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EDITORIAL

Editorial

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In the modeling of rock mechanics and rock engineering problems, one is faced with the choice of continuum or discrete methods, depending on the problem scale and the geometry of the discontinuous features in rock and in rock masses. Typically, continuum methods are used when no fractures or many fractures are present, whereas discrete methods are more appropriate for describing moderately fractured media containing a limited number of discontinuities.

Continuum modeling by closed-form solutions was used very early in "rock mechanics and the design of structures in rock" (Obert and Duvall 1967), soon to be superseded by numerical methods, mainly the finite element method, FEM (Zienkiewicz and Cheung 1967). With the rock mass being recognized as "made up of a large number of elements… influenced by two basic properties, its immense anisotropy and discontinuity…" (Müller 1974), the attention moved to discontinuum modeling.

With the well-known "Goodman joint element" (Goodman et al. 1968) implemented in FEM codes, discontinuum modeling became possible, although large-scale opening, sliding, and complete detachment was not permitted. It was only with the landmark paper presented in Nancy, France, by Peter Cundall (1971) that the representation of rock masses as "blocky rock systems" was initiated with the discrete element method (DEM).

A remarkable development of DEM took place in the following years (e.g., Jing 2003; Sainsbury et al. 2011). These methods are enjoying, today, a wide application in rock mechanics and rock engineering by the research community and practicing engineers, in 2D and 3D simulations, in static and dynamic conditions. At the same time, efforts are being undertaken to develop alternative formulations for dealing with discontinuum modeling, including fracturing and coupled processes simulations.

The Rock Mechanics and Rock Engineering Journal has edited this special issue with the intent of providing a view of present trends, with a number of recently received papers, where some of the above-mentioned discontinuum modeling aspects are discussed. However, it is not the intent to provide our readers with a comprehensive presentation of the state-of-the-art of this type of modeling.

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