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单钻孔中水压致裂法三维地应力测量的新进展

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摘要 由于测量深度深和其他突出优点，水压致裂法地应力测量已被国内外广泛应用，但以往只能测量钻孔横截面上的二维地应力状态。长江科学院在国内率先提出在3个不同方向钻孔中和单钻孔中进行三维地应力测量的原理和方法，扩大其应用范围，并已在工程中得到广泛应用。近期，长江科学院又提出新的单钻孔水压致裂法三维地应力测量原理，只需选择2个或2个以上原生裂隙段进行重张试验的测量，或者在完整岩体段常规压裂试验的同时，选择1个或1个以上原生裂隙段进行重张试验的测量，就可确定岩体的三维地应力状态，并且可以应用到深钻孔的测量中，在工程上有广泛的应用前景。对该测量方法资料整理的计算公式严格进行推导，在实例中，三维地应力测量的测量成果，不仅得到水压致裂法钻孔横截面上实测的二维应力状态的检验，还得到同一钻孔对应深度的套芯应力解除法实测的三维地应力状态的印证。

关键词 岩石力学；水压致裂法；三维地应力测量；原生裂隙；套芯应力解除法

分类号

NEW ADVANCE IN 3D GEOSTRESS MEASUREMENT BY HYDRAULIC FRACTURING TECHNIQUE IN ONE BOREHOLE

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Abstract

Hydraulic fracturing as a technique of geostress measurement has been widely used both at home and abroad due to its many outstanding merits. But this measuring method is only used to the 2D stress state in a plane normal to the borehole axis previously. The principle and method of 3D geostress measurement in three boreholes with different directions and one borehole have been suggested by YRSRI at home for the first time，expanding its applied scope，and it has been widely applied in engineering. Recently，a new measuring principle has been suggested by taking conventional hydraulic fracturing tests，at the same time taking reopening tests at one or more preexisting fractures，the 3D geostress state can be determined. It can be applied to measurement in depth borehole，and has wide prospects of engineering appliance. The calculating formulas of measured data processing of this method have been derived strictly. In the example，the results of 3D conventional hydraulic fracturing tests geostress measurement are checked not only by 2D stress state measured by conventional hydraulic fracturing technique in a plane normal to the borehole，but also by the 3D geostress states to be

measured by over-coring stress relief method in corresponding depth in the same borehole.

Key words rock mechanics；hydraulic fracturing technique；3D geostress measurement；preexisting fissures；over-coring stress relief method

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