システム情報工学研究科修士論文概要

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論文題目				
Study on Bond Behavior between Concrete and CFRP Plate under Fatigue Loading				

(CFRP 板とコンクリートの付着疲労性状に関する研究)

論文概要

Carbon fiber-reinforced polymer (CFRP) plate represents an ideal material for structural repair and strengthening for concrete structures. The main attributes of CFRP plate are high strength, lightweight, good resistance to chemicals as compared to steel, good fatigue strength and nonconductive properties. The bond behavior between CFRP plate and concrete has an important role to have the effectiveness of CFRP strengthening. For strengthening concrete structures, furthermore, the evaluation of fatigue performance is considered to be a very important problem. This study aims at investigating clearly the bond behavior of CFRP plate bonded to concrete under fatigue loading.

The fatigue loading test for double-face bond specimens is carried out. According to the experiment results to investigate the influence of bond behavior with different concrete strength, types of CFRP plate and variables of upper limit fatigue load, the fatigue behavior of bonding surface between CFRP plates and concrete is finally characterized by the conducted *S*-*N* diagram representing the relationship among the upper limit bond stress and cycle numbers at debonding. From the test results and discussions, the followings are concluded.

- 1. Fatigue debonding faces include two portions. First is debonding from the concrete face near the notch, second is debonding from the resin face until load end.
- S-N curves for fatigue failure of bond are proposed. It is considered that the fatigue limit bond stress to 1 million cycles for the specimen with concrete strength of 13, 21 and 36 MPa is 70%, 60% and 50% of static bond strength, respectively.
- 3. The monotonic post-fatigue tests show that the peak load is not influenced by the fatigue cycles.
- 4. Stiffness of local bond stress-slippage curves decreases by fatigue loading cycle increase. The reduction coefficient of stiffness is evaluated by cycle numbers.