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论文

节理玄武岩体变形模量的尺寸效应和各向异性

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摘要：

目前系统研究柱状节理玄武岩工程力学特性的成果仅见于美国汉佛德玄武岩核废料埋藏工程和中国西南白鹤滩水电工程。列举了国内外相似工程柱状节理玄武岩的原位试验成果,分析了我国不规则柱状节理玄武岩体的柱体偏转特性和多级结构面发育特征,采用可变形离散元法建立了柱状节理玄武岩体的三维离散元数值模型,通过数值模拟不同尺寸的承压板试验,探讨了尺寸效应和各向异性对试验成果的影响。数值分析表明：承压板的尺寸效应是产生柱状节理岩体水平和铅直原位试验各向异性的主要原因,随着承压板直径的增大,各向异性效应减小,当承压板直径大于6m后,柱状节理玄武岩体可视为各向同性体,研究成果对利用和改造柱状节理岩体具有较好的工程意义。

关键词： 不规则柱状节理█数值承压板试验█尺寸效应█各向异性█离散元法

SCALE EFFECT AND ANISOTROPY OF DEFORMATION MODULUS OF CLOSELY JOINTED BASALTIC MASS

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Abstract:

The research results of engineering mechanical properties on closely jointed basaltic mass were only reported in the open literature from the Basalt Waste Isolation Project in Handford,USA and the Baihetan hydropower project in China. The in situ tests of the closely jointed basaltic mass were summarized from similar projects at home and abroad. The developed plunging colonnade and multi level structural planes of closely jointed basaltic mass in China were discussed. The deformable discrete element method was applied to the modeling of its 3 dimensional numerical model. Then the scale effect and anisotropy of the in situ tests were studied by numerical bearing plate test with different plate diameters. The results show that the cause is mainly due to scale effect of bearing plate tests. The anisotropy of in situ tests decreases as the diameter of bearing plate increases. The closely jointed basaltic mass can be regarded as an isotropic rock mass when the diameter of bearing plate is over 6 m. The results have some practical value in engineering on utilization and reconstruction of jointed basaltic mass.