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A geometric approach for natural rock blocks in engineering structures. (English)

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Summary: The spatial positions of the discontinuities and the shapes of rock blocks that are bounded into rock masses are important features that should be taken into consideration, especially in an effort to better understand the mechanisms in which a rock fails under a load. Therefore, explicit descriptions of in situ rock mass structures are necessary in many areas of mining and construction engineering. In this paper, new geometrical classifications of two discontinuities as a construction method are developed according to the spatial orientations of the discontinuities and their locations relative to each other. Discontinuities were geometrically analyzed using a rectangular prism as an engineering structure. Thus, the geometries of the possible failure of rock blocks in engineering structures were generated and included road cuts, open slopes, and dam walls that are founded in rock media. Several basic mathematical equations and approaches derived from these equations were used. Thus, wedge forms bounded by two discontinuities and free surfaces were geometrically identified and classified. In addition, the isometric perspective method was used to better illustrate the methodology. The results obtained from two experiment fields show the effectiveness of the proposed modeling method.

MSC:

74L10 Soil and rock mechanics

74R10 Brittle fracture

Keywords:

discontinuity; wedge failure; rock failure; rectangular prism; isometric perspective method

Software:

LIP-RM; UDEC; Dips; Swedge

Full Text: DOI

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