

## 論文審査の要旨

博士の専攻分野の名称	博 士 （ 工 学 ）	氏名	Nguyen Huu May
学位授与の要件	学位規則第4条第1・2項該当		
論 文 題 目 Utilization of a simplified non-destructive test with water spraying for cover concrete quality inspection (かぶりコンクリートの品質検査における散水簡易非破壊試験の活用)			
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〔論文審査の要旨〕			
<p>In this doctoral dissertation, the applicability of the water intentional spraying test (WIST) was investigated under controlled measurement conditions via laboratory tests.</p> <p>Chapter 1 presented the background, purposes, and methodology of this study.</p> <p>Chapter 2 provided a review of the existing literature on non-destructive test (NDT) methods to measure the penetrability resistance of concrete.</p> <p>Chapter 3 presents the experimental program consisting of materials, the mixing, and casting procedure.</p> <p>Chapter 4 presented an experimental program to prove the usability of WIST under various conditions including all key factors in concrete. For this target, the WIST result was correlated with the coefficient of air permeability determined by the well-known Torrent method as a verify durability index. The tests were conducted on the various cover concretes produced with different cement types, water-to-cement ratios, curing periods, and measurement heights. The observed good relationship between the parameters proved the WIST as a simple and promising NDT method for evaluating the cover concrete quality. Particularly, the WIST also found to be sensitive for the detection of poor-quality concrete.</p> <p>Chapter 5 then described an investigation to expand the usability of the WIST method in order to expand the applicability of WIST method. As expected, numerous outstanding results thereafter were withdrawn include: (i) established a new index to improve the accuracy of the WIST measurements that provided a generalized approach for evaluating cover concrete; (ii) developed</p>			

and validated a more rapid evaluation procedure utilizing the double spraying technique; and (iii) proposed a novel durability index for quality classification of cover concrete. The results of this study provide a cost-effective, and potential durability indicator for practical applications in assessing cover concrete quality.

Chapter 6 focused on validating the effectiveness of the WIST method for evaluating the quality of early-age cover concrete on the basis of the potential evaluations based on its thin depth affected wherein free water quickly evaporates. The results indicated that the WIST is highly sensitive in detecting poor- and normal-quality concrete 1st and 7th day, respectively, after demolding. The results of this study contribute to the establishment of a rapid evaluation of the quality of cover concrete at several days just after demolding. The study can solve typical problems of NDT methods related to the high moisture content in concrete. In practice, the WIST method can be used to assess the quality of workmanship during the construction of durable concrete structures.

Chapter 7 described an investigation to determine the influence of several temperature regimes on the results of three nondestructive methods including Torrent air permeability, surface water absorption test (SWAT), and WIST. The results indicated that, under temperature changes, the corresponding changes in surface moisture content is main reason explaining for the changes in air permeability and water absorption. In particular, the observed good relationship between the air permeability and water absorption. This critical result can provide a flexible approach for evaluating the performance of concrete in case of knowing one of two parameters.

Chapter 8 provides a novelty approach to service life prediction of steam-cured concrete utilizing in-situ air permeability measurements. The first stage of the study presents an in-situ air permeability measurement approach to evaluate the carbonation resistance of steam-cured concrete. The results indicate that the air permeability coefficient measured by Torrent testers (kT) and the repetition number of water spraying measured by WIST (rW) are good indexes for predicting carbonation resistance of steam-cured concrete. In the second stage, an application of the kT and rW indexes for predicting the service life of steam-cured concrete is demonstrated on mock-up box culvert elements produced in a precast concrete plant.

Chapter 9 stated the conclusion of this research. Recommendations for future work were also provided herein.

The examining committee members evaluated that the dissertation met the standard of excellence expected of a doctoral candidate at Hiroshima University.

備考：審査の要旨は，1,500字以内とする。