

Theses

- The expense of modelling und calculating to dimension steel structures is an economical problem of civil engineering. Its extent depends on the largeness of load-bearing structures and the degree of difficulty of their dimensioning.
- The improvements of partial safety factors and load combination rules which go beyond the modern design codes, e.g. the Eurocodes, are limited by the practical usability of semi-probabilistic concepts.
- With the help of pre-set target values of failure probability and the corresponding reliability index generally accepted comparative levels for the application of probabilistic assessment of structures are defined according to reliability classes, reference periods and mode of limit state. Rules for probabilistic design are not included in the Eurocodes.
- Since the quantification of the parameters within the significant extreme value range comes up against limiting factors in the general practice of civil engineering, the reliability based assessment of structures requires qualitative advances in the stochastic determination of time-variant variables.
- Present concepts of future probabilistic model codes should be specified with regard to the methodical and sophisticated stochastic modelling of climatic actions, such as ground snow load and wind speeds, which can be described by largely dispersed values over a long period of time.
- In this work, structural reliability based assessment is achieved by combining a deterministic finite element approach and established probabilistic analyses. The established design criteria of stress and stability of steel structures still apply.
- For the design of steel-framed structures that are predominantly stressed by static loads important variables of resistance, stiffness and actions can be described appropriately by stochastic models. Detectable dependencies between various basic variables are described by correlations.
- Stochastic model parameters of climatic actions can be determined by applying established methods of extreme value statistics or, alternatively, by using other modern methods of descriptive statistics. The insufficiency of limits periphery from measured data sets can be taken into account by quantifying the uncertainty of random samples.
- Upper threshold values for models of uncertainty of snow load and wind speeds are physically fixed. With reference to extreme guest wind speeds it is illustrated that such a threshold value exists nationally.
- Taking stochastic parameters of time-variant actions that are typical of certain locations as a basis, the probabilistic design of selected steel-framed structures make a sophisticated assessment of serviceability and ultimate limit states possible.