Structural Reliability Analysis and Prediction

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Structural reliability has become a discipline of international interest, addressing issues such as the safety of buildings, bridges, towers and other structures. This book addresses the important issue of predicting the safety of structures at the design stage and also the safety of existing, perhaps deteriorating structures. Attention is focused on the development and definition of limit states such as serviceability and ultimate strength, the definition of failure and the various models which might be used to describe strength and loading.

Much consideration is given to problem formulation and to the various techniques which can be applied to problem solution. These include the First Order Second Moment method and their derivatives, as well as various Monte Carlo tchniques. Each of these are described in considerable detail and example applications are given. Structural systems are also described, as is the effect of time on reliability estimation, and on the development of design code rules on the basis of limit state principles as under-pinned by probability theory. Furthermore, procedures for the reliability estimation of existing structures are also included.

The book emphasises concepts and applications, built up from basic principles and avoids undue mathematical rigour. It presents an accesible and unified account of the theory and techniques for the analysis of the reliability of engineering structures using probability theory. A balanced view of the subject is offered here not only for newcomers, but also for the more specialist reader, such as senior undergraduate and post-graduate students and practising engineers in civil, structural, geotechnical and mechanical engineering.

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