thickness of Surrounding Rock Self-Stability of Metro Tunnel in Soil-Rock Dualistic Stratum" (ID: 9120983). We have studied comments carefully and have made correction which we hope meet with approval. The main corrections in the paper and the responds to the reviewer's comments are as following:

Responds to the reviewer's comments:

Reply to reviewer #1:

In this paper, based on the cusp catastrophe theory, the author established the stability evaluation method of metro tunnel excavation in soil-rock dualistic stratum. At the same time, the numerical analysis and field monitoring methods were used to verify the tunnel depth effect and tunnel size response of tunnel excavation in such stratum. This paper is well organized, logical and coherent, but there's still some problems which need to be solved. Major comments are annotated in the manuscript.

(1)In the "Introduction", the literature review of research of tunnel excavation in soil-rock dualistic stratum is not enough, the authors should read more related articles, some examples are given below. More up-to-date literatures should be cited in the main text.

Refs: "Extreme deformation characteristics and countermeasures for a tunnel in difficult grounds in southern Shaanxi, China"; "Centrifuge modelling of twin-tunnelling induced ground movements in loess strata".

Meanwhile, as an international journal, is it appropriate to quote too many Chinese articles in this paper? The "Introduction" should be simplified, and it's too long.

Re: Thank you very much for your comments.The "Introduction" had been re-write and simplified according to the reviewer's comments, and the more up-to-date reference related to the topic had been added in the revised manuscript.

According to the topic of the manuscript, some Chinese articles had been replaced with more appropriate literature.

The revised text is as follows:
The fundamental goal of an excellent metro tunnel design scheme is to make full use of the self-stability of the surrounding rock. Recently, many subsurface metro tunnels have been carried out in the soil-rock dualistic stratum in cities, such as Qingdao [1], Dalian [2], Guangzhou [3], Chongqing [4], Guiyang [5], etc. When a metro tunnel is excavated in the urban area where the buried depth of the bedrock is shallow and the soft soil stratum thickness is thin, the tunnel should be placed in the rock stratum and maintained the minimum rock cover thickness meets the requirements of the self-stability of the rock surrounding. In this case, the construction of a metro tunnel can greatly reduce the tunnel support measures, save construction costs, reduce the tunnel construction safety risk and construction difficulty, and reduce the impact on the surrounding environment. Many scholars have studied the relationship between the stability of the surrounding rock and the rock cover thickness. Sun et al. [1] used an example of a metro station in Qingdao to determine the safety factor of a tunnel in surrounding rock at different buried depths by using the strength reduction method. They also considered the safety factor equal to 1 as the basis for judging the

surrounding rock self-stability of the metro tunnel and determined the relationship between the minimum rock cover thickness and the soil stratum thickness. Yang et al. [6] established the cusp catastrophe model of the safety thickness of a karst tunnel floor and derived the expression for the critical safety thickness. Xu et al. [7] designed a study based on the Qingdao Jiaozhou Bay Subsea Tunnel using two mutually verified discrimination methods: the minimum vertical displacement of the tunnel vault and the maximum safety factor of the tunnel surrounding rock. They then studied the minimum rock cover thickness of the subsea tunnel and considered that the minimum rock cover thickness of a subsea tunnel is the reasonable and effective thickness of the tunnel. Wang et al. [8] pointed out that the reasonable buried depth of the metro station in the soil-rock dualistic stratum should be determined by using the double index system of the overburden thickness-span ratio and the rock cover thickness-span ratio, and noted that the rock cover thickness-span ratio is more sensitive to the safety of tunnel construction than the overburden thickness-span ratio. Qiu et al. [9] studied the relationship between the minimum rock cover thickness and the surrounding rock stability of the subsea tunnel by numerical method.Zhang et al. [10] discussed and expounded upon the issues of the surrounding rock self-stability of the motro tunnel in the soil-rock dualistic stratum from the three aspects of the stress, the displacement and the safety factor. Wang et al. [11] studied theconversion timing of tunnel excavation method in upper soft and lower hard strata based on displacement direction angle theory under different working conditions.

The catastrophe theory was put forward by Thom, a French scholar, in the 1970s [12] and was then expanded into a perfect system by Trotman et al. [13], Zeeman et al. [14], and Poston et al. [15]. Catastrophe theory is a mathematical method used to study the phenomenon of discontinuity in nature. The cusp catastrophe model is one of seven primary catastrophe models in catastrophe theory, which has been widely used in the study of tunnel surrounding rock stability, and it has achieved ideal results [16-22]. Xia et al. [16] used cusp catastrophe theory and the discontinuous deformation analysis method to study the stability of the tunnel surrounding rock and obtain the safety factor. Based on the measured deformation data of the surrounding rock, Ren et al. [17] established the catastrophe model of the tunnel surrounding rock cusp by using catastrophe theory and deduced the instability criterion of the surrounding rock. Wang et al. [18] used the cusp catastrophe model to study the stability of gas storage pillars in layered salt caverns. Zhang et al. [19] used catastrophe theory to study the collapse mechanism and possible collapse block shape of a shallow, unlined tunnel. Zhou [20] et al. established a model based on the cusp catastrophe theory and analyzed the stability of the support system in the goaf of room pillar gypsum. Zhang R et al. [21], Huang x et al. [22] used catastrophe theory to study the instability mechanism of a shallow tunnel.

(2)In the section "Methodology and Research Process", all formulas should be processed with the Equation Editor, the following formulas in this paper should be treated in the same way, if these formulas are not original, they should be quoted strictly.

Re: Thank you very much for your comments. All formulas had been modified by the Equation Editor, and these formulas had been cited by the reference citation.

(3)All the case drawings (Fig 4, 5, 7, 12) in this paper should be processed by appropriate methods to make them standardized. Figure 9 also needs to be processed. Similarly, the table

processing in this paper is not standardized and needs to be optimized.

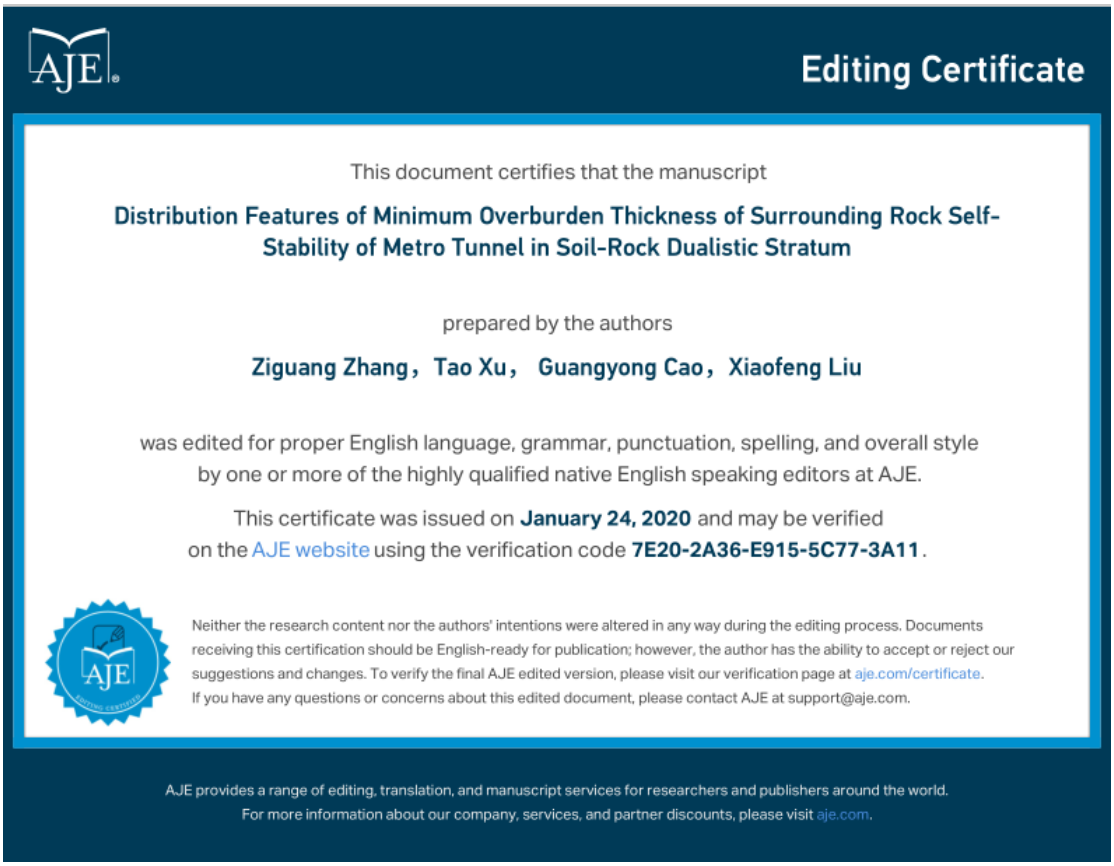
Re: Thank you very much for your comments. All the drawings and tables had been checked and modified according to the published papers in this Journal.

(4) In the Table 5, the author should indicate the full names of different tunnel excavation methods in the form of "annotations", such as "CRD method". There are a lot of English abbreviations in this paper, whether these are standard?

Re: Thank you very much for your comments. The full names of different tunnel excavation methods had been added in the Table 5. Others abbreviations in this paper had also been checked carefully in the manuscript.

(5)There are some grammatical and linguistic errors in this paper. English should be carefully proofread by native speakers, at best, it can be polished by professional institutions. In the revised manuscript, an overall checking is also required to prevent grammar mistakes.

Re: Thank you very much for your comments. After modifying the manuscript per the reviewer comments, the manuscript was sent to professional English-editing service provider (AJE, www.aje.com). Please see the attached file for the proof.



AJE

Editing Certificate

This document certifies that the manuscript

Distribution Features of Minimum Overburden Thickness of Surrounding Rock Self-Stability of Metro Tunnel in Soil-Rock Dualistic Stratum

prepared by the authors

Ziguang Zhang，Tao Xu， Guangyong Cao，Xiaofeng Liu

was edited for proper English language, grammar, punctuation, spelling, and overall style by one or more of the highly qualified native English speaking editors at AJE.

This certificate was issued on **January 24, 2020** and may be verified on the AJE website using the verification code **7E20-2A36-E915-5C77-3A11**.

Neither the research content nor the authors' intentions were altered in any way during the editing process. Documents receiving this certification should be English-ready for publication; however, the author has the ability to accept or reject our suggestions and changes. To verify the final AJE edited version, please visit our verification page at aje.com/certificate. If you have any questions or concerns about this edited document, please contact AJE at support@aje.com.

AJE provides a range of editing, translation, and manuscript services for researchers and publishers around the world. For more information about our company, services, and partner discounts, please visit aje.com.

Figure 1 Editorial certificate

Special thanks to you for your significant comments and suggestion.

Reply to reviewer #2:

This paper introduced the distribution features of minimum overburden thickness of surrounding rock mass of tunnel, which is valuable to the tunneling engineering. However, the writing and format of this manuscript are very poor.

1. It is necessary to add the Line number in the paper. It is hard to review for this version.

Re: Thank you very much for your comments. The Line number in the paper had been in the revised manuscript, so please see the new version.

2. Introduction, the format of literature review confused me, such as "Then Chen [16] (2003) established``````". I suggest referring to the published papers in this Journal.

Re: Thank you very much for your comments.I'm sorry to cause the reviewer some confusion, and the format of literature review had been revised according to the published papers in this Journal.

3. The variable should be italic. Now I can not follow the formulas in this paper.

Re: Thank you very much for your comments. I'm sorry to cause the reviewer some confusion, the variable had been modified to italic, and the formulas had also been modified by the Equation Editor.

4. For the existed methodology or theory, reference citation is indispensable, such as Lines 1-6 of Section 2.1.

Re: Thank you very much for your comments.The reference citation had been added in the existed methodology or theory.

After modifying the manuscript per the reviewer comments, the manuscript was sent to professional English-editing service provider (AJE, www.aje.com).

Special thanks to you for your significant comments and suggestion.