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SENSITIVITY OF RELIABILITY-BASED OPTIMUM DESIGNS: IMPLEMENTATION TO STOCHASTIC LINEAR SYSTEMS

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Reliability-based optimization (RBO) procedures provide the most efficient structural designs satisfying standard and reliability requirements. In this context, characterizing the effect of model parameter perturbations on final designs is relevant for decision making processes. This contribution presents a framework for the sensitivity assessment of reliability-based optimum designs in the context of linear dynamical structural systems subject to Gaussian excitation. A method based on an equivalent direction-finding problem [1] is adopted to quantify the sensitivity of optimum designs. In addition, Directional importance sampling (DIS) [2] is adopted as reliability and sensitivity assessment technique. This enables a sequential optimization technique based on a class of feasible-direction interior-point algorithms [3] to solve the RBO problem in an efficient manner. Overall, optimum design sensitivity measures are obtained as a post-processing step of the optimization results. A numerical example is presented to show the usefulness and potential of the proposed framework.

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