ANALIYSIS OF BONDING BEHAVIOR OF GFRP AND STEEL REINFORCED WITH CONCRETE QUALITY FC 25 MPA

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ABSTRACT

Coastal environments such as Bengkalis Regency are characterized by high humidity and salt content, making reinforced concrete structures with steel reinforcement highly susceptible to corrosion. This condition highlights the need for alternative materials that are resistant to aggressive environments, one of which is Glass Fiber Reinforced Polymer (GFRP). This study aims to analyze and compare the bonding behavior between GFRP reinforcement and steel reinforcement in concrete with a compressive strength of f'c 25 MPa, using reinforcement bars of equal diameter. The experimental tests were conducted using two main methods: pull-out test and flexural bonding test, with three variations of bond length: 5db, 10db, and 15db. The results show that GFRP exhibits superior tensile strength and corrosion resistance compared to steel, although it has different bonding characteristics. In the pull-out test, the maximum bond stress was achieved at a bond length of 5db, reaching 31.97 MPa with a maximum load of 36.16 kN. In contrast, the flexural test showed that a 10db bond length produced the highest bond stress of 13.433 MPa and a maximum load of 15.19 kN. These findings also indicate that GFRP reinforcement outperformed steel reinforcement in flexural bonding. The observed failure modes included pull-out and concrete splitting, influenced by both the type of reinforcement and the bond length. This study concludes that GFRP has significant potential as an alternative structural reinforcement material, especially in high-corrosion environments. The results are expected to serve as a technical reference for future structural material development.

Keywords: GFRP*, steel reinforcement, bonding*, f'c 25 MPa *concrete, pull-out test, flexural bondin*