The 2025 World Congress on
Advances in Structural Engineering and Mechanics (ASEM25)
BEXCO, Busan, Korea, August 11-14, 2025

Model study on the Hydraulic Behavior during the tunnel excavation

Seung-Hyun Kim[1] Hyun-Il You[2] Jae-Ho Jeong[3] and *Jong-Ho Shin[4]

[1), 2),4)] *Department of Civil Engineering, Konkuk university, Seoul 05029, Korea*
[3)] *GEO EXPERT GROUP Co., Ltd, Republic of Korea*

[1)] *ksh0120@konkuk.ac.kr*

ABSTRACT

The principle of tunnel formation is generally described by the Mechanical Convergence-Confinement theory. As the tunnel is excavated, the relationship between displacement and ground pressure is represented by the ground reaction curve, while the relationship between ground pressure and support is depicted by the support reaction curve. The intersection of these curves defines the equilibrium state, where tunnel displacement is effectively constrained. While studies on the mechanical behavior induced by tunneling are well-established in tunneling mechanics, research on hydraulic behavior in tunnel design has just primarily focused on hydraulic boundary conditions.
Jeong et al. (2024) attempted to identify the hydraulic equilibrium process due to tunneling. Although their study contributed to explaining the hydraulic equilibrium process influencing, it did not fully consider all tunneling activities related to hydraulic behavior.
This model study identifies the hydraulic behavior during tunnel excavation, considering various hydraulic conditions.

REFERENCES

Jeong, J. H., Kim, S. H., You, H. I., & Shin, J. H. (2024). “Hydraulic convergence and confinement behavior characteristics of tunnels”, Journal of Korean Tunnelling and Underground Space Association, 26(5), 489-506.

ACKNOWLEDGES

This paper was supported by the Korea Agency for Infrastructure Technology Advancement (KAIA) grant funded by the Ministry of Land, Infrastructure and Transport (Research of Development of Technology to Enhance Safety and Efficiency of Ultra-Long K-Underground Expressway Infrastructure, Grant (RS-2024-00416524) and The National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2022R1A2C1003139)

[1)] Ph. D Candidate
[2)] Master Student
[3)] CEO
[4)] Professor (corresponding author: jhshin@konkuk.ac.kr)