

Summary

The paper starts by describing and exemplifying the new design method. An elementary survey of probabilistic methods (first order second moment theories) used in normal structural design is given.

The safety analysis of fire-exposed structures begins with the procedure critical in every reliability evaluation; the assessment of underlying uncertainties.

The paper presents a general systematized scheme for the identification and evaluation of the various sources and kinds of uncertainty possible for a fire-exposed building component.

To get applicable and efficient final safety measures, the investigation comprises one specified structural element, an insulated simply supported steel beam of I-cross section as a part of a floor or roof assembly. The chosen statistics of dead and live load and fire load density are representative for office buildings.

With the basic data variables selected, the different uncertainty sources in the design procedure are identified and dissembled in such a way that available information from laboratory tests can be utilized in a manner as profitable as possible.

Summing up, this pilot study has demonstrated that a safety analysis, using probabilistic methods, of fire exposed structural steel components, is today well within the bounds of possibility.

The implication is that one of the main components in the overall firesafety problem for the first time has been rationally assessed, thus opening the way for an integrated system approach with a reliability optimization as final objective.