# Numerical analysis of tunnelling excavation

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Abstrak

The transportation or railway system constructors usually, wherever possible, build the transportation system on the ground surface and avoid the necessity of underground tunnelling. However, this is not always possible. In many locations, such as mountainous area, hilly area or urban area, the underground tunnelling have to be built. The main problem of underground tunnelling is the soil stability around the tunnel, and the problems continue to mount for long and big tunnel. Therefore in recent years, engineers try to find the method to predict and solve all aspect of ground responses induced by excavating and tunnelling.

For the past 30 years, the research for estimating an accurate prediction of ground deformation caused by tunnelling processes, have been a major engineering challenge all around the world. A good prediction of ground deformation due to tunnelling excavation and advancement is highly necessary to ensure that no damage will occur in the existing buildings and services at the surrounding area.

In this study, the excavation and advancement of tunnelling excavation in Tunnel TGV of Tartaiguille, France is modeled and analyzed using the numerical program in order to simulate the ground response due to the construction processes. On the other hand, CETU (Centre d'Etudes des Tunnels) had set out an instrumentation in sections of the tunnel in order to analyze the loading of the support of the tunnel and obtained the displacement of surrounding ground responses. The numerical simulation will take into account the visco plastic behavior of the soil. And then the result of numerical simulation will be compared to the field measurement data.

The constitutive model used in this study is an elasto-plastic constitutive model called CJS 2EC which has been developed by Ecole Centrale de Lyon. To lake into account the time-dependent behavior of the soil, the visco-plastic constitutive model has been embedded in the CJS 2EC model.

Hopefully with this study, we are getting one step ahead in estimating the ground responses in tunneling. The more realistic behavior of the soil around the tunnel, which include the time dependent behavior of the soil will be examined and gives an accurate prediction of ground response due to tunnelling excavation.

Observation of the results and comparison with the measurement data demonstrate that the time dependent behavior of soil cannot be neglected in the analysis of the tunnelling excavation.