시멘트페이스트의 영계수에 기초한 콘크리트 영계수의 평가법
Determination of the Static Young's Modulus of Concrete from the Young's Modulus of Cement Paste

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Abstract

The Static Young's modulus of concrete is an important factor, as well as creep, for evaluating the long-term internal stresses of a concrete dam. This paper therefore proposes a method of predicting the Young's modulus of dam concrete made using moderate-heat portland cement. Assuming that concrete is a two-phase material composed of cement paste and aggregate, the Young's modulus of concrete is calculated based on the composite theory. Here, the Young's modulus of hardened cement paste is evaluated from an experimental equation considering unbound water, which is affected by the degree of hydration of cement, whereas the Young's modulus of aggregate is estimated from the amount of water absorption. The static Young's moduli of concretes in existing dams are measured for comparison with those calculated based on the composite theory, and proven to agree well with the calculated values.

Keywords: Young's modulus of dam concrete, Composite theory, Young's modulus of hardened cement paste

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강상형교의 신뢰성기반 설계 최적화
Reliability Based Design Optimization of Steel Box Girder Bridge

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Abstract

This paper presents the method to solve reliability based design optimization (RBDO) of steel box girder bridge using computer program which is developed by integrating Matlab optimization toolbox and reliability analysis subroutine. The cost functions considered in the optimization process consist of initial cost and failure cost. All behavior and side constraints are formulated base on American Association of State Highway and Transportation Official (AASHTO) LRFD code, reliability constraints are formulated in term of ultimate and service limit state functions. The general procedure of optimization analysis is proposed and applied to the simply support steel box girder bridge with reinforced concrete slab. In the optimization process, the steel box girder is represented by a number of deterministic design variables including the depth of girder, the thickness of web, top flange, and bottom flange. Sensitivity analysis is performed for investigation the effect of span length and target reliability index level on the optimum solution.

Keywords: Steel box girder, Reliability based design optimization, Probability of failure, Failure cost, Structural reliability

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