灌浆施工过程中岩石抬动变形观测装置存在的缺陷及改进措施

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摘 要: 在进行多次岩石抬动变形观测装置的埋设和观测之后, 对灌浆施工过程中, 岩石抬动变形观测装置在实际中存在的缺陷及改进措施作了探讨。现行的变形观测装置不仅造成观测成果的混乱与假象, 而且成本高、封孔困难, 改进后的岩石抬动变形观测装置克服了现行变形观测装置的不足之处, 提高了可操作性。

关键词: 岩石抬动观测; 缺陷; 改进措施; 成本
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1 引 言

在灌浆施工过程中, 应在灌浆孔周围设置岩石抬动变形观测装置, 岩石的抬动变形值不得大于规定值, 以防止岩石发生抬动变形, 从而破坏岩石的完整性。

现行岩石抬动变形观测, 有下列两种方法:

(1) 精密水准仪观测。灌浆地段的表层如果是砂砾石或土层时, 在灌浆孔周围需设置专门的抬动变形观测孔, 并使其深入到基岩以下。在孔内放置测杆, 测杆的出露部分上附有刻度, 在灌浆升压过程中, 使用精密水准仪进行观测, 水准仪的设置地点应距灌浆地段尽可能远些, 避免由于观测孔的表层岩石与水准仪所在位置的岩石都产生抬动, 造成观测成果混乱与假象。

(2) 百分表或千分表观测。如果灌浆地段的表层是岩石, 则在灌浆孔附近布置观测孔, 设置岩石抬动测量设备。在灌浆压力加大时, 从 φ51 mm 铁管绝对上升值(φ25 铁管不发生抬动时) 或是从 φ25 管、φ51 管两者高度相对值之差, 使用百分表或千分表测得岩石抬动变形值。

但现行的用百分表或千分表测量岩石抬动变形的装置在实际应用中存在很大缺陷, 需进行改进。

2 现行的百分表或千分表测量岩石抬动变形的装置存在的缺陷

2.1 串浆很容易造成观测成果的混乱与假象

灌浆孔的浆液容易从岩石的裂隙中渗透到 φ25 mm 铁管和 φ51 mm 铁管之间, 将 φ25 铁管和 φ51 铁管胶结在一起, 同岩石形成一个有机的整体, 这样将观测不到岩石抬动变形值或造成观测成果的混乱与假象。许多施工单位用百分表或千分表观测岩石抬动变形的装置在形成初期, 常常能正常使用, 现行岩石抬动观测装置见图 1。但经过一段时间以后不能正常使用了就是这个道理。

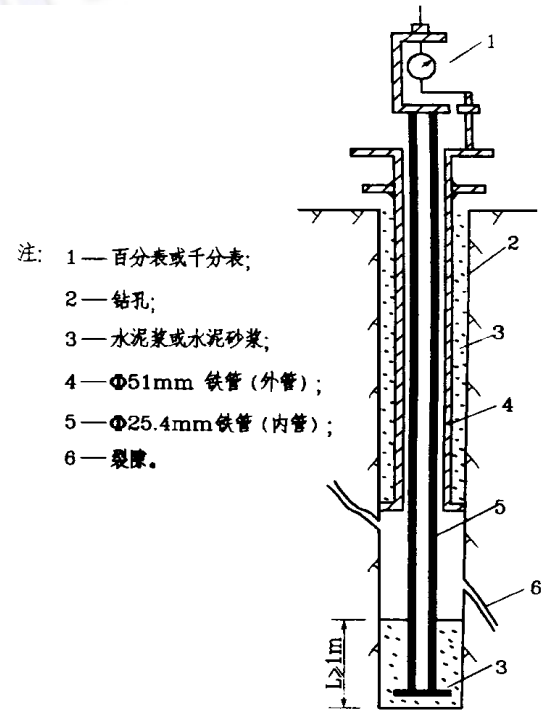

图 1 现行岩石抬动观测装置示意图

2.2 外管同岩石的胶结力会造成外管长度内的岩石抬动变形测量值比实际岩石抬动变形值偏小

在 φ51 mm 外管长度内的岩石发生抬动变形时, 由于 φ51 mm 外管同岩石胶结在一起, 一部分岩石发生抬动变形, 一部分岩石不发生抬动变形, 不发生抬动变形的那部分岩石同 φ51 mm 外管的胶结力

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粘连着外管, 从而造成测量到的岩石抬动变形值比实际岩石抬动变形发生值偏小。

2 3　**现行的用百分表或千分表测量岩石抬动变形的装置成本高, 封孔困难**

φ51 mm 外管和 φ25 mm 内管均采用铁管, 无法回收, 成本较高, 而且该岩石抬动变形观测孔使用结束以后钻机无法扫孔, 因而导致无法封孔。

3　对现行的用百分表或千分表测量岩石抬动变形的装置的改进措施

正如前一节所述, 现行的用百分表或千分表测量岩石抬动变形的装置既然存在那么多缺陷, 那么是否可以通过适当的改进措施使其更加趋于合理? 答案是肯定的。

改进措施是将 φ51 mm 铁管改变成硬塑料管, 并将该管同 φ25 mm 铁管一样一同延伸到孔底, 并用水泥浆或砂浆将其同基岩胶结在一起, 胶结长度 L 必须等于或大于 1 m。将百分表或千分表安装在 φ25 mm 铁管和基岩之间, 改进后的岩石抬动观测装置见图 2。在灌浆压力加大时, 从 φ25 mm 铁管和基岩两者高度相对值之差, 使用百分表或千分表测得岩石抬动变形值。

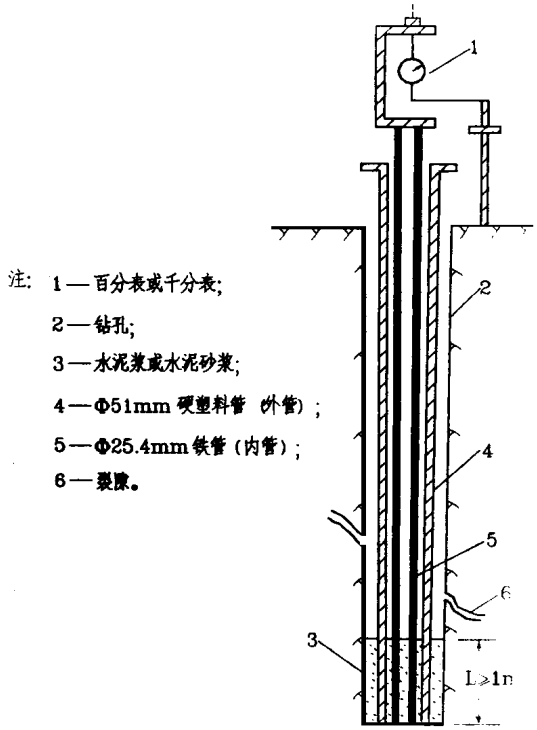

图 2　改进后的岩石抬动观测装置示意图

改进后的岩石抬动变形观测装置的埋设要点是 φ51 mm 硬塑料管和 φ25 mm 铁管要同时埋入基岩内大于或等于 1 m, 这样, 灌浆时的浆液就不会串入到 φ25 mm 和 φ51 mm 管之间。当岩石发生抬动变形时, 由于抬动变形部分的岩石和 φ25 mm 铁管是两个独立的整体, 百分表或千分表显示出岩石抬动变形值就是岩石的实际抬动值, 而且 φ51mm 管使用硬塑料管也降低了该装置的成本。为了保证能顺利地拆除和回收 φ25 mm 管, 以利于降低成本, 便于扫孔和封孔, 可将 φ25 mm 管作成段长为 5 m 的正反扣联结, 见图 3。安装时先在钻孔内注入 1 m 长水泥浆或水泥砂浆, 先放入 φ51 mm 管, 再将 φ25 mm 铁管有反扣的一端插入孔内。这样, 当抬动观测孔使用完毕后, 只需用管钳就可拆除 φ25 mm 铁管了。拆除 φ25 mm 铁管后就可使用钻机扫孔和封孔了。

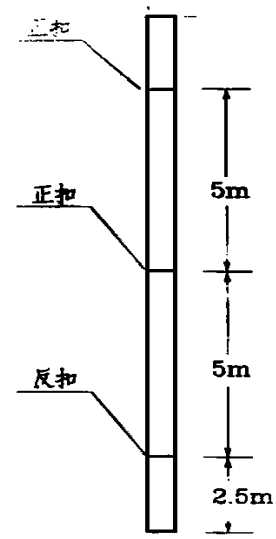

图 3　改进后的 φ25 mm 铁管构造图

总之, 现行岩石抬动变形观测装置不仅成本高, 封孔困难, 而且由于串浆容易造成观测成果的混乱与假象。改进后的岩石抬动变形观测装置不仅观测成果能较好地反映岩石实际抬动变形值, 而且由于 φ25 mm 铁管能拆除回收, φ51 mm 外管采用硬塑料管, 因此大大降低了成本, 扫孔和封孔也很容易进行, 在灌浆施工过程中变得更加经济、适用。

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ABSTRACT

Construction of Concrete Faced Rockfill Dam during Flood Season in Daqiao Reservoir

ZHANG Jian-hua
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering, Chengdu, Sichuan, 610066, China)

Abstract: Concrete faced rockfill dam for Daqiap Reservoir is located in an active earthquake zone with earthquake intensity of 8. 5. High construction quality is required. Diluvial deposits are used as bedding material in the construction , which has arrived advanced level in China . Therefore , experiences and lessens gained during construction in flood season can be used for reference to the similar projects.

Key words: concrete faced rockfill dam; during flood season; temporary section

Concrete Works of Toe Slab in Daqiao Reservoir

YANG Ning-rui
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering , Mianning, Sichuan, 615616, China)

Abstract: The paper systematically presents construction techniques for toe slab, toe slab excavation, fault treatment, formwork support , arrangement of reinforcing bars and seals, concrete proportions, concrete placement , cure and quality control.

Key words: Daqiao Reservoir; concrete placement of toe slab; construction technique

Study on Shotcrete Method in Hydropower Project

WANG Sen-rong
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering , Miyi, Sichuan, 617200, China)

Abstract: By analyzing advantages and disadvantages of dry shotcrete , wet shotcrete and parallel shotcrete method, semi-wet shotcrete method which is between dry and wet shotcrete is developed. Advantages and disadvantages of semi- wet shotcrete method is analyzed , together with its technical process, jet nozzle structure , water ring structure and effectiveness. The primary test results indicate that the semi-wet shotcrete method is technically feasible , significantly economic and applied widely after improvement.

Key words: dry shotcrete; wet shotcrete; parallel shotcrete method; semi-wet shotcrete method

Defects for Upward Rock Deformation Observation Instrument during Grouting and Improvement

LUO Ming-quan WANG Sen-rong
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering, Miyi, Sichuan, 617200, China)

Abstract: After many times of embedments and observations for upward rock deformation observation instrument , defects for upward rock deformation observation instrument during grouting and improvement are discussed. The actual deformation observation instrument not only results in confused and false readings , but also high cost , difficult hole sealing . The improved upward rock deformation observation instrument with higher maneuverability overcomes the shortcomings of actual one.

Key words: observation for upward rock deformation; defect; improvement; cost

Embankment Construction of Concrete Faced Rockfill Dam at Daqiao Reservoir

XUE Kai
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering , Miyi, Sichuan, 617200, China)

Abstract: For the concrete faced rockfill dam at Daqiao Reservoir in Mianning, Sichuan, the foundation treatment of embankment , selection , processing and preparation of embankment materials , arrangement of construction access road to dam , embankment construction , embedment of observation instruments and construction organizations are presented for reference to the similar projects.

Key words: concrete faced rockfill dam; embankment construction; Daqiao Reservoir in Mianning, Sichuan

Brief Description of Construction Arrangement and Design Features for Concrete Mixing System at Daqiao Reservoir

ZHANG Xiao-guang ZHANG Sheng-zhong
(Chinese 5th Construction Bureau of Water Conservancy and Hydropower Engineering , Guangyuan, Sichuan, 628003, China)

Abstract: In Lot II project at Daqiao, HZD50 mixer fabricated by Chengdu Construction Engineering Machine Factory is selected as concrete mixing system. Dam excavation material forms a large platform which is well used as site for concrete mixing. Cement collection hopper is self made and reinforcing concrete wall is used. he general arrangement is reasonable, leading to high efficiency and benefits and low cost. Practice indicates that construction arrangement and design features for concrete mixing system is successful and can give reference to the similar projects.

Key words: Daqiao Reservoir project; concrete mixing system; construction arrangement ; design

Important Role of Hydropower Development in Development in Western Region

CHEN Dong-ping
(Hydropower and New Energy Development Department, State Power Company, Beijing, 100031, China)

Leaderette: The paper is the speech by Chen dong-ping , deputy director of Hydropower and New Energy Development Department , for "Academic Conference for West China Development."

"Academic Conference for West China Development" was held during April 18 to 20 in 2000 in Chengdu and was jointly sponsored by Chinese Natural Resources Society, Sichuan Science and Technology Association , Chinese Qinghai-Tibet Plateau Research Institute , Regional Sustainable Development Research Center of CAS , Natural Resources Comprehensive Investigation Committee of CAS , Beijing Teachers University and Sichuan Natural Resources Research Institute. Sixty-one experts and scholars from Development Research Center of the State Council, CAS, Chinese Academy of Sciences , Chinese Academy of Engineering , Forestry Ministry , Water Conservancy Ministry and State Power Company , attended the meetings. Now the speech of Mr. Chen is published here.