二维裂隙岩体渗流传热的离散裂隙网络模型数值计算方法

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A NUMERICAL METHOD FOR DISCRETE FRACTURE NETWORK M HEAT TRANSFER IN TWO-DIMENSIONAL FRACTURED ROCKS

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摘要 针对裂隙岩体渗流传热问题，用解析方法，比较2种不同岩石基质与裂隙水界面热交换假设下的计算结果，对一般裂隙 种假设下的计算结果相同。基于离散裂隙网络模型的思想，在商业有限元软件COMSOL中实现一种计算已知裂隙网络的裂隙 和传热过程的数值方法，该方法可以同时计算岩石基质与裂隙中的渗流和传热过程及二者间的交换，并与解析解比较进行验 方法对一随机生成的二维裂隙岩体进行计算，得到的出口温度曲线，可以反映裂隙岩体渗流传热的早期热突破和长尾效应等 分析岩石基质渗透率、热传导系数的不同取值对裂隙岩体渗流和传热过程的影响。

关键词： 岩石力学   裂隙岩体   渗流传热   离散裂隙网络   有限元

Abstract： For the problem of flow and heat transfer in fractured rocks，two hypotheses of heat exchar between rock matrix and fluid in the fracture are compared analytically. It is found that the same result w obtained for that the fracture aperture is small in general. A discrete fracture network model is realized in commercial finite element software COMSOL for the computation of flow and heat transfer in fractured ro fluid flow and heat transfer in rock matrix and fracture can be calculated in this model，as well as fluid an exchange between them. The results are validated by comparing with analytical solutions. Finally，the mo used to simulate a randomly generated fracture network to study the characteristics of flow and heat tra fractured rock；and reasonable results are obtained.

Keywords： rock mechanics   fractured rock   flow and heat transfer   discrete fracture network(DFN) elements