

## 基于BOTDR的传感光纤固定方式研究

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摘要：

光纤固定困难，制约了应用光纤监测的许多领域。针对边坡变形监测中光纤固定方面遇到的问题，利用摩擦力对张力分布的影响，提出采用缠绕方式固定光纤的方法。通过对缠绕模型的力学理论分析，缠绕光纤固定方式下加载前后光纤应变特征的测试研究，并结合深泽乡滑坡表面变形监测的实际应用，对缠绕固定光纤监测方法的有效性进行了全面的讨论。结果表明缠绕方法能有效固定光纤。基于BOTDR距离分辨率，推导给出了缠绕方式固定光纤时缠绕长度的确定方法；结合滑坡监测工程实践，提出了合理设计布线方式，解决了边坡表面地形起伏对光纤固定的影响，其铺设方式还便于及时修复监测系统出现的问题。

关键词：BOTDR；光纤监测；缠绕固定；边坡

## Study on the Fixation Technique of Optical Fiber Based on BOTDR

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**Abstract:**

Difficulty of optical fiber fixation has restricted the application of optical fiber monitoring in many areas. Aiming at solving optical fiber fixation problem during slope deformation monitoring, the twining method to fix optical fiber is proposed using the effect of friction on tension distribution. With mechanical analysis of the twined model, pre- and post-load tests on the strain characteristics of the optical fiber and landslide deformation monitoring in Shen-ze Township, the effectiveness of twining fixation method in optical fiber monitoring is fully discussed. The results show that the optical fiber can be effectively fixed by twining. Based on distance resolution of BOTDR, a method to determine the length of twining fiber is derived. Combined with the engineering practice in landslide monitoring, the proper layout design of optical fiber is proposed, which eliminates the slope surface undulation effects on the optical fiber fixation and also facilitates the timely repair of the monitoring system.

**Keywords:** BOTDR; optical fiber monitoring; twining fixation; slope

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