**Reviewer #7:** This paper conducted numerical analysis of the rock deformation in twin tunnels with transverse gallery. Overall, this paper is interesting. The following comments are for the authors to consider. After revision, I think this paper can be published.

**(1) In the introduction, the authors mentioned that tunnels are widely used and in the underwater environment. Therefore, the latest research regarding the interaction between rock mass around tunnels and water is recommended to be added (10.1016/j.engfailanal.2024.109137).**

Thank you for your comment and for recommending a reference regarding the interaction between rock mass and water. The mention of underwater tunnels in the introduction was intended as a general statement to highlight the widespread use of tunnels in diverse environments, rather than as a focus of this study. The scope of the introduction and the manuscript is specifically limited to applications involving twin tunnels and their structural interactions. However, the Citation of the article was incorporated in the XXXXX section:

[ESCREVER A PARTE ONDE FOI CITADO PELO SAMIR E VERIFICAR SE FORAM LISTADOS CORRETAMENTE NAS REFERÊNCIAS]

We appreciate the relevance of the suggested research for broader tunneling studies and will consider incorporating such references in future work where the effects of water on rock mass behavior are within the scope of the study.

**(2) For the fundamental assumptions, this section can be shortened.**

[VER COM O SAMIR COMO FICOU ESSA SEÇÃO REDUZIDA]

**(3) Please further check whether some equations or figures should be cited in Section 3, such as Figure 1 and Equation (2).**

The authors considered Figure 1 and Equation (2) important for understanding the mathematical description of the model.

**(4) The above comment is also applicable to section 4.**

The authors considered Figure 3 and equations important for understanding the mathematical description of the model.

**(5) When author mesh the geometry to the corresponding number of elements, which guideline did the authors follow? I mean how did the authors determine the corresponding number of elements?**

The mesh density and element distribution in our study were defined based on a balance between accuracy and computational efficiency. We followed standard meshing practices for geotechnical problems, ensuring that the element size was sufficiently small in regions of high stress gradients, such as near the tunnel-gallery intersections. A mesh convergence study was performed, wherein we progressively refined the mesh and monitored key results (e.g., stress distribution and convergence profiles) until changes between successive refinements were negligible. Special attention was given to areas with complex interactions, such as the transverse gallery and surrounding rock mass, where 10-node tetrahedral elements were used to capture detailed stress redistribution. For the remaining structure, 8-node hexahedral elements were employed to optimize computational costs. The final number of elements was also influenced by the computational resources available, as we aimed to ensure the feasibility of running multiple simulations for different parametric studies.

To make it clearer, it will be added to section 5 in the fourth paragraph:

“The mesh density was determined based on a balance between accuracy and computational efficiency. A mesh convergence study was conducted comparing the results, such as stress distributions and displacements, between successive mesh refinements until changes were negligible. The results also were verified with analytical solutions presented in the following section. […]”

**(6) The authors conducted a comprehensive analysis and parameter study. However, it will be better to compare the numerical study with some in-situ tunnelling cases. I understand that the fundamental research will be quite difficult to have certain in-situ tunnelling cases. Therefore, this is a recommendation for the authors to consider.**

We sincerely thank you for your valuable comment highlighting the importance of comparing numerical study with in-situ tunneling cases. We fully agree that such comparisons are critical for validating and enhancing the practical applicability of the research findings.

As noted, the primary focus of this study is on fundamental research and the development of a robust numerical approach to modeling the interactions between twin tunnels and transverse galleries with delayed effects. While the current work does not incorporate specific in-situ cases due to limitations in accessing detailed and well-documented project data, we emphasize that the developed methodology is designed to be applied in future analyses of real tunneling projects.

We acknowledge the significance of this recommendation and are actively exploring opportunities to collaborate with tunneling projects to validate the computational model using field data in subsequent research. Thank you once again for your insightful suggestion, which we believe will be an important direction for future studies.