**Estimation of structural reliability in consideration of high-dimensional non-Gaussian random variables**

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**Abstract.** Accurately estimating the failure probability, i.e., structural reliability of a structure, is of great importance to ensure its safety in a conservative way; however, in reality, this is particularly challenging due to the high dimensionality of input variables and the non-normal nature of variable distributions. Therefore, this study develops a two-stage method based on the modified Metropolis-Hasting and Box-Cox transformation algorithm to address the above challenge. In the first stage, the Box-Cox algorithm is leveraged to transform non-Gaussian random variables into new variables with approximately normal distributions. Next, the modified Metropolis-Hasting is leveraged to estimate and plot the failure probability evolution curve in the function of the limit-state threshold using transformed variables from the first stage. The viability of the proposed method is demonstrated via a case study of a 2D frame structure with up to 30 random variables. Obtained results reaffirm the efficacy and efficiency of the proposed method as it can provide highly similar results with the standard Monte Carlo simulation but with orders of magnitude less computational time.

**Keywords:** Structural reliability, Markov chain Monte Carlo, Simulation, non-Gaussian