Digital Mapping for Rock Mass Discontinuities: Opportunities and Challenges

A. Fereshtenejad[1], S. Mehrishal[2], J. Kim[3] and J. Song[4]

1. Geotechnical Engineer, GHD, Melbourne Vic 3000.Email: sayedalireza.fereshtenejad@ghd.com
2. BK Assistant Professor, Department of Energy Resources Engineering, Seoul National University, Seoul South Korea. Email: ahmad@snu.ac.kr
3. PhD Candidate, Department of Energy Resources Engineering, Seoul National University, Seoul South Korea, Email: kjineon@snu.ac.kr
4. Professor, Department of Energy Resources Engineering, Seoul National University, Seoul South Korea. Email: songjj@snu.ac.kr

Keywords: Rock joint characterisation, Drone technology, Photogrammetry, Artificial intelligence

ABSTRACT

Rock mass discontinuity mapping plays a crucial role in developing a reliable Discrete Fracture Network (DFN), providing insights into the distribution of geometrical and mechanical properties of discontinuities. This enables an accurate assessment of geotechnical infrastructure and mining excavations. Data obtained through conventional mapping approaches are substantially limited by factors such as accessibility and subjectivity. Moreover, these conventional methods may pose inherent risks due to manual techniques, exposing practitioners to potential dangers. Recent digital developments in remote surveying techniques offer opportunities for safer and more reliable rock mass discontinuity surveys. These technologies allow extensive three-dimensional surveying and the production of high-resolution 3D surface models, applicable at any time. This paper presents a workflow for digital discontinuity mapping employing drone technology and photogrammetry. Additionally, the capabilities and challenges of applying artificial intelligence (AI) algorithms in the rock mass discontinuity characterisation process are discussed.