

Experimental Investigation on the Anchor Behavior of Planar Clamping Anchor for Carbon Fiber-Reinforced Polymer Plate

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Abstract : The anchor plays a critical role in the utilization of the tensile strength of carbon fiber-reinforced polymer (CFRP) plate when it is applied for the prestressed retrofitted and cable structures. In this paper, the anchor behavior of planar clamping anchor (PCA) under different interface treatment forms and normal pressures was investigated by the uniaxial static tensile test. Two interface treatment forms were adopted, including pure friction and the coupling action of friction and bonding. The results indicated that the load-bearing capacity of PCA could be obviously improved by the coupling action of friction and bonding compared with the action of pure friction. Under the normal pressure of 11 MPa, 22 MPa, and 33 MPa, the load-bearing capacity of PCA was enhanced by 164.61%, 68.40%, and 52.78%, respectively, and the tensile strength of the CFRP plate was fully exploited when the normal pressure reached 44 MPa. In addition, the experimental coefficient of static friction between the galling CFRP plate and a sandblasted steel plate was in the range of 0.28-0.30, corresponding to various normal pressure. Moreover, the failure mode was determined by the interface treatment form and normal pressure. The research in this paper has important guiding significance to optimize the design of the mechanical clamping anchor, contributing to promoting the application of CFRP plate in reinforcement and cable structure.

Keywords : PCA, CFRP plate, interface treatment form, normal pressure, friction, coupling action

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