

Postprint of Structural Reliability Analysis Method Based on Improved Flexible Tolerance Method

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Abstract

HL-RF (Hasofer-Lind and Rackwitz-Fiessler) method exhibits oscillation and non-convergence issues when handling highly nonlinear structural performance functions. While the variable tolerance method can effectively address these problems, the selection of reflection points in this method lacks directional guidance. To remedy this deficiency, this paper proposes a variable tolerance method that enhances the reflection base point through weight analysis. The method first computes the distances from non-worst points to the origin in the standard normal space, and increases the weights of points closer to the origin, thereby strengthening the directional guidance of the reflection base point and enabling iterative points to converge more rapidly toward the failure point. Numerical examples demonstrate that the proposed method effectively resolves the issue of reflection points lacking directional guidance and offers significant advantages in computational efficiency.

Full Text

Preamble

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Note: Figure translations are in progress. See original paper for figures.

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