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Development of 3-D fractured rock mass visualization model to assess geohazards

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A firm understanding on structural characteristics of fractured rock mass is very important in assessing geohazards. This arise from the fact that strength, deformability and hydraulic behaviour of the fractured rock masses depend very much on the fracture network characteristics of the rock masses. In this study the word 'fracture' is used as a general term encompassing fractures, joints, faults and bedding planes. Due to the complex nature of the fracture patterns in rock masses, even though considerable amount of progress has been made to understand the structural characteristics of the rock masses, satisfactory analysis on geohazards based on 3-D rock mass visualization model is still not available in the literature. This presentation covers the studies performed to develop 3-D fractured rock mass characterization and visualization to analysis mechanical and hydraulic behaviour of fractured rock masses. A procedure has been developed to measure the fracture geometry parameters for fractured rock masses using a non-reflector total station and digital photogrammetric mapping technique. The stochastic approach was applied to build up 3-D fracture network model based on probabilistic distributions of orientation, size and 3-D frequency of the disk shaped fractures. Also, a rock mass visualization model in 3-D has been developed to show the possible rock blocks that can be formed in the rock mass due to the intersection of the fractures that represented the 3-D fracture network for the selected rock masses. To explore the field applicability of developed procedures, stochastic 3-D fractured rock mass visualization model for a rock slope at the one of copper mines in Korea was constructed and validated. The conducted research in this study have shown that the 3-D fractured rock mass visualization model has strong capability to characterize rock block geometry effectively. This visualization model, also, can be used to demarcate hazard zone encountered in geological engineering. The developed procedures will be refined and then combined into the tools to assess geohazards by capturing the mechanical and hydraulic characteristics of the fractured rock masses.