

Structural Reliability of Existing Structures: A Case Study

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Abstract : A reliability-based methodology for the analysis assessment and evaluation of reinforced concrete structural elements of concrete structures is presented herein. The results of the reliability analysis and assessment for structural elements are verified by the results obtained from the deterministic methods. The analysis outcomes of reliability-based analysis are compared against the safety limits of the required reliability index β according to international standards and codes. The methodology is based on probabilistic analysis using reliability concepts and statistics of the main random variables that are relevant to the subject matter, and for which they are to be used in the performance-function equation(s) related to the structural elements under study. These methodology techniques can result in reliability index β , which is commonly known as the reliability index or reliability measure value that can be utilized to assess and evaluate the safety, human risk, and functionality of the structural component. Also, these methods can result in revised partial safety factor values for certain target reliability indices that can be used for the purpose of redesigning the reinforced concrete elements of the building and in which they could assist in considering some other remedial actions to improve the safety and functionality of the member.

Keywords : structural reliability, concrete structures, FORM, Monte Carlo simulation

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