

عنوان مقاله:

Analysis of Different Methods of Pre-Supporting of the Ground and its Influence on Surface settlement due to Tunneling (NATM)

محل انتشار:

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خلاصه مقاله:

Due to inappropriate soil and shallow tunneling in urban area, tunnel excavation will face difficulties which one of the most important issues is the settlement phenomenon and surface structures damage. Also, when establishing the ground strengthening system and lining immediately after the tunnel excavation are not possible, ground pre-supporting is usually needed to be implemented during tunnel excavation. Furthermore, due to the flexibility of the New Austrian Tunneling Method (NATM), today, this method is widely replaced by the traditional tunneling. The methods of pre-supporting consists of ground jet grouting, Umbrella Arch Methods (UAM), pipe roof method, freezing and ... which each of them can be applied depending on the tunnel geometric and ground mechanical properties. In this paper by using the profile of Steinhaldenfeld tunnel and following the previous studies we had covered the numerical modeling of three ground pre-supporting methods, including grouting, jet grouting and pipe roof. Each pre-supporting method has parameters which we made the models based on different parameters and the ground settlement profile has obtained after the modeling, and the control degree of each method on the ground settlement has been assessed. In order to model the structure, finite element modeling with plane strain conditions has been applied. According to the results, all three methods are significantly effective in reducing the ground settlement level, and the magnitude of the settlement reduction will be increased by improving the geometrical and mechanical parameters of grouting such as jet grouting diameter or thickness and elasticity module of grouting materials, By comparing the ground settlement magnitude situated on top of the tunnel crown, it is perceived that the grouting method with approximately 4 meter thickness around the tunnel, according to its simple implementation, can be more successful than the other methods in controlling settlement and it is proposed as the efficient method.

کلمات کلیدی:

(Surface Settlement, Numerical Analysis, Pre-Supporting, Umbrella Arch Methods (UAM)

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