中国地应力场分布规律统计分析

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摘要　查阅迄今为止中国现有的实测地应力资料，参照霍克－布朗的地应力分析、统计和拟合方法，形成实测平均水平地应力与垂直地应力的比值随深度变化的散点图，回归实测平均水平地应力与垂直地应力的比值随深度的变化曲线并与霍克－布朗曲线进行比较，发现深度超过1 200 m以后，中国实测平均水平地应力与垂直地应力的比值统计值大于霍克－布朗曲线中值，且最大应力包线与霍克－布朗包线基本吻合，而最小应力包线的应力水平小于霍克－布朗包线的应力水平。进一步分析回归中国岩浆岩、沉积岩和变质岩等3种岩性的地应力统计结果，得到类似的回归曲线。统计结果对了解中国地应力场的宏观分布情况具有重要参考价值，对进行深埋地下结构分析计算和辅助设计具有重要的实用价值。

关键词　 岩石力学；地应力场；回归分析；散点图；拟合曲线

分类号

ANALYSIS OF DISTRIBUTION RULE OF GEOSTRESS IN CHINA

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Abstract

The initial geostress measurement results up to now in China are reviewed. Three typical results from the southern mountainous area in Fujian Province，Baka oilfield in Xinjiang autonomous region and No.2 mining area of Jinchuan nickel mine in Gansu Province are listed. The ratios of the average horizontal geostresses and the vertical geostresses(RAHVG) varying with depth are plotted in a dispersed point chart following the Hoek- Brown¢s method. The regression curve and the maximum envelope curve as well as the minimum envelope curve for RAHVG are fitted in the dispersed point chart. Compared with the Hoek-Brown¢ curve，when the depth is more than 1 200 m，the RAHVG are greater than that of Hoek and Brown. The maximum envelope curve for China is almost consistent with that of Hoek and Brown，but the minimum envelope curve for China shows smaller than Hoek-Brown¢s minimum envelope curve. Furthermore，the dispersed point charts are plotted and the same type of the RAHVG curves is fitted for the rock types of the magmatic rock，sedimentary rock and metamorphic rock based on the initial geostress measurement results. The regression results of the three different rocks show the different properties in RAHVG curves. When the

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depth is more than 500 m，the RAHVG curve for the sedimentary rock is approaching to 1.0. For the magmatic rock in China，the values in the RAHVG curve are bigger than those of the other two types when the depth is less than 500 m，but smaller when the depth is more than 500 m. The measurement geostresses for the metamorphic rock are more dispersed than those for the other two types of rocks. The fitted regression curves are of importance for the numerical analysis of underground engineering.

通讯作者