

Delamination Detection in Concrete Structure Strengthened with CFRP Sheet using Active IRT

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The development of defects in concrete structure is unavoidable because of the impact of its self-weight and external loads or errors at the construction stage. Active infrared thermography (IRT) has become an efficient non-destructive testing method in defect detection not only in normal concrete (i.e. concrete without strengthening) but also in concrete strengthened with CFRP (concrete-to-CFRP). Although delaminations in the core of concrete, commonly caused by hidden cracks is one of the most critical defects in the concrete-to-CFRP structure, not much attention is paid to it compared to other deteriorations, e.g. debonding and unbonded defect of the CFRP part. Thus, the detection of delamination in concrete strengthened with CFRP needs to be studied further by means of the active IRT since the active IRT can be applied more effectively in real structure inspection. In this work, active IRT is employed to detect artificial delamination in a concrete deck specimen that has a part strengthened by a one-direction CFRP sheet (assumed as concrete-to-CFRP structure surface) and the remaining part not strengthened (assumed as concrete-without-CFRP structure surface). The main aim of this work is to comprehensively study the detectability of delamination in both the concrete-to-CFRP and the concrete-without-CFRP structure utilizing active IRT. Specifically, the study would explore how accurately active IRT could be used to capture the occurrence of delamination in both cases of the concrete specimen with or without CFRP. Also, the comparison would be made between the detectability of delamination in the concrete-to-CFRP and the concrete-without-CFRP structure under similar test conditions.