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Title: Importance sampling strategy for oscillatory stochastic processes

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Abstract: This paper contributes to the structural reliability problem by presenting a novel approach that enables for identification of stochastic oscillatory processes as a critical input for given mechanical models. Identification development follows a transparent image processing paradigm completely independent of state-of-the-art structural dynamics, aiming at delivering a simple and wide purpose method. Validation of the proposed importance sampling strategy is based on multi-scale clusters of realizations of digitally generated non-stationary stochastic processes. Good agreement with the reference pure Monte Carlo results indicates a significant potential in reducing the computational task of first passage probabilities estimation, an important feature in the field of e.g. probabilistic seismic design or risk assessment generally.

Author Keywords: Stochastic process, Critical excitation, Reliability analysis, Importance sampling, Image processing, Pattern recognition, Identification problem

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