A reliability analysis method for structures with correlated

parameters using vine copula

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Correlation analysis is of great importance in structural reliability analysis. This work presents a new method to conduct structural reliability analysis involving multidimensional correlated input random variables. The vine copula model is adopted to construct the joint Cumulative Distribution Function (CDF) of the input variables. The correlation parameters between variables are calculated from the samples using Maximum Likelihood Estimation (MLE), and the best copulas between variables are identified by the Akaike and Bayesian Information Criteria (AIC and BIC). Finally the reliability result is computed by using a Rosenblatt-based Monte Carlo simulation. The computational results of numerical examples indicate that the presented method has a higher precision than the existing methods for reliability analysis with correlated parameters.

Keywords: Structural reliability, Vine copula, Parameter correlation, Monte Carlo simulation