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A comparative study of tunnel deformation by designing of auxiliary tunnels

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Long-term deformation of tunnels is always the major geological disasters in deep mining engineering. High-fragmentized rock mass, high horizontal tectonics stress, and long-term mining disturbances lead to large and long deformation of tunnel in Jinchuan mine of China. Although many measures have been taken, tunnel deformation and damage have not been alleviated effectively. In this study, numerical simulation has been done to determine whether the design of auxiliary tunnels is an effective measure. Different excavation schemes are designed in numerical simulations, and a group of results are illustrated in Figs. 1 and 2. It is indicated that no matter how the distances between the auxiliary tunnel and the main tunnel and the excavation orders changes, excavating of auxiliary tunnel will actually aggravates the deformation of the main tunnel because of the increased stress difference and the decreased strength of the expanded naked surrounding rock mass.

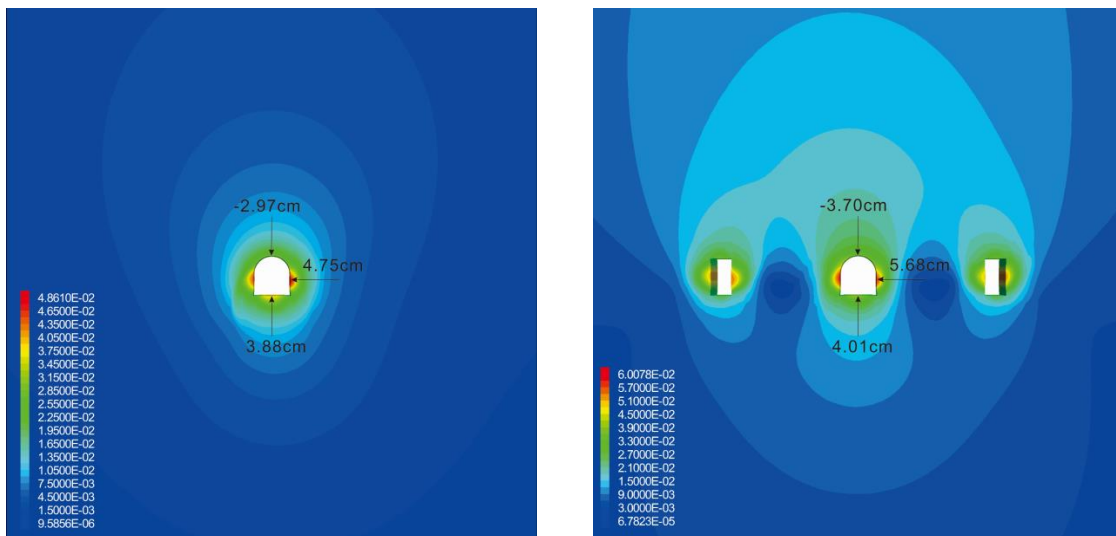


Figure 1: Contour maps of displacement under different excavations

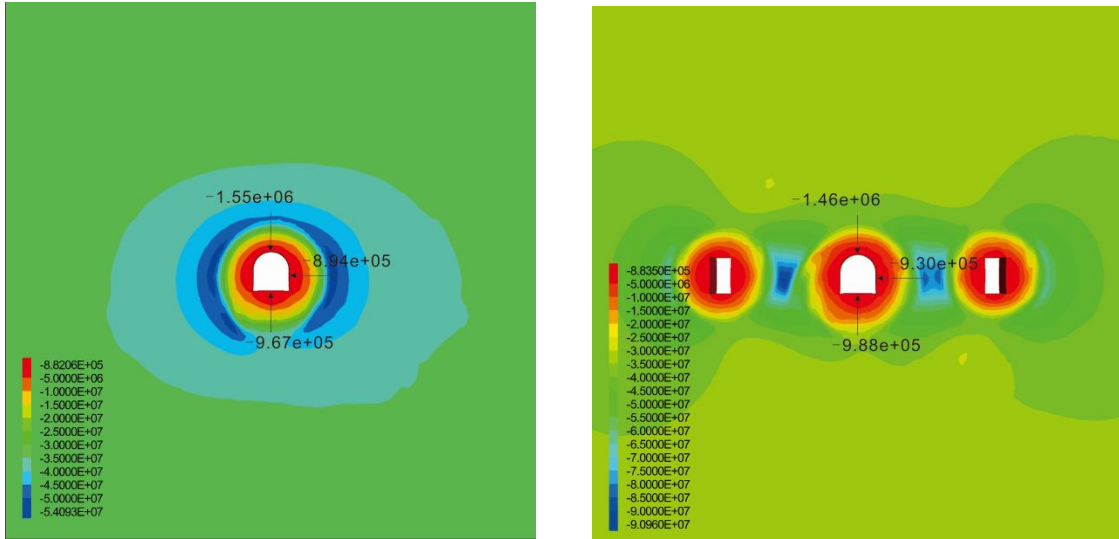


Figure 2: Contour maps of the maximum principal stress under different excavations

