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On The Evaluation of Multiple Failure Probability Curves in Reliability Analysis with Multiple Performance Functions

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Highlights

- Many systems have multiple failure modes that result in multiple performance functions.
- A new stochastic simulation based approach is proposed for evaluation of multiple failure probability curves in a reliability problem with multiple performance functions.
- The proposed approach generalizes the Subset Simulation and is an improvement of the Generalized Subset Simulation.
- The proposed approach is robust with respect to the dimension of the failure probability integral, model complexity, the degree of nonlinearity, number of performance functions, and efficient in cases involving the computation of small failure probabilities.
- It is shown that the total number of conditional samples required at each level of simulation is directly proportional to the area of the failure region, that is, the union of individual failure regions.

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