Reliability of Structural Reliability Estimation

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Abstract

Engineers are rightfully concerned with the reliability of the estimation of structural reliability. It has been demonstrated in several studies that the reliability, and its complement to unity, the probability of failure, are extremely sensitive to

a) modeling errors, i.e. the errors associated with use by deterministic theories of various levels of approximation,

b) numerical errors,

c) errors in the data.

This paper is devoted to an investigation of the second of the above topics.
Namely we will address the following question: how the numerical approximation is affecting the resulting reliability? We will also discuss some non-probabilistic approaches in this context: namely, fuzzy sets based approach, convex modeling of uncertainty, as well as interval analysis.

Pertinent comments will be also made about the modeling errors as well as the error in data.