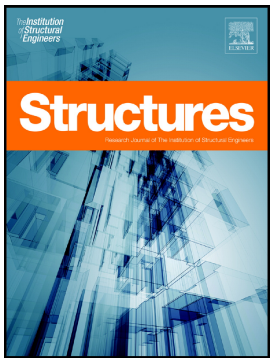

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Improvement in first-order reliability method using an adaptive chaos control factor

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ABSTRACT

The Hasofer-Lind and Rackwitz-Fiessler (HL-RF) method in structural reliability analysis is a popular iterative method for computation of reliability index. However, when the nonlinearity of a problem increases the method may encounter numerical instability. Chaos control can be used to overcome the instability of HL-RF but it lengthens the computation process. In this paper, numerical instability of HL-RF is to be removed by chaos control concepts, but with focus on keeping the relative efficiency of the algorithm and avoiding large number of iterations. By representing a criterion, the chaos control factor can vary during the computation process and therefore it does not have to be a small fixed value from the beginning of the whole procedure. This can reduce the number of iterations in highly nonlinear cases. The accuracy and efficiency of the proposed algorithm will be shown through various nonlinear numerical examples.

Keywords: *Reliability index; HL-RF method; Chaos control; Stability transformation method.*

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