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GFRP锚杆拉伸力学性能试验研究

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摘要 玻璃纤维增强塑料(GFRP)是一种由树脂和玻璃纤维复合而成的新材料, 具有较好的力学和耐腐蚀性能, 在钢筋混凝土中用其代替钢筋可以解决耐久性问题。由于材料容易脆断, 对于大直径的GFRP锚杆, 试验机夹头夹持不住, 导致直接拉伸试验很难成功, 常用的方法是加工成小直径试件。采用f 10, f 13, f 15几种不同直径的GFRP锚杆试件进行试验, 然后用回归方法预测大直径f 32试件力学指标, 从而试图避免试件加工造成的影响。通过拉伸试验, 研究了GFRP锚杆基本力学指标, 画出了应力-应变关系曲线, 讨论了其基本破坏形态。与普通钢材比较具有强度高、脆性破坏的特征, 应力-应变曲线呈直线型。同时, 与螺纹钢的力学性能指标和经济指标进行了比较, GFRP锚杆显示了优越的力学性能和良好的性价比。通过试验证实, GFRP锚杆具有强度高、与混凝土变形协调性好等力学性能, 如果替代钢材锚杆应用于边坡永久加固工程, 将具有广阔的应用前景。

关键词 [岩石力学；玻璃纤维增强塑料锚杆；拉伸试验；力学性能；性价比](#)

分类号

EXPERIMENTAL STUDY ON TENSILE MECHANICAL PROPERTIES OF GLASS FIBER REINFORCED PLASTIC REBAR

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Abstract

The glass fiber reinforced plastic(GFRP) rebar is a kind of material formed with resin and glass fiber compound, with good mechanical properties and excellent corrosion resistance. The problem of durability of concrete can be solved if steel bars are substituted with GFRP rebar. Because GFRP rebar is easy to fracture, the chuck of testing machine can not hold big diameter sample, and the direct tensile test is difficult to perform. The commonly used method is processing into the small diameter sample and carrying on the test. Different diameter samples f 10, f 13, f 15 are tested; then the regression analysis for forecasting the mechanical properties of big diameter sample f 32 is implemented to avoid the influence caused by processed samples. The tensile test of the GFRP rebar is carried out; and the stress-strain curve and the failure modes of GFRP rebar are discussed. High strength and brittle failure are the most characters of GFRP rebar; and the stress-strain curve of GFRP rebar is found to be linear. Compared with the mechanical properties and prices between GFRP rebar and ribbed steel bars, the good mechanical properties and high performance/cost ratio of GFRP rebar can be

testified. Meanwhile, the high strength of GFRP rebar and the good distortion coordination with concrete are testified. GFRP rebar can be used for slope engineering reinforcement in practice.

Key words [rock mechanics](#); [glass fiber reinforced plastic \(GFRP\) rebar](#); [tensile test](#); [mechanical properties](#); [performance/cost ratio](#)

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