

# Strength Evaluation on the Basis of Linear Buckling Analysis of Concrete Shells with Carbon Fiber Reinforcement

by

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(Received on Aug.17, 2004, accepted on Dec.2, 2004)

## Abstract

The main purpose of this study is to investigate the strength evaluation of concrete shells on the basis of linear buckling analysis. The ultimate strength of concrete shells is not easily evaluated, because of the requirement of expensive experiments or complicated numerical analysis. However, strength evaluation on the basis of linear buckling analysis, as proposed by the revised version of the IASS Recommendations, could predict ultimate strength with rough precision. Therefore, in this study, ultimate strength evaluation by stability analysis is investigated with consideration of an initial imperfection corresponding to an actual shell thickness fluctuation. An effective initial imperfection for predicting ultimate strength is investigated and an initial imperfection ratio with consideration of the actual shell thickness fluctuation is presented. For this purpose, hemispherical shells fabricated from concrete reinforced with mixed-in carbon fiber chips and cylindrical shells fabricated from concrete reinforced with chips and sheets of carbon fiber were investigated. The results of ultimate strength evaluation by numerical analysis are discussed on the basis of the failure experiment applied to small-scale shell specimens..

**Keywords:** Concrete Shell, Stability Analysis, Strength, Carbon Fiber Reinforcement

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