Study on constitutive model of fractured rock masses by using statistical strength theory

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Abstract

By using the basic principle of the continuous damage mechanics as a reference, together with the statistical strength theory based on the Weibull distribution, a new constitutive model of fractured rock masses for deep underground engineering is proposed. In this model, a new definition of the fracture degree Ft has been proposed for the first time, which can quantitatively describe the fracturing process of a fractured rock mass. Based on the results of laboratory tests and numerical simulations for fractured rock mass specimens, the constitutive model with different fracture degrees are verified. Moreover, the applicability of two yield criteria (the M-C and D-P criteria) for describing the mesoscopic strength of rocks is analyzed. Finally, the effects of the random distribution parameters on the constitutive model are discussed in detail. The results show that the theoretical results agree well with the experimental and numerical results, and the constitutive model with the D-P criterion is better than the model with the M-C criterion.

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